

# THINK LIKE AN ARCHI- TECT

How to Develop Critical,  
Creative and Collaborative  
Problem-solving Skills

RIBA 

Randy Deutsch

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Creative and Collaborative  
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RIBA Publishing

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## Dedication

This book is dedicated to  
encouraging you to become  
someone a human, machine or robot  
would want to collaborate with.

## Preface

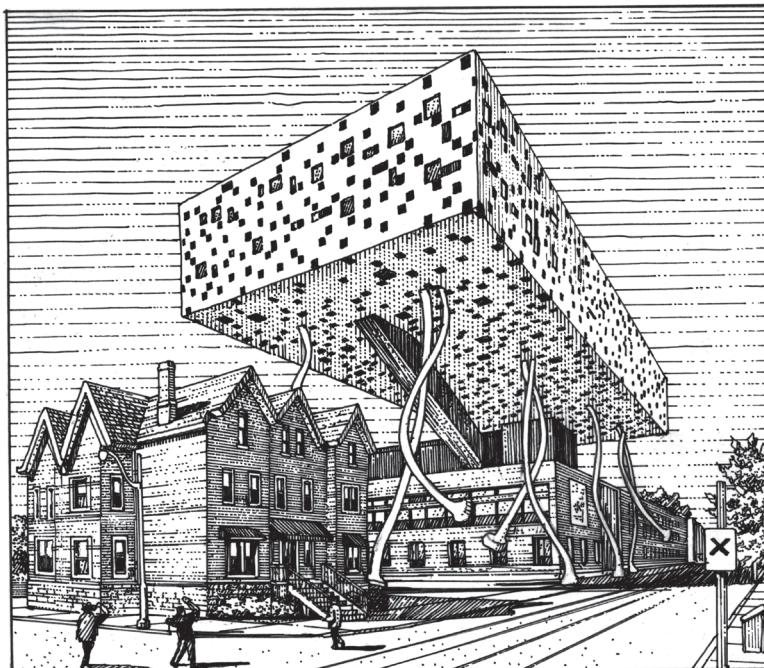


Fig 0.1: Architects think in pretty remarkable ways. Sharp Centre for Design  
by Will Alsop by way of Little Nemo in Slumberland by Winsor McCay

'But what is seeing without thinking?'  
Johann Wolfgang von Goethe

There is something your tutor or professor, school administrator or employer want you to know that they can't tell you:

*You may be talented as a designer and adept using the latest technology, but you have some room for improvement when it comes to the oldest technology: thinking.*

One area that students, professors and practitioners typically struggle with is tacit knowledge. Knowledge that professionals gain over time but have difficulty explaining – knowledge that you either have or don't. Most students and emerging practitioners can grasp technical skills fairly readily. Soft skills, on the other hand – including mindsets, attitudes and thinking skills – are rarely covered in university courses or training in practice.

There is evidence that today's students and emerging practitioners struggle with thinking and communicating their ideas, and learning and acquiring soft skills, multiplied by the decrease in mentoring of the upcoming generation by firms' more senior members. Yet mastery of such tacit knowledge is arguably critical for both academic success and career longevity. This book addresses both this dearth and dichotomy.

School's absolutely the right place to emphasise the combination of critical thinking, creative thinking and interpersonal intelligence. A school's ability to blend or fold such vital content into other courses is a sign of both the course's – and the school's – relevance and ability to sustain itself into the future.

*Think Like an Architect* is about the ordinary work required by you to achieve extraordinary results. I wrote it to share insights, strategies and skills picked up over my career as a practising architect, employer, professor and administrator, backed by science and the research of others. Between these covers is a world of ideas that will make everything you do and say about what you do better. The only technology required is that found between your ears.

One tool we often overlook is the human mind, the most powerful tool we possess. The problem comes when we trust our instincts without questioning our assumptions or seeking evidence to back up our hunches. This book is here to help.

Why do we continue to design buildings that ought to last decades without the capacity to accommodate all users on day one? Or design using the latest computational design tools but forget to show the surrounding context in our design studio presentations?

Why are reason, science and evidence so ineffective against magical thinking? Why is it so difficult to influence people's deeply held beliefs? Are ethical beliefs more like facts or more like preferences? How can we focus on long-term thinking when so many who we design and build for are focused on short-term thinking?<sup>1</sup>

While architecture is both a science and an art, architects and future design professionals have to be above the fray and can't afford to engage in magical thinking. We have a duty to others – building users, neighbours, the public-at-large and not-yet-born future generations; the planet and its inhabitants. Even as the role of the architect faces an existential threat with the rise of technology, the way architects think ought to be preserved, practised and perpetuated.

## Why think like an architect?

I am interested in the way architects think, the value that brings to the profession, and have done a lot of thinking about thinking – aka *metacognition* – lately, and this book is the result. It will encourage the development of your own metacognitive abilities to spur your cognitive growth and career trajectory.

*Think Like an Architect* is about the way architects think critically, creatively and collaboratively to address the increasingly complex problems facing us all. For some readers this will be a refresher. For others this will help connect

the dots. For others still it will offer nuanced and myriad ways in which the architect adds value by the way they think.

Buildings, and the process of building, have become increasingly complex undertakings, and there are several societal and industry challenges that could be overcome – including wicked problems where the answer either does not exist or is not readily apparent – if the reader had access to the information this book provides. The world today is filled with intractable, complex, wicked problems without obvious solutions. The insights, mindsets and thinking tools presented in this book will go a long way to help the reader address intractable wicked problems such as climate change, the health and wellbeing of the larger population, and urban issues, while addressing the deterioration of our infrastructure. Addressing these complex problems requires navigating and getting results from diverse teams, which in turn requires us to think in terms of others.

Writing this book at a time of great upheaval, challenges to our wellbeing, and change ought to make acquiring the act of thinking critically, creatively and collaboratively all the more urgent. We're living in a world with rising use of AI and machine learning; machines that think. Technological disruption and change makes the need to think effectively all the more urgent. Our increasingly intelligent tools may be optimised based on criteria we establish, but all lack common sense – something that humans have in abundance.

To think like an architect prepares you for the world to come: the world of robots, automation, autonomous design, AI and machine learning, but also a world of mass migration, housing shortages, rising oceans and other impacts brought about by climate change. With the rise of AI and robots, process-driven tasks and jobs are going away. Creative and soft skills (i.e. empathy, collaboration) are more important than hard skills, since they are precisely the skills robots can't automate. In the era of AI students need to rely on their thinking ability.

## Future skills vs capabilities

Continuously evolving economic, technological and social changes will inevitably impact the employment marketplace long after you leave school and begin your career.<sup>2</sup> Students attend architecture school for a variety of reasons: to learn how to design buildings; to learn how to practise architecture; to acquire marketable skills. But less frequently students pursue a degree to foster human capabilities that go beyond skill building.

This book has ‘skills’ in the subtitle, but it easily could have read *capabilities*. Why? If architecture school better equips students, job seekers, and future career professionals for the realities of the twenty-first-century economy, it does so not just by focusing exclusively on acquiring marketable skills, but on investing in human capabilities like critical, creative and collaborative thinking.<sup>3</sup> Many of the skills architects have today will in time become obsolete, whereas their capabilities – to place buildings in a larger context, to propose

and develop alternative outcomes, and to apply creative thinking to achieve improved results – will endure, likely becoming even more important than any individual skillsets.

In my most recent book, *Superusers*, readers were encouraged to address the future with both confidence and aplomb. The book urged them to be open to acquiring new technology skills while honing their soft skills, demonstrating how so-called *superusers* have done so with substantial and meaningful career success.<sup>4</sup>

We often receive advice to ‘futureproof yourself’ by keeping your eyes open (on what?), becoming indispensable (how?) and staying abreast of the latest trends in technology (which?). Stay relevant and valued in school and in the workplace? OK. But how? Without offering specifics or addressing practical realities, this well-intended advice amounts to little more than platitudes at best, and at worst conflicting and confusing career advice.<sup>5</sup>

Three current capabilities happen to be among the most sought-after by professors, architecture school administrators and employers to thrive into the future: the ability to think critically, creatively and collaboratively<sup>6</sup> – and demand for these skills is only increasing.<sup>7</sup> In other words, to stay relevant and avoid career obsolescence, focus less on what you do (skills) and more on how you *think* (capabilities).<sup>8</sup>

What is it about the architect that no machine can replace? This is the question that *Think Like an Architect* seeks to answer. There are critical thinkers and creative problem solvers as well as collaborative thinkers, but few beside the architect bring this triple-threat combination of thinking abilities together in one person. This book is less a celebration of this fact than an assurance that these qualities continue. This book will help you recognise these thinking capabilities in yourself and show you how to build them into your own unique repertoire or toolbox. To assure your continued relevance, think critically, creatively and collaboratively – think like an architect.

## Why read a book like this?

Many books focus on what to think. This one focuses on *how* to think, providing a foundation and establishing good thinking habits early on. The focus throughout is on the thought process – to help designers design better and present their ideas more effectively, and to think more rigorously, logically, thoroughly, creatively, intuitively, and in tandem with the thinking of others.

*Think Like an Architect* is the book I wish I had read when I was just starting out, represents what I want my students to be aware of before they are my students, and what I want emerging professionals to understand before joining the firm.

There are books on how to design buildings, detail buildings, draw buildings, understand buildings and become an architect. There are videos and books on how to write, speak, read, sketch, draw, travel, act, shop at a flea market (go on, google it) and dress like an architect. But no book that focuses on the ways an architect thinks.

A primary purpose of this book is to fill your thinking toolbox with easy-to-access tools. Thinking like an architect is a learnable behaviour with the tools to become a lifelong habit. This book is about you and what you bring to your classroom discussions, studio projects, research and job interviews, as well as the unexpected serendipitous situations that open doors for you in your career as you evolve from being a student to a contributing design professional. *Think* will challenge you to higher levels of critical and reflective thinking, increasing your tolerance for ambiguity and uncertainty, and enable you to gather, analyse and synthesise information.<sup>9</sup>

College students are falling behind. The book *Academically Adrift: Limited Learning on College Campuses* reported that critical thinking is no longer progressing during college compared with previous generations of students.<sup>10</sup> When young adults between the ages of nineteen and thirty (both current college students and recent graduates) were given a test designed to test their ability to detect fake news, only 24% were able to correctly answer eight out of nine questions; 44% could not correctly answer six out of nine questions.<sup>11</sup> There is a gap in learning – and this book seeks to fill this gap.

This book serves as a roadmap for what questions to ask along the way: of yourself, of your project, of your instructor and critics; how to make the most of your situation and education. Those who learn how to think critically, creatively and collaboratively earlier in their academic or professional career will become more effective, resilient and sought-after problem solvers no matter the application, field or interests.

Becoming an architect takes time. It's not like you start out in architecture school establishing a foundational vocabulary – line, plane, mass, volume, form, shape, space – then *yada yada*,<sup>12</sup> you're designing and building skyscrapers. No book can provide all of the *yada yada* – that can come only from education – including reading and experience. This book aims to fill in the missing links.

## How to read this book

'Sometimes, first you think and then you do; and sometimes first you do and then you think.'

Olivo Ferrari<sup>13</sup>

Architects tend to work fluidly, iteratively – between the rational and intuitive – and aren't excited by the notion of working with action plans or checklists. Consider what is presented in this book more as insights to shape your mindset than presenting steps in a design method.

The book is divided into three parts:

PART I: Critical Thinking

PART II: Critical Creative Thinking

PART III: Critical Collaborative Thinking

Each part has three sections. Why critical thinking first? IF you think critically first, your creative thinking will be grounded in reality. This will improve your design and help you to be more effective. In truth, it doesn't matter where you start, as long as you pass through all three.

Why *critical* creative thinking? Because architects take their creativity critically. Too often creative thinking is thought of, incorrectly, as being right-brained (it's both right *and* left, or *whole-brained*) intuitive, fantasy-based, visual thinking. The way architects think creatively goes beyond these – and has to – because what they come up with has to work, be buildable, using available materials and labour; it has to protect the health, safety and welfare of those who use it and live in and around it; it has to come within budget and schedule; it has to address its context, it cannot use too much energy. In other words, architects – unlike artists – need to think critically even about their creative output.

There are critical thinkers and creative thinkers. Few bring the two together in one person as well as the architect. This book emphasises both critical and creative thinking so that one's solutions are both sound and unexpected. By the end of this book it is my hope that you will agree we all need to start thinking like an architect, because it will become increasingly necessary to do so in light of the rise of machines, sea levels, AI and the deluge of information.

Each chapter that follows concludes with a set of useful questions, reading suggestions and practical tips to try – ASK THIS, TRY THIS, READ THIS – aimed at students and emerging professionals who are interested in improving the quality and outcomes of their thinking. The practical tips are short and simple so they're easily digested. Here's an example from the Critical Collaborative Thinking section on *Thinking Like Others*:

---

**TRY THIS —**

Make it your aim to know how others think, know what others do in the process, so you know who to go to when you're in need of information that you don't possess or have access to. As a generalist, specialise in people. Zoom out to better see connections and join the dots. Appreciate specialists but be the one who actively seeks to get them out of their silos to solve holistic problems with common sense solutions. Know just enough to be able to communicate the overall contours of the assignment, the problem you are trying to solve, and your ideas – then strive to get others including stakeholders involved in helping you solve it.

To address the most challenging of problems – problems that you have never faced before – and to be assured, indeed confident, that your ability to think, to gain insights, and to imagine, is commensurate to any problems you may face. And not just any problems – *open-ended* problems without easy solutions. *This* is what it means to think like an architect.

## Introduction: Solving Wicked Problems

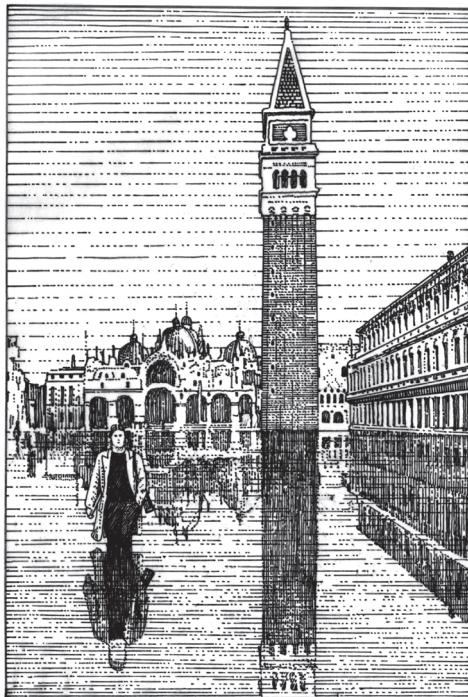


Fig 0.2: The rapidity of climate change has led to sea level rise

The past decade was the warmest ever recorded.<sup>14</sup> The rapidity of climate change that has led to sea-level rise, the scale of massive extinctions, acidification of our oceans, slow-decay pollutants, contamination of fresh water, and industrialisation, to name just a few, are realities we as inhabitants of this planet all must face.<sup>15</sup>

We live at a time with increasingly intractable unsolvable problems. Fortunately, as you are about to witness in this book, architects think in pretty remarkable ways.

Instead of feeling helpless, understanding and applying how architects think can empower you in the face of wicked problems. The kinds of problems architects face – dwindling natural resources, climate change and its repercussions, overpopulation – will keep them busy for the foreseeable future.

Learning how to think like an architect enables you to address and solve wicked, complex, intractable problems – aka non-obvious problems without a single, definitive solution – and apply what you learn to other future, not-yet-imagined problems.

Design technology and software are all just tools in your virtual toolbox. Three tools that are often missing from the designer's toolbox are critical

thinking, creative thinking and collaborative thinking – tools that will give you an edge and act as differentiators throughout school and well into your career. They're the focus of this book.

Even more than these thinking tools, this book is about you – what you bring to these thinking tools. And thereafter, what you bring to class: to classroom discussions; to studio projects; to lectures; and, later still, to job interviews, and your first assignments at work.

Challenges the world is facing are due to pervasive and accelerating change including climate change, poverty, inequality and the need to house refugees will all require the architect's thinking capabilities: not only to think critically, creatively and collaboratively, but quickly, assuredly, and with care, quality and conviction.

In other words, they will require all of us to think like an architect.

Wicked problems can be found when people come together to improve a site, situation or condition. As you'll read in the book, architects are ideally suited to:

- address inevitable density in cities without resorting to high-rises
- house the homeless in high-rises so that they are people-friendly
- locate millions displaced by immigration, including refugees
- design for rising sea levels due to climate change
- convince others that climate change is real and worth paying to ameliorate.

In a later chapter we'll revisit the topic of wicked problems, but here let's just look at the fact that buildings account for one-third of global carbon emissions, energy consumption and waste.<sup>16</sup>

Seventy per cent of greenhouse gas emissions in the world come from the built environment – with buildings alone making up close to 40% of CO<sub>2</sub> emissions.<sup>17</sup> The last four years (at the time of writing) were the four hottest on record, and winter temperatures in the Arctic have risen by 3°C since 1990.<sup>18</sup> The latest analysis shows that if we act now, we can reduce carbon emissions within twelve years and hold the increase in the global average temperature to well below 2°C – and even, as asked by the latest science, to 1.5°C above pre-industrial levels.<sup>19</sup>

Roughly 11% of the global carbon footprint is related to what buildings are made out of.<sup>20</sup> Take concrete, third only to water and stone as the Earth's most used material and the second-largest producer of carbon dioxide (CO<sub>2</sub>), with manufacturing of cement accounting for 8% of total CO<sub>2</sub> emissions.<sup>21</sup> This has architects and others turning to alternatives that are better for the environment.

Artificial intelligence and machine learning, cloud-based and quantum computing, additive manufacturing and nanofabrication, advanced automation and robotics – these disruptive technologies are already impacting every industry.<sup>22</sup>

The key components of critical thinking for design professionals include:

- asking questions to gather relevant information
- identifying biases and minimising their influence
- evaluating all available data relevant to the situation or problem
- asking for feedback and collaborating with those involved in the situations, including people with different backgrounds, perspectives and knowledge specialities
- generating a variety of possible solutions and determining the optimal implementation, given the desired consequences.<sup>23</sup>

Coinciding with your career, over the next forty years it is estimated that nearly 2.5 trillion square feet of new construction will be needed to support growth in the world's increasingly dense urban areas.<sup>24</sup>

Sea levels are rising, coral reefs are dying, and we are starting to see the life-threatening impact of climate change on health, through air pollution, heatwaves and risks to food security.<sup>25</sup>

Virtually every country is experiencing an increase in the number of older people – those aged sixty and over – in its population. An ageing population will have implications in terms of housing of the elderly.<sup>26</sup>

When it comes to atomic energy, more than thirty countries worldwide are operating 444 nuclear reactors for electricity generation, and sixty-six new nuclear plants are under construction. In 2014, thirteen countries relied on nuclear energy to supply at least one-quarter of their total electricity.<sup>27</sup>

Climate change is one of the major challenges of our time. From shifting weather patterns that threaten food production, to rising sea levels that increase the risk of catastrophic flooding, the impacts of climate change are global in scope and unprecedented in scale.<sup>28</sup>

In response to climate change, architects must design for rising sea levels, and the impact this will have on communities and entire regions where people live and work.

Today, more people than ever before live in a country other than the one in which they were born. The world is witnessing the highest levels of displacement on record. An unprecedented 59.5 million people around the world have been forced from home. Among them are nearly 20 million refugees, over half of whom are under the age of eighteen.<sup>29</sup>

In response to decolonisation and immigration, architects will not only be needed to design housing for the Earth's rising population, but also for refugees and displaced people around the globe.

## Thinking about the thinking that will be required of us

There are books on how to design buildings, detail buildings, draw buildings and understand buildings. There are books devoted to detailing to keep water out and to building a thriving practice, but no book that focuses on thinking like an architect.

Frankly, we have bigger fish to fry. While most architects come to discover that a bathroom redo for a discriminating client can be as challenging to design as a high-rise – and client relations, customer service and being a trusted adviser will always be important – the world won't wait or be put on hold. You, future architect, were meant for bigger things.

Why architects? Because of your passions and the way you were trained and educated – and are therefore comfortable with ambiguity and uncertainty – you can take on and tackle difficult-to-define, seemingly unsolvable problems. It's what we *do*.

In fact, by definition *an architect is someone who is asked to do impossible things they know nothing about*.

And they don't let that stop them. They leverage critical thinking to ask pertinent questions, and separate facts from fiction. They leverage creativity to propose previously unconsidered solutions and have the wherewithal to evaluate until they arrive at one that is effective and amenable to all involved – including those not represented at the table (or even yet on the planet). They leverage their vast network to assure that the decision is informed and backed by experience and sound judgement, and can indeed be acted on and implemented. They, in other words, think like an architect so as not to be overwhelmed by the near-constant bombardment of seemingly impossible problems that demand to be solved.

## A rejection of rational thinking

The world today has become a far less rational place. The fact that you have an architectural education doesn't guarantee that you will think rationally or critically once out of school.

An acceptance of critical thinking and, conversely, the rejection of the subjective, emotional and irrational thinking as acceptable criteria for decision-making, only comes with deliberate, conscious choice and some significant effort.<sup>30</sup> In other words, it requires us to rethink the way we think.

Architects are rightfully encouraged to use simpler, non-technical terms and are justifiably chastised for speaking in a way that is understandable to fellow

professionals but hard to follow by nearly everybody else. And yet, urged to simplify, they risk over-simplification, and the diminishment of critical thought – so they strike a balance by leveraging multiple thinking types at once.

Instead of the exclusive use of rationality to get their message across, architects utilise other thinking types, including creative thinking to help others understand and accept their ideas.

Architects, as we'll see, are masters at thinking like others and, in doing so, shape both the content of their message and the terms in which it is delivered, so as to be better understood and ultimately reach consensus on the decision at hand.

Instead of dumbing down their message, they leverage a form of thinking – collaborative thinking – that helps projects proceed towards an amicable conclusion.

Thinking rationally and critically alone isn't enough today to assure that we'll be understood, that our messages get across and persuade others to act. We also need emotion, creativity and the ability to think like others – attributes that architects possess, having acquired them during years of architectural education and practice. The unique combination of thinking types used by the architect is the subject of this book.

## Mind the gap

The shift from theory to practice is as difficult and unpredictable for the soon-to-be-graduating architecture student as the shift from analysis to synthesis,<sup>31</sup> and represents an inherent conflict where architects find themselves caught between the opposing identities of a service profession where you are expected to meet a client's needs, and a design profession where you are expected to create culturally significant works of architecture.<sup>32</sup>

There's a gap between the theoretical knowledge you learn in school and the practical knowledge you acquire in practice. The *mind the gap* message broadcast at London's underground stations ought to be broadcast to every architecture student who plans on embarking on a career in architecture, because what students are taught in school, and what they need to know to succeed throughout their careers – as many come to discover – can be two entirely different things, and a leap that can be as difficult and unpredictable as the leap from analysis to synthesis.<sup>33</sup> It's the difference in architectural education between knowledge-based development (theoretical) versus skill development (practical).<sup>34</sup>

Architecture school is designed to provide a foundation, establishing good habits to build on. The problem is that design education was never intended to address such a litany of intractable, seemingly unsolvable problems, all occurring at the same time. There are so many problems requiring our attention it is hard to know where to focus. In response to the situation we

find ourselves in today where outcomes are unknown, ‘today’s curricula needs to focus on developing adaptive and agile systemic and integrative thinkers rather than focusing on disciplinary adherence and skill building’.<sup>35</sup>

## What the world needs now

What if architects, due to AI and automation, were to go away tomorrow. How would we describe them? What they did? How they were different from others who purported to perform and deliver similar services? What about them would we want to preserve? What would we want to discard? What about the architect is timeless and ought to continue in perpetuity into the future?

In this book I make the argument that it is the way architects think that distinguishes them and is of the utmost importance to preserve and emulate – no matter your field or calling, or who or *what* in the end will do the designing. Especially now, in this time of wicked, seemingly unsolvable problems. The book argues that the unique way the architect thinks ought to continue. That the world needs this way of thinking now more than ever.

Writing this book at a time of great technological, economic and demographic upheaval, with challenges to our wellbeing, and near-constant change, ought to make acquiring the act of thinking critically and creatively all the more urgent. The focus here isn’t on the design or even the designer, but on the thought process – to help designers think better as a means to designing better solutions.

## What’s past is prologue

In the section that follows, the prologue paints a picture of what it will look like once you have internalised the lessons in the book. While fictional, this critique represents what goes through the mind of an architect when evaluating someone’s work. It also represents a simplified account of what goes through the mind of an architect when designing. Simplified, because questions concerning cost-effectiveness, time constraints, availability of materials and labour and more would normally need to be taken into account. It is clear, whether designing or evaluating, architects have to think of *everything*. Granted, they don’t have to *know* everything – for example, they don’t need to be experts in crowd control or on the impact of monsoons on public plazas – they just need to know enough to be able to ask questions. They need curiosity. They need imagination. They need a network they can turn to for feedback and for timely responses to their enquiries. And most of all, they need to know how to think.

## Prologue: How to Think Like an Architect in Under Three Minutes

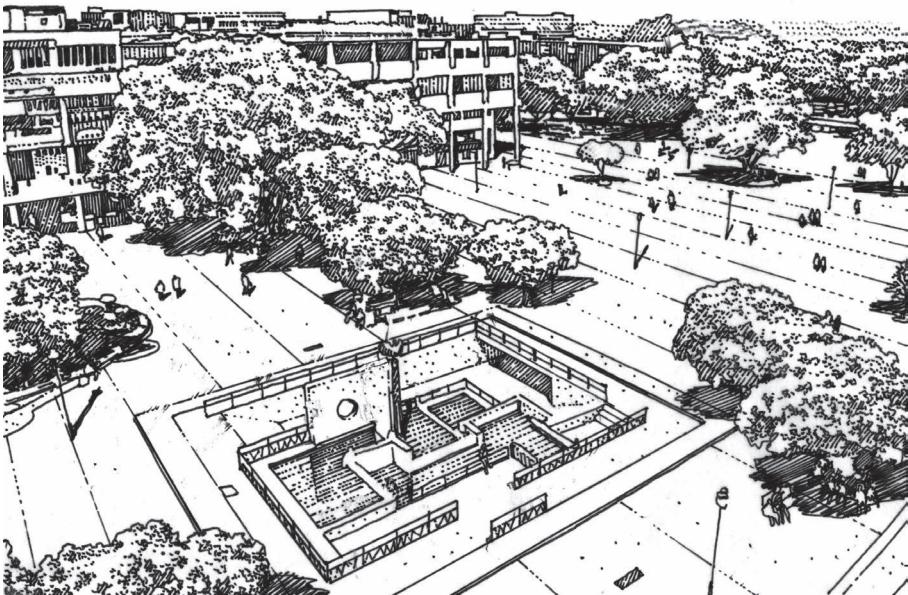


Fig 0.3: Retail designs were proposed for the commercial sector of Chandigarh, India

At the last minute a tutor volunteers to critique the four-week assignments of ten second-year students in the Strategies of Architectural Design course.

Reviewers are given eight minutes to critique the interventions of each student. Their retail designs in Sector 17, the commercial sector of Chandigarh, India, include the student's urban analysis, context plan, site section and physical model.

The student presents. Then in the remaining time the reviewer asks questions, providing feedback. When the eight minutes are up, the reviewer moves on and repeats with the next student, until all students have been addressed. Each reviewer has ten students to review. In a row. While standing: a bit like playing chess with ten players blindfolded – the grandmaster playing ten boards simultaneously.

As explained to each reviewer, students have been introduced to the history of the Chandigarh urban plan and have completed some basic urban analysis at the city scale. Their projects comprise an architectural intervention including a covered pavilion for outdoor retail vendors, and seating for 300 people (adults and children) in the existing plaza. Students were asked to pay particular attention to the environmental conditions of heat, sunlight and monsoon rains. Their projects – their *imagined constructed reality* – should respond to the need for shading and protection from the rain, and demonstrate an ability to think about public urban space planning for multiple users and age groups.

The first student presents for five minutes, leaving three minutes – 180 seconds – for the reviewer's feedback.

When it is the reviewer's turn to respond, she starts with what is positive about this student's solution to the assigned problem, followed by a critique, concluding with something positive. A *compliment sandwich*: praise, critique, followed by praise. Lessens the sting, improves the aftertaste. The praise – earned or not – is good manners. It is in the critique (the creamy filling) that learning – if learning is to be had – takes place.

Quickly, the reviewer, using a rubric to organise her succinct feedback, considers *what is actual?* She needs to size up the situation and understand what is existing vs what is the student's intervention (the separation is not always clear). What is the situation this student is entering into and potentially changing with their intervention? The reviewer assesses the site conditions from the site analysis – prevailing winter and summer winds, the best and least desirable views, flows of people to and from the site – and considers how successfully the student's intervention addresses them. Did the student consider how the sun's path could influence the orientation of the pavilion to maximise wanted daylight while shading unwanted sun's rays? Did the student orient the pavilion based on this existing information – or was its orientation based on other forces?

The reviewer asks herself *what is necessary?* She imagines a client – assigns them a persona – to assess their specific needs, answering *what is the general functionality required of this design?* As for necessities, the prompt listed the project's minimum requirements: the covered pavilion for outdoor retail vendors, seating for 300 people in the existing plaza, and engagement with a pre-existing fountain. What are the intervention's space requirements, and how successfully has this student met them?

Without regulations available – zoning ordinances, building codes, environmental regulations – the reviewer supposes the project's health, safety and welfare requirements. Does the seating for 300 accommodate people in wheelchairs? Does the retail pavilion take both children and the elderly into consideration? Did the student coordinate their plans, sections, elevation and model so that the information in each was consistent and clear? If not, the reviewer looks for clues as to which is the latest version of the design. Is there evidence that the student had another pair of eyes – a studio-mate, a friend – look at the presentation before printing?

The reviewer recognises the inspiration for the green roof from an Instagram post that went viral, and wonders if the student looked at books, periodicals or websites devoted to landscape design for additional information. Is there enough depth for the pavilion's green roof? Can people access and maintain it? Will the openings to the pavilion accommodate people's flow and movement? Will the vendors' tables block physical and visual access to the existing retail? That also needs to thrive and can't suffer at the expense of the student's intervention. Did the student study lines of sight

and the visual impact of the intervention to enhance user experience? Does the student's scheme capitalise on prevailing winds, air flow and local air quality? The prompt talked about monsoons and need for shade: how well does this student's solution address these? Did the student consider water management – keeping water out, directing it away from the pavilion and potentially reusing it for the surrounding landscape? Did the student consider how people will approach the pavilion from all directions, how they will experience, circulate within and exit the pavilion as a matter of routine or in an emergency?

With ninety seconds left, the reviewer then considers, *what is desirable?* Beyond actualities and necessities, what would this imaginary client *want*? While only a four-week assignment, did the student consider integrating technologies to complement the efficiencies of the design? Did the student use integrated thinking in the design of their intervention? The pylons holding up the pavilion roof are large enough that they could double as storage or support lighting. Had the student considered this? The reviewer looks to see if there is nearby transit infrastructure – bus stops, bicycle stands, side roads or alleys – to consider the direction that people would approach the intervention from. She considers whether this student's retail intervention solves the client's problems, is strong conceptually and creates a sense of place; whether the design is innovative, with clear organisation, circulation to accommodate large crowds, form and appropriate use of materials, while still fitting into its surroundings; whether it communicates its function to those who might use it; whether it uplifts or would oppress the moods of people who use it.

Closing in on the eight-minute time allotment, the reviewer asks herself *what is possible?* Did the student develop alternative conceptual designs to explore possibilities? The reviewer considers other possibilities and tries to understand why the student went with this one. What hasn't the student considered? *Why this and not something else?* Retail on covered buses that could take retail goods and food to the people, so they didn't have to travel to the commercial sector in the heat? Or proposing doing nothing at all – would *that* have been an improvement? What could the student have done to make something more of this opportunity to design in this situation? What would be non-obvious? What would differentiate this project from others? What would make people who use the intervention happy and look forward to going to it? Proud of it as an addition to their community?

The reviewer glances at the site survey, the aerial photo, to assess the surrounding architectural form – however traditional or contemporary. She looks at the site section to consider the building elevations in the distance, to assess how the intervention's scale relates to or contrasts with the surrounding buildings, and relates to the sector's buildings, pedestrians and shoppers. But none are included in the presentation.

The reviewer observes if the student is taking notes or for signs that the student is listening to the feedback or just relieved the interminable tribunal

is nearing its conclusion. Does the student ask questions in response to what the reviewer says? Does the student attempt to defend their design – or themselves? Does the student present their design solution as a sacrificial offering then await the attack? Or do they persevere with an open mind and the intention of learning from what they present, and the response their work triggered?

The reviewer's three minutes – the eight-minute time allotted to this student – are up, and they move on to the next student.



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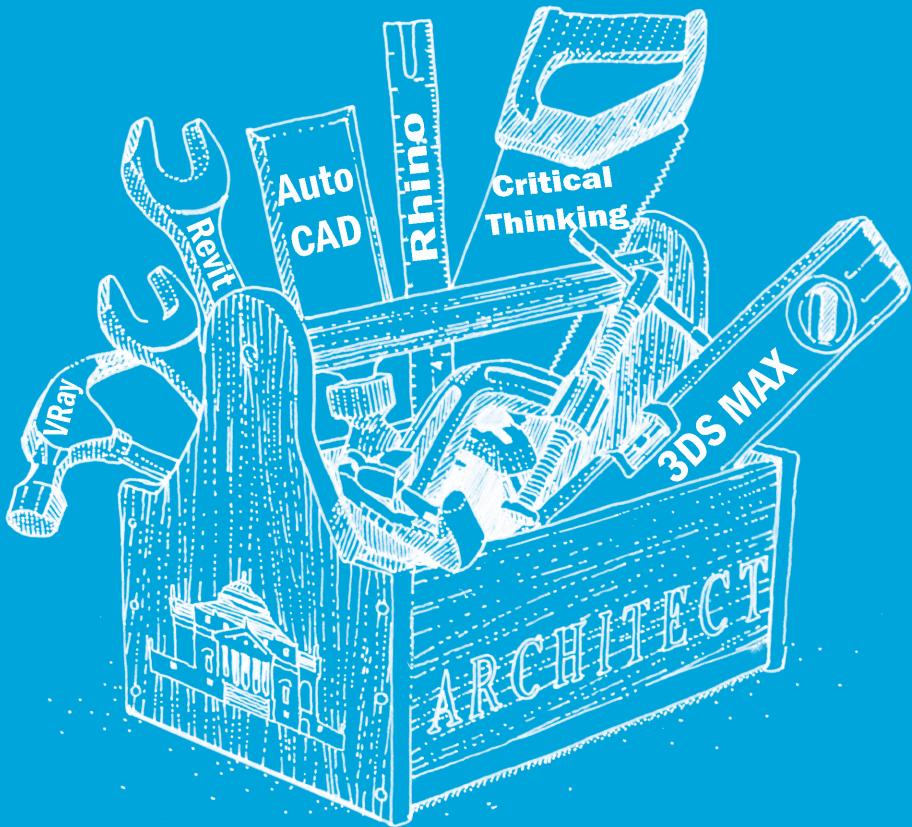


Fig 1.0: Critical thinking as a go-to tool in your toolbox

# PART I: CRITICAL THINKING

**Architects think critically.** Architects recognise that there are consequences for their architectural actions. For them it cannot be out of sight out of mind. Architecture has serious consequences – people may get hurt – and so, architects are responsible for the health, safety and welfare of inhabitants and passersby alike. They can't be flippant or sloppy in their work. If they are to build, architects can't just design for themselves. They need to think not only in terms of the owner – who pays for the work, and with whom the architect is contracted – but the building's users, neighbours and the public-at-large who will have to live with the resulting building. The architect uses real materials that obey physics, physical constraints and laws – but architects also have to consider future generations, giving heed to their voiceless concerns.

# SECTION 1: CRITICAL THINKING

# 1: What Were They Thinking?

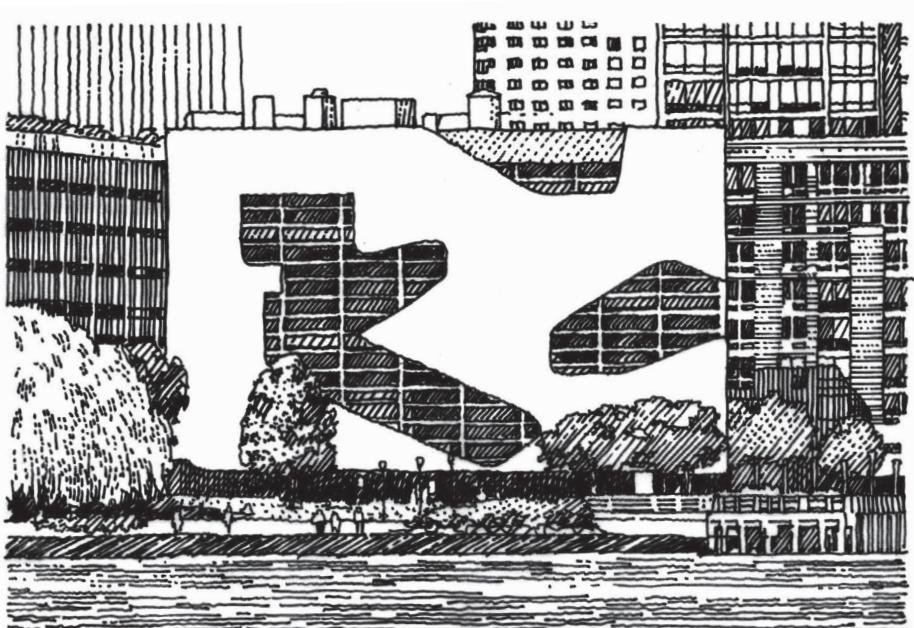


Fig 1.1: View of Hunters Point Library across New York City's East River

**Architects  
need to think  
of everything.**

The new Hunters Point Library in Long Island City is the third completed building in New York City by the New York-based, internationally recognised prize-winning architectural firm Steven Holl Architects.

And unlike the first two, this third innovative work made the headlines for all the wrong reasons.

There is certainly much to like: landings and terraces, natural light, stunning views of Manhattan across the East River.

But to take in those views, and despite disability rights laws, the library relies heavily on stairs – to get to some of those landings and terraces – making it difficult for people who cannot climb them to access all of the library's levels.<sup>36</sup>

There were reportedly other barriers at the library, including a potential hazard on the children's stairs, and the fact that the five-storey building has only one lift, one that does not stop at certain levels.

So, a class-action lawsuit was filed, calling out the architectural firm over the library's alleged Americans with Disabilities Act (ADA) violations.<sup>37</sup>

You would be right to ask: *how did no one catch these oversights?*

Architects – at least those who want to see their buildings built – don't design in isolation. In the library's case, among others, there's the client and approval agencies with their lengthy planning process.

Focusing on the architect – this book is after all about how architects think – while one might question the architect's QA/QC or code analysis check process, we will question their thinking.

Suggestions that architects should be required to go through sensitivity training, or spend time with kids so they understand how kids behave – while well-meaning – miss the point.

This isn't about codes, mores or public sentiment changing from the time the building was first designed until it was constructed and opened. Things change – and people, including architects, adapt.

This isn't about the building needing to adapt or the staff needing to adapt but the architect needing to adapt so that this doesn't happen again.

Thankfully, because architects don't design in isolation, they don't need to know everything.

When necessary, we turn to experts for answers. But: architects need to think of everything – with an emphasis on the word 'think'.

People will assume everything in a building is deliberate – the architect might as well make it so.

And so, architects need to learn how to think more critically: so they can adapt in real time – ideally during the design process when potential problems are still digital – before there is a need for sticking plasters, roping-off or retrofits.

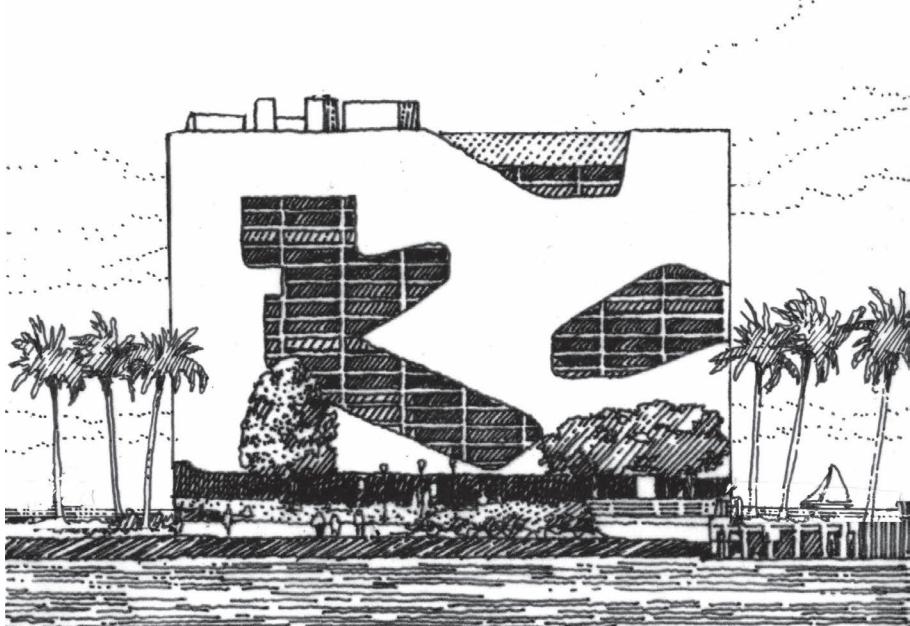


Fig 1.2: Hunters Point Library, on the banks of New York City's East River, was never intended to be an island

For starters, it's not always clear what is meant when we say 'critical thinking'.

If almost 90% of faculty consider critical thinking to be important to instruction, why can only 19% of them adequately articulate what critical thinking is?<sup>38</sup>

More than half of companies say that new employees aren't sufficiently trained to think critically.<sup>39</sup>

Critical thinking is like jazz or obscenity: you may not be able to say what it is, but you know it when you see it.

Professors, university administrators and employers all want you to have it – even if they can't explain exactly what it is.

They know when students have it and – as importantly – when they don't.

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**TRY THIS**

Critical thinking is a lot of things, especially the ability to: look at facts in order to come to sensible conclusions to help make decisions; analyse the way you think then present proof for your ideas, rather than presenting your personal opinions as sufficient evidence; see both sides of an issue, be open to new evidence that challenges your ideas, reason equitably, expect claims to be backed by evidence, deduce conclusions from available facts, and identify and solve problems.<sup>40</sup>

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**ASK THIS**

Why open a section on thinking critically with an example where the architect apparently wasn't? To emphasise the fact that buildings are complicated? That there is too much to think about? To point out that to think critically it helps to have some industry knowledge? Or some common sense?

---

**ASK THIS**

As some of the alleged accessibility problems are rooted in the design itself,<sup>41</sup> here we must ask: *is there a way the architect could have thought to make the outcome better for all involved – the architect, the owner, the library's current and future patrons, community members and the city beyond?*

## 2: Architecture Can't Be Reduced to a Formula



Fig 2.1: Hunters Point Library interior

**Architects are expected to think both deliberately and intuitively.**

Architecture and design critic Alexandra Lange visited the Hunters Point Library before it opened, and to her credit asked at that time whether all of the levels were accessible. It's a good question – but one that could be answered, with room for interpretation (accessible to whom?) in the affirmative.

Soon, though, she realised that she could have asked another, more specific, question. Evaluating her thinking process, questioning her question. Not to have gotten a scoop on what would become a headline-making story, but to identify the question behind the question. That question would have been: *if you are unable to climb stairs, can you still access every level?*<sup>42</sup>

Had the architect asked precisely *this* question during the design process, perhaps they would have avoided many of the building's preventable shortcomings, not to mention the lawsuit and unwanted publicity.

As an architect, would you have been able to come up with the second question?

It's a subtle difference – between the word *accessible* and the ability to climb stairs – but the specificity of the follow-up question is an exemplar of critical thinking.

Today there is an imbalance in our thinking – where less rational thinking is winning out.

Glancing at the headlines, nobody would mistake our time period for an Age of Enlightenment.

'There are enormous challenges for the built environment ahead,' explains Alexandra Lange. 'Sea level rise. Wildfires. Decaying infrastructure. Insufficient housing. But access should not be difficult. The design imperative to make public spaces that are open, usable, and even fun for the widest possible audience isn't new, or novel, or much affected by technology. It is a design problem that's solvable and, at this moment of crisis, the need for public space for people of all abilities only gains imperative.'<sup>43</sup>

This section attempts to address this imbalance and provide some tools for thinking more critically about your designs, thoughts and ideas, helping you along the way to *think like an architect*.

There are specific kinds of critical thinking characteristic of different subjects, helping you to, say, think like Sherlock Holmes or like a futurist. This is what is meant when we say we want to think like an architect.

Here's a quick way to remember what's involved in the critical thinking process. In this book, critical thinking is defined much like the design process, where you:

**Conceptualise:** consider, visualise and conceive

**Analyse:** take apart, inspect, observe, scrutinise and study

**Synthesise:** incorporate, bring together, converge, unify and integrate

**Evaluate:** assess, check and decide

While shortcuts like CASE can be helpful in the short run, like design, critical thinking isn't a simple formula or linear process – first this, then this – otherwise everybody would already be doing it. The architect gathers and analyses information and is expected to synthesise all of the information obtained from numerous disciplines.

Unlike the steps implied in this example, when an architect thinks critically it pretty much happens concurrently, in ever-tightening loops of analysis and synthesis: the designer appears to work within these two modes simultaneously.<sup>44</sup>

But we're getting ahead of ourselves.

Because it is deliberate, and because it is a process, critical thinking prevents us from jumping to conclusions like CASE.

Instead, critical thinking takes you through step by step, opening up the way you look at things, expanding your point of view, your sources, which findings you accept, helping you to put aside personal biases. With some practice, over time, you will be able to do this all at once.

This is not to imply that architecture is completely rational and doesn't involve emotions. It does.

As architecture is both an art and a science, it requires the imagination born of the unconscious as well as conscious rational thinking: both ineffable and applied thinking.

Thinking and feeling are related responses to information. There's a relationship between thought and feeling, reason and emotion, explaining why creativity can't be ignored when thinking critically.

## The knowing-thinking gap

Since a domain's received wisdom evolves over time, being an architect is less about how much you know and more about how you think.

In fact, when intelligence and critical thinking are pitted against each other, critical thinkers fare better.<sup>45</sup>

Critical thinking isn't domain-specific – it's a transferable skill – so should you decide to leave architecture for another major or career or take on another career on top of or alongside architecture, the time you put in here won't be wasted.

Does it help to have domain knowledge to think critically? Sure. That can only come with experience – something admittedly in short supply while still in school. But it will come.

For example, you know how to ask questions – like the ones Lange asked about accessibility and people who are unable to climb stairs – and can improve at asking increasingly relevant questions when it counts. Doing so takes some focus and attention – things like experience that may be in short supply at the start, but that we'll work on in the pages to come.

This critical ability has particular relevance for you and the education of architects. In the course of their studies, and into their role in the profession and industry, architecture students need to be able to raise relevant questions, formulate arguments, compare positions and consider consequences for their architectural actions – again, all things we'll discuss in the pages that follow.<sup>46</sup>

Though sometimes confused with intelligence, unlike IQ – which is mostly genetic – critical thinking can be learned and built on,<sup>47</sup> as this book will show you.

### TRY THIS

The thing is, you soon come to realise that enough credit isn't given to common sense and a lifetime observing the world around you. In other words, you know and can do more than you think. Take a moment and give yourself some credit.

### TRY THIS

Learn to question and evaluate the information you have been given or happened upon, including the very problems you have been given to solve, your assumptions and preconceived ideas.

### ASK THIS

When given or finding information, question your assumptions and evaluate your beliefs by asking: Why do I think this is the case? Why do I believe this? Am I attached to this idea emotionally? Is there another way I could be looking at this?

3:

# What's Critical About Critical Thinking



Fig 3.1: Architects are nothing if not critical

**Architects serve  
as role models  
for how to think.**

An architecture student is asked to draw a section of an existing house. Never having drawn a section before, the student repurposes a section they find online. It turns out that the section the student copied is inaccurate: the student didn't use critical thinking.

Architects are nothing if not critical. So, you'd think critical thinking would come easily to them.

And yet critical thinking apparently doesn't come easily to anyone.

*Thinking* isn't the only thing modified by the critical modifier. Among others, there are critical theory, critical practice, critical regionalism, critical architecture and critical modernism.

For example, use of the word critical in *critical regionalism* contrasts with reference to the vernacular. Critical regionalism is a heightened, i.e. *critical*, study of vernacular architecture.

To be critical means to make a critique of something in the mainstream. So, for an architect to practise critically means to be critical of the mainstream ways one might practise architecture; to go beyond the status quo in which architects normally work, beyond the economic realities, construction constraints and commercial interests of a client.<sup>48</sup>

To be fair, architecture is a bigger topic than the design of buildings. Architecture includes design, history, theory, technology and building performance, and urban, social and professional studies.<sup>49</sup>

Critical practices often focus more on theory and history than on building, construction or building performance – which are seen more as the *status quo*. A critical practice therefore might be one that focuses on activist architecture, on computational urbanism, or on serving the underprivileged, displaced or disadvantaged.<sup>50</sup>

What does this have to do with critical thinking? Similar to the use of the word *critical* above, to think critically – to be a critical thinker – means to think purposefully, deliberately.

## Be critical, but be nice

Sometimes the word critical is equated with being negative. But being critical isn't an invitation to be a troll or do a hatchet job. To be critical implies being respectful, whereas critical thinking is an act of kindness (or at least being *cruel to be kind*).

By communicating your design intentions, you are helping others to understand your thought process and in turn, when critiquing your peers, they are helping you understand theirs. So be nice.

Every time you think critically and communicate your findings, you are serving as an example, modelling behaviour.

So, it should be clear that the way we are using the word critical here is not intended to imply a strictly negative approach to thinking. Critical can also mean vital, useful, even indispensable.

But here *critical* implies the way we evaluate our thoughts and the thoughts and ideas of others: consciously, creatively and collaboratively.<sup>51</sup>

So how about the word *crit* – derived from and related to critical, criticism and critique – dating from the nineteenth-century Beaux-Arts school of architectural education?<sup>52</sup> The two most common types of crit are those that occur informally in studio<sup>53</sup> – *desk crits* where tutors move from student to student reviewing progress and offering feedback – and those that serve as studio project milestones – *design jury* or *design review* where students present their design projects to a panel of tutors and external critics – usually involving pin-ups and more formal verbal and graphic presentations.<sup>54</sup>

Crits – where students are expected to communicate their design intent and be prepared to discuss their work<sup>55</sup> in an effort to continuously improve – are the heart of the development of design thinking, distinguishing architecture and design education from just about every other subject taught at university level.

4:

## 12 Challenges of Thinking Critically

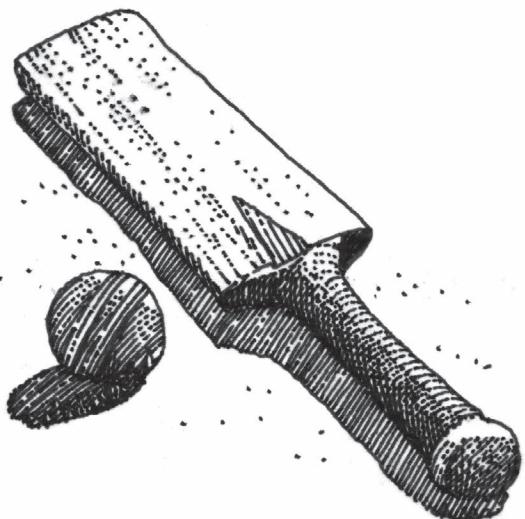


Fig 4.1: A cricket bat and a ball cost £1.10. The bat costs £1 more than the ball. How much does the ball cost?

If architects were *only* deliberate thinkers, they'd be unemployed and their buildings would be uninspiring.

A cricket bat and a ball cost £1.10. The bat costs £1 more than the ball. How much does the ball cost? If you answered ten pence, you are an intuitive thinker – you instinctively or impulsively relied on intuition to arrive at your answer. A deliberate thinker – more rational in their thinking – would have spent time thinking about it. When they did, they'd see that the ball costs five pence. Then, if the bat costs £1 more, it comes out to £1.05, which, combined, gives you £1.10. That is how automatic, habitual, intuitive thinking can lead to mistakes. Arriving at solutions habitually and intuitively will mean we are frequently wrong. Most professors will say that their students need more deliberate thinking – that their ineffable ideas and designs were brought into existence by instinctive or intuitive thinking, relying heavily on emotions and feelings rather than rationally addressing the problem that needed solving. Yet if architects were *only* deliberate thinkers, they'd arguably be unemployed, and their buildings would be uninspiring. As long as architecture is both an art and a science, architects will continue to need both intuitive and deliberate thinking.

**Critical thinking is exhausting.** Students soon learn that quiet reflection is a lot of work. Because thinking is fatiguing, it is hard to continue doing it except in short bursts (try thinking on a low-carb diet). The brain uses 20% of the body's energy intake,<sup>56</sup> the most energy of any organ in the body.

**Critical thinking is hard.** If it was easy, everybody would be doing it. There are other things in our environment vying for our attention. Some are shiny and a lot more fun to do than thinking. It's hard to change, to take on new habits – especially the thinking kind. Thinking deliberately may be difficult – but the consequences of *not* thinking more than make up for any hardships.

**Critical thinking is deliberate.** You have an intractable problem without an obvious solution – the kind that would really benefit from your concentrated thinking – and you realise that you deliberately need to make time/place/space to think about it. So, it doesn't happen. People didn't evolve to think deliberately but to navigate plains and forests, identifying predators. Our brains have numerous hardwired heuristics, rules-of-thumb that often gets us to the right answer. To think deliberately we have to go against our own brain wiring.

**Critical thinking involves others.** Thinking often needs to be done in real time, on our feet, with others present: *reflection-in-action*. In these situations, thinking becomes a kind of performance – which can cause anxiety. Critical thinking is the most interdisciplinary design skill, and for that you need others.<sup>57</sup>

**Critical thinking is unfamiliar.** Yes, you may have taken a course in critical thinking, but learning how to think critically as a result of real-life problems – that's something else altogether. And what that something else is – is *unfamiliar*. It may be possible to learn critical thinking while you are doing everything else you are asked to do without resorting to using, say, *Star Trek* to learn critical thinking, despite the fact that critical thinking is unfamiliar and *Star Trek* is familiar and makes you feel comfortable.<sup>58</sup>

**Critical thinking is the exception.** There is not a lot of evidence that others are doing it – just turn on the news or go online and read the comments: anti-intellectualism and *uncritical* thinking are rampant. If world leaders aren't thinking, the argument goes, then why should we?

**Critical thinking is > Ctrl+C Ctrl+V.** Architecture students tend to misuse the internet to seek ideas, images and information that reinforces already-held positions – as opposed to seeking other points of view and ideas that challenge their preconceived ideas. Critical thinking requires us to pause, consider, apply any one of several thinking tools, and repeat – which is hard to do in a fast and-only-getting-faster world that values Instagram.

**Critical thinking is too rational.** It took me a long while as a teen to come to realise two facts: that thinking isn't brooding, and that thinking doesn't always have to be rational. There's the belief that doing *any* thinking (as opposed to feeling or intuiting) will lead to a too-rational (i.e. boring, repetitious, inhuman) design. Can critical thinking be abused or taken too far? Sure, by not taking emotions into consideration, ignoring people and their all-too-human needs, resulting in an overly rational, imbalanced solution.

**Critical thinking has too many rules.** Architects are gregarious, independent thinkers, and they don't like to follow rules, menu items or checklists.

**Critical thinking is a process.** Not a thing but a process, and people are usually rewarded for results (i.e. things) – not reasons. Similar to action, the world rewards not just words but outcomes. So, in addition to deliberately concentrating and thinking, you have to commit to *making something* out of your decision. True, students are often rewarded for both their results and the thinking that led to them (ask any Year 6 student doing maths homework who is expected to show their work), but in the real world (IRL, i.e. once you graduate) the work that led to your results is seldom scrutinised outside of court or unless something goes awry. Being judged on results not reasons works against the person who needs to do some deliberate thinking. The thinking that led to your results will only be scrutinised when asked, thank you. The sign ought to read: *Justify only upon request*.

**Critical thinking requires action.** You are rewarded for action – not thinking. In the US, with its Puritan work ethic, you are rewarded for performing. The British have a similar work ethic and are even more action-oriented.<sup>59</sup> So, in addition to concentrating and thinking, you have to commit to acting on the decision: to action, to actually *doing* something. People have a preference/inclination/bias for action – not thinking. Once out of school you will only be rewarded for action. We live in a world where learning is increasingly actionable and project-based. If you are to conduct research, it will probably be *applied* research. If you are studying one of the fine arts, it is increasingly likely to be an *applied* art – like architecture. We are predisposed towards applying what we learn – and not studying or learning for its own sake. (Yes, people once did that. Hard to believe, right?)

Less art for art's sake, more art for-profit. Likewise, our thinking is expected to be applied to real-world problems – not just abstractions. R&D today requires more development and less research. Which is a good thing, but nonetheless a challenge.

**Critical thinking takes focus.** Lastly, the London architect John Pawson says he thinks more clearly when put in a situation where he is unable to do anything else apart from think.<sup>60</sup> He's not alone: minds wander, and it is hard for anyone to concentrate for long periods of time. The ability to focus without distraction and to work in long uninterrupted stretches is a skill worth cultivating, a tool worth adding to your kit. Focused attention improves outcomes:<sup>61</sup> like a muscle that you build when you work out, focus improves as we use it and weakens or even atrophies when we don't. So, to differentiate yourself, focus. Frankly, because all architects need to stand apart, given the competition – people and technology – the ability to focus is a non-negotiable skillset and mindset. We need to focus to accomplish important things; to be assured that we won't wait until the last minute to address hard work that needs to be completed; to work smart – not long, providing us with some semblance of balance in our lives. According to a University of California Irvine study, after a distraction such as looking at email or social media it takes an average of 23 minutes and 15 seconds to get back to the task.<sup>62</sup> Recognise that designing buildings where people will live and work – and public safety is at stake – is important and deserves concentrated, undistracted, focused effort. We need to stop multitasking, move beyond good intentions and show up – bums on seats, eyes on the road.

You can address your distractions – social media, email – during your breaks. As noted previously, architecture is an art *and* a science. We need both focused awareness and down time where our minds are allowed to drift. It is often thought that attention needs be in the service of problem solving, but often our best ideas come when we allow the mind to drift. (Who hasn't had a great idea when showering?) For designers, focused attention does not have greater value than daydreaming, where we allow the mind to wander. What you're aiming for is a combination of abilities to have extreme concentration at times, and allowing time for reflection, the wide-open mental wandering kind at others. Accept that all things of lasting and deep value require time, some nurturing and only come to us after a little effort. That said, your goal should be to learn how to work smarter – not longer, or harder.

### READ THIS

*Indistractable: How to Control Your Attention and Choose Your Life*

by Nir Eyal

*Deep Work: Rules for Focused Success in a Distracted World*

by Cal Newport

*Digital Minimalism: Choosing a Focused Life in a Noisy World*

by Cal Newport

## 5: Unlimited Benefits of Thinking Critically

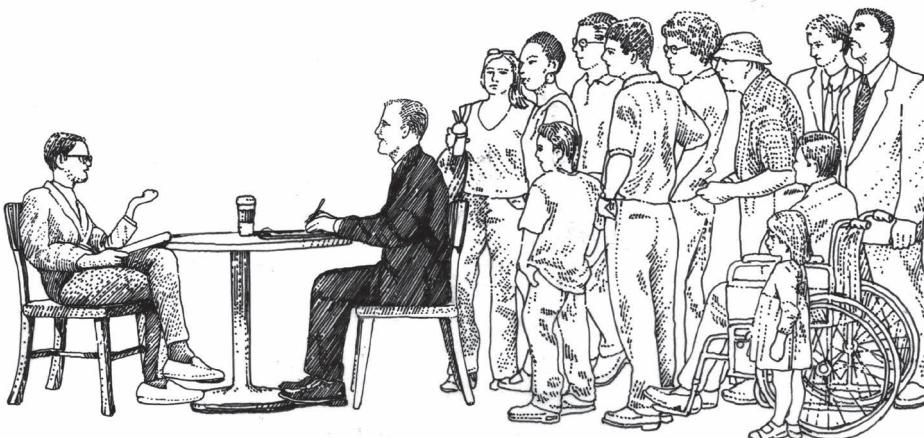


Fig 5.1: With the architect here are those not usually present at the table where decisions are made

**The benefits of  
thinking critically  
like an architect  
are unlimited.**

Having the ability to think critically will help you pass the *sleep test*. When you do your own thinking and problem solving, you can rest assured that everything has been considered and thought through – you will sleep well at night knowing you left nothing to chance.

Thinking critically ensures that you will not be a victim of others' manipulation or bullying – since critical thinking provides you with the ability to see through spurious arguments, unsupported reasoning and persistent bullying. As an architect, critical thinking reminds you that you – and you alone – represent those not present at the table where decisions are made – including current and future building users, neighbours, the public at large, and even future generations (not yet born), who will have to live with these decisions. All of these – and more – are seen as benefits of thinking critically.

As with the challenges, here are twelve benefits:

**Critical thinking encourages curiosity.** The more you enquire into something, the more you learn about it, the more you want to know – it becomes addictive. Critical thinking and curiosity have a symbiotic relationship: each spurs the other on.

**Critical thinking encourages creativity.** Critical thinking requires curiosity, and curiosity leads to more innovative ideas.

**Critical thinking increases problem-solving ability.** Because it forces us to focus and consider both sides of an argument, critical thinking improves our ability to amicably and constructively address situations, solve problems and resolve issues in a way that will be acceptable to all involved.

**Critical thinking is a transferable skill.** Are architecture students in pursuit of skills they are told are useless as soon as they reach the job market? Why bother? Time spent invested in developing critical thinking pays off.

**Critical thinking is hard.** That's right – but not too hard. And that is a good thing. Your ultimate goal is to take on work where most of your time is in a state of flow.<sup>63</sup> Ideally, the work you do is neither too hard nor too easy, but just challenging enough to keep your mind occupied. Critical thinking requires just the right level of focus, concentration and effort to keep you engaged for long periods of time.

**Critical thinking is deliberate.** And a good thing it is. No one becomes an architect because they want to sleepwalk through life. Better to pursue a career that requires you to think purposefully than habitually and automatically.

**Critical thinking requires you to engage with others.** Studies show that we find more fulfilment when working with and among others. Engaging with others in the thinking process also keeps our thinking honest. Critical thinking is considered the most interdisciplinary design skill.<sup>64</sup>

**Critical thinking is the exception.** In today's marketplace, you need to stand out and differentiate yourself. There is no better way to do that than to think critically. Do so and you will probably be the exception – and before long you will be recognised, sought after and rewarded for it.

**Critical thinking is not domain- or discipline-specific.** Time invested in developing this capability pays off. Critical thinking is not domain- or discipline-specific. The ways architects think – critically, creatively and collaboratively – is transferable to multiple fields and roles including start-ups and entrepreneurs, and they're necessary to your everyday tasks in architecture.

**Critical thinking is sought after by employers.** Considered a current and future capability, employers look for and reward those who possess critical thinking capabilities.

**Critical thinking is associated with wellness and longevity.** Critical thinkers experience fewer bad things in life than people who simply have a high degree of intelligence, and critical thinking has been associated with wellness and longevity.<sup>65</sup> Having the ability to think critically empowers people, lowering their anxiety.

**Critical thinking strengthens self-reliance.** Developing critical thinking skills enables you to think more independently, relying less on others and other sources to do your thinking for you.

Critical thinking has its challenges, but it should be clear by now that the benefits win.

## 6: Deliberate Thinking



Fig 6.1: The good news about critical thinking being deliberate is that you are not expected to do it all the time – most of the time, habitual thinking works just fine

**Architects think deliberately about how inhabitants experience their buildings.**

Do you imagine the experiential qualities of spaces as you create architecture? Do you think of spaces you design in these terms? Do you sense the quality of the light streaming in through the windows at various times of the day and year? Do you feel the cooling breezes which are a result of the manipulation of the section and openings? Do you feel the heat baking the occupants of unshaded south-facing windows in the summer? Do you hear the deafening roar of air through the ventilation ducts from HVAC systems desperately attempting to reach the setpoint of the thermostat?<sup>66</sup> When you design, do you imagine how the senses are impacted by the decisions you make?

Professor Terri Meyer Boake posed these questions to architecture students, then offered a reply of her own:

'I would venture to say that the majority of students, as well as designers, never think in these terms.'

Imagine designing a building without imagining how the spaces in that building would feel to its inhabitants. According to Boake, it is unlikely that students and designers in the design process give this much thought, and she concludes her enquiry by posing a question to educators of these students and designers:

'How can we enlighten students to think critically in these terms?'<sup>67</sup>

This is what deliberate designing looks like. There's a level of curiosity, specificity and detail when thinking and designing deliberately.

It is intentional, rigorous and holistic, whereas most of the time the type of thinking we do is selective, automatic, uncritical and habitual.

Critical thinking isn't haphazard – you have to will it, make time for it, and expend some energy and effort to make it happen.

The fact that it is deliberate – where you consciously set time aside to focus on a problem – is what differentiates critical thinking from other types of thinking.

Yet, just because it is deliberate doesn't mean that it is entirely rational. It just means that the thinking that takes place is purposeful – on purpose – and not haphazard or random. For that reason, deliberate thinking often includes other thinking types – specifically intuitive and analytical thinking: both are important to make assured decisions that stick.

People assume that what architects do – including the buildings they design – is deliberate: they might as well make it so.

The opposite of critical thinking isn't critical mindlessness, it's uncritical thinking: automatic, non-deliberate thinking: the kind of thinking we do most of the time, when driving home, while brushing our teeth or taking the stairs.

But deliberation is slow. Usually we don't have time to stop and think critically. What then?

Coming to conclusions too quickly can be counterproductive, resulting in shortsighted or superficial results that aren't thoroughly vetted, in the long run costing you more time and effort than you might have saved. The opposite is also true: if you deliberate too slowly, you might miss out by missing deadlines.<sup>68</sup>

## Reflection-in-action

To counter the counterproductivity of working too fast and the missed opportunities of working too deliberately, architects and other designers partake in a particular kind of thinking: reflection-in-action, or thinking on your feet: where they don't stop what they're doing to navel-gaze; where they learn how to think in real time, on the fly. Reflection-in-action is a coveted and sought-after ability, up there for effectiveness with sketching in front of people.

The good news about critical thinking being deliberate is that you are not expected to do it all the time: most of the time habitual thinking works just fine. Most activities don't require deliberate thinking. Habit and routine work are just fine to complete day-to-day tasks and challenges.<sup>69</sup> If you had to think about every movement you make in walking down a flight of stairs you would probably trip! Most of the time, automatic or habitual thinking serves us well. It is only when we have to create that gap in time and turn our attention to the problem at hand that we think deliberately and critically.

The opposite of superficial, surface thinking, deliberate thinking requires you to probe deeper. Examples of automatic or habitual thinking include memorising facts that can then be regurgitated come exam time, and repeating information you may have read or overheard somewhere without analysing or comprehending it.

So, while we don't have enough clues yet to know how an architect thinks, we have an inkling as to what it means to *not* think like an architect:

Base decisions on assumptions that go untested; ignore feedback; go with hunches and habitual thinking without resorting to reason; let preconceived ideas drive design decisions; copy/paste ideas from other sources as your design direction; and, go with what feels right to the exclusion of evaluation.

When designing, there is a lot of pressure to come up with a brilliant idea. When given an assignment, the tendency is to do an online search where you zero in on what appeals most to you, and *that* becomes the impetus or inspiration for your design. The next time this happens, don't just mindlessly see an image online and copy/paste: ask questions of it. What sorts of questions?

---

**TRY THIS**

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Create a time and place for deliberate thinking, a ritual for deliberate thinking, or a trigger such as making a cup of coffee or tea; have a favourite place to sit and think; minimise distractions and make it easy for yourself to concentrate. Concentration – like any habit – takes repetition: rinse and repeat.

---

**TRY THIS**

---

Approach your next design assignment by using deliberate thinking, setting aside any preconceived ideas, keeping track of the questions that arise while you design and the decisions you make. Seriously consider feedback, whether from classmates or your tutor. Your goal in this exercise is to surpass habitual thinking to think thoughtfully, contextually, rigorously, exactingly, self-critically and equitably.

---

**ASK THIS**

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Ask questions of a project's context: What is this project's location? Region? Weather conditions? Ask questions of its origin: Who made this? And why? Why is this the way it is? Ask existential questions: Why this and not something else? What are the forces that drove or determined this into existence? What were the constraints that led to this as a solution to a problem? What was the nature of the problem that this is the solution to?

## 7: A Tool in Your Toolbox

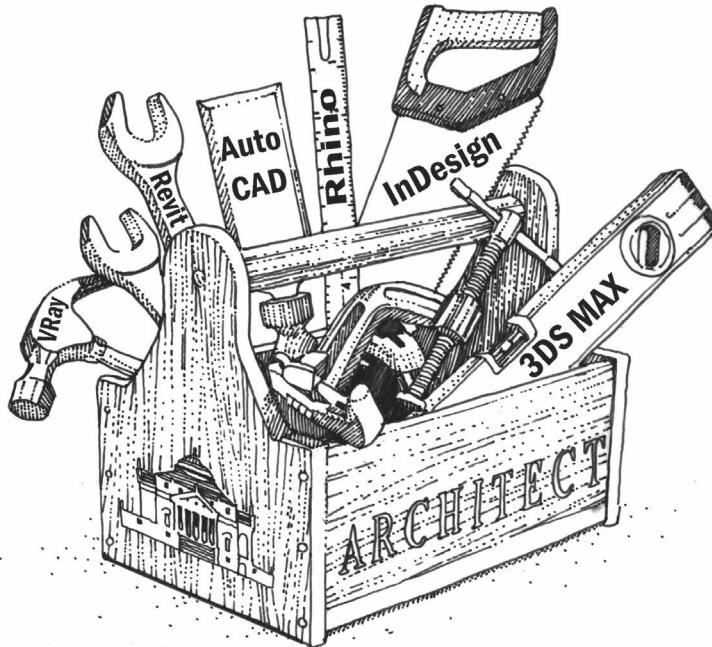


Fig 7.1: Critical thinking is a go-to tool in the architect's arsenal

**Critical thinking  
is a go-to tool.**

It is important to think of critical thinking not just as a scholastic subject or academic achievement, but as a tool in your toolbox.

It is a tool like any other tool that you want to have at the ready, and tool belt and toolbox analogies work particularly well for the architect – even if they're associated more with construction than design.

Critical thinking belongs there alongside the architect's scale, mechanical pencil, Moleskine notebook and metal swing-arm LED desk lamp; with CAD, Revit and Rhino; with your scalpel, tracing paper and Prismacolor pencils, laptop and Monte Blanc pen with sepia ink.

Pritzker Prize-winning architect Alejandro Aravena has gone so far as to suggest that 'rather than architecture being presented as a profession, it should be seen as a set of tools to understand society. You may end up designing buildings with your training, or you may use your degree as a way to understand reality, and given the global challenges we are dealing with, that is also desirable.'<sup>70</sup>

As you work your way towards being able to think on your feet – reflection-in-action – you can reach for that tool in your tool belt.

You want to avoid thinking of critical thinking, though, as a tool in your tool shed. It's not something you learn and then store or park – where it might be out of sight and out of mind.

As critical thinking is one of your go-to tools, you'll want it close at hand as you design.

### TRY THIS

If it is too hard to think of critical thinking as a tool in your toolbox, break it down into its constituent parts – reason, intuition and reflection – and ask yourself: which will serve me best here, in this situation? A thinking process can begin with any of them.<sup>71</sup>

### ASK THIS

Use critical thinking to evaluate the other tools in the toolbox. Before using, for example, Rhino or Revit, ask: Is this the right tool to accomplish what I need to do? How do I know? Does this tool work well (from an interoperability standpoint) with other tools in my workflow? Is this worth doing? If working in a team, will others need access to the file, and do they have this software? How will the deliverable be presented? Is it value-added? Will this tool help to explain my project? How so?

8:

## Argument in Architecture

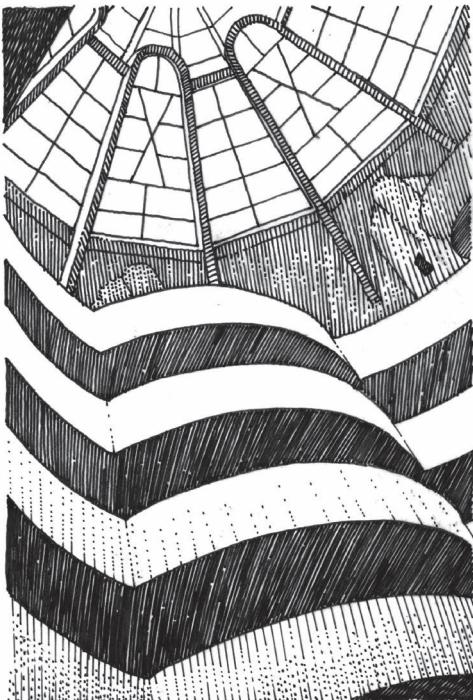


Fig 8.1: The interior rotunda of Frank Lloyd Wright's Solomon R. Guggenheim Museum in New York City. If natural light harms photographs and paintings, then why is there direct natural light where the art is hung?

**Architects argue effectively by appealing to reason, the emotions and ethics.**

Frank Lloyd Wright's Solomon R. Guggenheim Museum on Fifth Avenue in New York City turned sixty in 2019.

A beloved building; nonetheless, the architecture competes with the art for your attention.

There's the difficulty of installing and displaying art – especially wall-hung pictures – along a continuous ramp.

And while it is a known fact that daylight can irrevocably harm artworks, natural light bathes the central rotunda of the museum via its nearly 20-metre-diameter oculus skylight.

If natural light harms photographs and paintings, then why is there direct natural light where the art is hung?

Why indeed. Because Wright was adamant there should be abundant light in the museum's rotunda.

And what argument did he use?

He alluded to the museum director's comment in 1955 that pictures – photographs and paintings – are among things that could be found in nature, and that nature benefited from the effects of natural light.<sup>72</sup>

So ... here we have Wright arguing for natural light in the Guggenheim even though light is known to permanently harm artwork.

A spurious argument at best, but Wright could be persuasive – and, Wright being Wright, got his way.

Of course, an architect's work isn't done once they come up with a design for a building.

If, while presenting multiple schemes, there is one in particular that solves most of the problems within the project constraints, they have to argue on its behalf.

As you might imagine, there are more or less effective ways to do that.

We can't all have the gall and persuasive powers of Wright. So, in addition to presenting the facts and evidence discovered in the design process, for when it matters most it would behove architects to learn to argue effectively.

## Cut to Aristotle

Aristotle famously put forward three appeals to argument: logical (logos), ethical (ethos) and emotional (pathos), where the best arguments are a balance of all three.

For example, when architects cite evidence (such as facts, data and statistics) to support their actions – presenting evidence-based decisions – they are able to convince others of the design direction by means of reason or logic.

Architects will appeal to the emotions, not as a substitute for logic or ethics, but responsibly – because they know for example that the visual appeal of buildings can persuade on an emotional level.

When architects serve as a trusted adviser to an owner – while taking the needs of others into consideration, including users, neighbours, the public-at-large and even future generations – arguments made on behalf of their designs are considered balanced, fair, equitable and ethical.

When an architect argues in support of a design direction, they offer reasons with an aim of persuading others that their design is right, or another is wrong.

Argument in architecture needs to use facts, data and evidence to support positions on issues like regenerative or whole systems design, sustainability and resilience.

## Make it compelling

It is essential to learn to defend your ideas, and to argue on behalf of your architectural decisions.<sup>73</sup> To do so requires persistence, persuasiveness and no small amount of eloquence. Minoring in rhetoric while majoring in architecture in college was one of the best decisions I ever made – not because I write books, but because for thirty years I designed buildings and, if they were to be built, I had to argue persuasively on their behalf.

Your argument needs to be rational and logical, but also well spoken and compelling.

'Eloquence is what's needed to resist the so-called inevitable futures and influence. People let bullies get away with it because they don't know any better – and retreat because it's overwhelming,' explains futurist David Zach. 'Most design schools ignore teaching how to defend ideas. At one school of architecture a professor told me (and the crowd) that "we teach design, not sales". If you can't explain and defend your ideas in compelling and logical ways – you're probably not really a designer.'<sup>74</sup>

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**ASK THIS**

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A homeowner wants to add a bedroom and bath to their house and turn their one-car garage to fit two cars, requiring the widening of the driveway. A contractor tells a client that they can handle this, but that working with an architect will slow down the construction process. Is this true? It is true that architects want to do things right, and where required by law will follow local rules, seeking a permit for construction. Following the rules, designing and detailing accordingly as opposed to just doing it will probably slow things down. Breaking the law will speed things up. So yes, the contractor's statement is correct: working with an architect will slow down the construction process. The contractor is itching to get moving on the project, and by not breaking the law the architect will probably need to slow down that process. But getting caught doing work without a permit *will* also slow things down, not to mention cost even more. And doing work that doesn't require a permit may not get you what you are looking to do.<sup>75</sup>

9:

# Can Buildings Argue?



Fig 9.1: Philip Johnson's Palladian curtain wall at One International Place

**Buildings can't  
argue, but their  
architects can  
and must.**

The best thing one could say about Philip Johnson's Palladian curtain wall at One International Place in Boston was that it was mischievous<sup>76</sup> and even silly. In fact, that is what *The New York Times*'s architecture critic called it,<sup>77</sup> explaining that the architect intended for the tower to look like a nineteenth-century crystal palace stretched out into a skyscraper.

But we may never know the real reason Johnson repeated the historical Palladian windows *ad nauseum* over the high-rise facade. The public outcry partly against the project's design eventually led to a lawsuit to block the project, causing only one of two proposed towers with Johnson's Palladian window wall-papered curtain wall to be built.<sup>78</sup>

Today, with the world on fire, arguments about style and (bad) taste may seem at best quaint and at worst beside the point. In the previous pages I argued that architects, if they are to see them built, must argue on behalf of their buildings. But how about buildings? Are buildings – made of masonry, concrete, steel and glass – really mute, or is architecture able to argue on its own behalf? And if so, how?

After all, architect Peter Zumthor believes that the building itself is an architect's best argument – irrespective of what their argument may be.<sup>79</sup> Rhetoric, or the art of persuasion, influence and argument, has a primary goal – to achieve consensus. To get others on board to agree with you. So, even if buildings could argue, before your building can argue on your behalf, you have to argue on its behalf.

## Making arguments in architecture

What we're really talking about when we ask if buildings can argue, is *discursive* architecture, where a building whose main purpose is not functional has been intentionally embedded with discourse and is used to stimulate discussion.<sup>80</sup>

Architecture, if it can be said to make arguments, does so either directly – using signage boards – or indirectly and abstractly. One example, the Eiffel Tower, was constructed in part to demonstrate France's industrial boldness to the world.

It's not like you can hand out pamphlets in front of your built projects explaining what your building means. Once a project is built – leaving aside architectural guidebooks and architectural websites – the building has to do the talking. At some point, your designs belong to the world and have to stand on their own.

Architects can try to speak on their behalf. But if they mean something, if they have an argument to make, buildings will just have to make it on their own. Architecture either creates our world – the built as opposed to the natural environment – and says something about our place in the world,<sup>81</sup> or serves as a backdrop for people's lives in the world.

Architecture can have an impact on how people feel, and the best architecture can make us feel profoundly.

To the extent that a building urges you on, it can be said to be making an argument in terms of directionality and movement. But buildings can also be said to *move* you in a different way, emotionally, impacting your mood.

Similarly, buildings make arguments when they play with your emotions, change your attitude or encourage you inside, manipulating you to look around or make a purchase. Or they serve an economic end – to make the building developer money or improve the economic conditions or prospects of the community – as in the case of Frank Gehry's Guggenheim Museum Bilbao, and the so-called 'Bilbao effect'.

For some, a building is an argument – where the building is a means to an end.<sup>82</sup> Yet even in those cases, a building has to fulfil a function, dictates and obligations that go beyond any discourse. As long as those are also met, buildings should be free to speak. The question is, given the various demands on people's attention, will people look up and listen?

### ASK THIS

If we can embed our projects with discourse, come crit time why not let our presentation boards – the combination of our drawings, renders and words – speak for themselves? Where the student who is about to present their design at a review starts their presentation with: *Any questions?* Can buildings make their own case? Do they need their architects to make their cases for them?

### ASK THIS

When an architect designs a building that addresses the climate crisis, *they* may be able to declare a call for carbon reduction, but can the building? A building can be designed with the climate in mind, i.e. to save energy. But can a building argue in favour of saving energy<sup>83</sup> or can only the architect do so?

### ASK THIS

Think of a building you have designed. Looking at it from the perspective of the public, what is your building trying to say? How well does it say it? What means does your building use (style? scale? materiality?) to communicate its message? Put this message in the form of an argument: What is the building arguing for?

## 10: Test and Evaluate

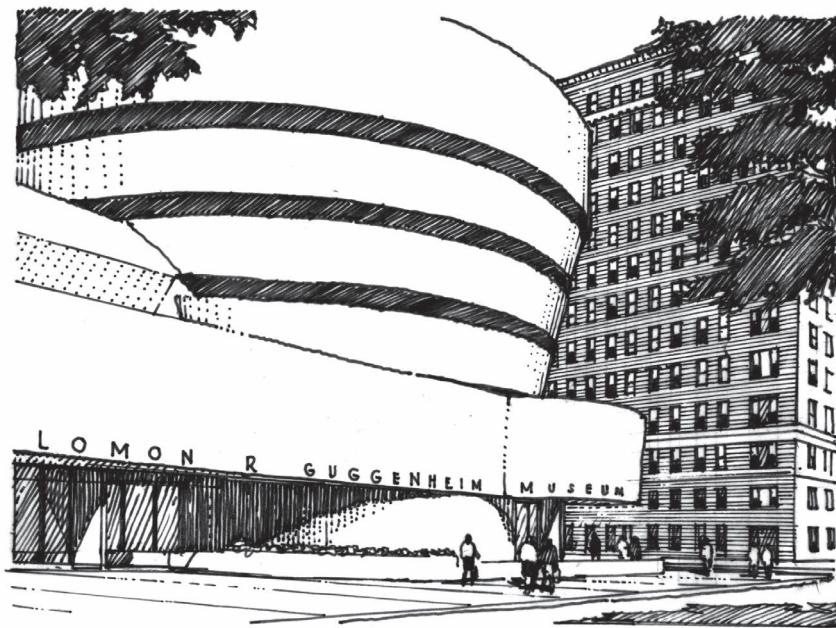


Fig 10.1: An architect's work is iterative, more like a spiral (directional, leading towards their goal) – like the spiral in Frank Lloyd Wright's Solomon R. Guggenheim Museum – than circular, cyclical or wheel-like. Less spinning of their wheels than spiralling towards a solution

**Architects don't wait to evaluate – it happens throughout the design process.**

Often associated with learning objectives, Bloom's taxonomy (knowledge, comprehension, application, analysis, synthesis, evaluation) is also a useful guide to determine what level of thinking is required for a given task.

A lot of mid-term and final exams, for example, test for rote memorisation – the lowest tier of learning in this model.

Testing and evaluating – making informed judgements – for example, are significantly higher-level orders of thinking: above remembering, knowing and memorising; above understanding, comprehending and being able to put something into your own words; even above applying what you know.

In fact, next to creating, evaluating is the second highest order of thinking ability in Bloom's taxonomy.

Despite what we've been told, while evaluation requires a higher-order level of thinking, testing and evaluation is not a set phase at or near the end of the design process.

When architects design, however microscopically small each design move may appear, each line we make is put to the test.

That's because architects design iteratively.

Architects think something, place a mark on paper or a line on their monitor, then test the mark or line in their imagination, or using a simulation tool to evaluate it against all the known constraints: building codes, sun orientation, energy use, aesthetic appeal, cost, schedule implications, adjacent uses, common sense and more.

Architects, in other words, test as they go. Testing and evaluating is something that occurs every step along the way.

Many experts on creativity advise that brainstorming and judgement are two separate acts or phases.

They are – but they're only separated by fractions of a second.

Despite what you might have read or been told about the right brain vs left brain, evaluating as you go doesn't stifle creativity – it *improves* it.

Architects are constantly bouncing ideas back and forth between their left and right brains: passing back and forth across the brain's tennis net, the corpus callosum, weaving together so-called right- and left-brain thinking.

It's wrong to think – like so many design processes indicate – that evaluation is a one-time phase or stage.

And like evaluation, when in the design process does critical thinking occur?

Hopefully it does, at every step along the way.

In Albert Camus's last complete work of fiction, *The Fall*, narrator Jean-Baptiste Clamence says: 'Don't wait for the Last Judgment. It takes place every day.'

Likewise, for architects in the design process there is no last judgement. Don't wait to evaluate – it takes place every day!

## Trust but verify

The best architects start by programming the spaces needed by the client and see how these can best fit the space of the site and its surroundings.

Architects trust themselves and the design process to assure that everything will work out.

They trust but verify. For architects, facts matter.

To verify, they test the soundness of claims made and evidence used to support the claims.

Architects assess the inferences and logical assumptions they make, asking themselves: is this True, Probably True, Requires More Information, Probably False, or False?

Critical and creative thinking are not linear processes or steps. There's a simultaneity of critical and creative thought while the architect designs.<sup>84</sup>

Architects don't wait for the building to be built before testing it on its inhabitants – that would be cruel and unusual. They test as they go.<sup>85</sup>

For the sake of clarity, when architects design, one stage they go through is test-fit, which tests how something works – for example, how the programme works in the space that has been allocated, confirming that the client's needs and requirements can be accommodated within a space.<sup>86</sup> It's a form of reality-check.

### TRY THIS

One time I worked on the design of a new manufacturer's headquarters. We designed the facility based on their space requirements, but by the time the building was complete, they had already outgrown the facility. For this reason, when doing a test-fit, architects factor in growth projections.

**TRY THIS**

Draft a test-fit drawing – a simple plan used to confirm that the stated programme requirements can be accommodated within the given or allotted spaces. Now try this using an app or digital tool. What did you learn?

**TRY THIS**

Next time you read something online, evaluate the source of your information. Use more than one source. Get in the habit of judging the quality of what you read online. The ability to evaluate the quality of sources is becoming more important – and most of us aren't getting better at it.<sup>87</sup> Since what they design must address the health, safety and wellness of its inhabitants and the public, architects especially need to get better at this.

**ASK THIS**

Architects go from radical thinkers to grounded thinkers seemingly in the same thought. How about this? How about this? Let's test it. What does it mean to test our ideas?

**ASK THIS**

Design something. Does it exceed the square footage, the budget, does it defy gravity? How do you know? When in the design process do you ask and find out?

**ASK THIS**

Can the place or space you are designing accommodate the client's plans for growth?<sup>88</sup>

## 11: Analogous Thinking

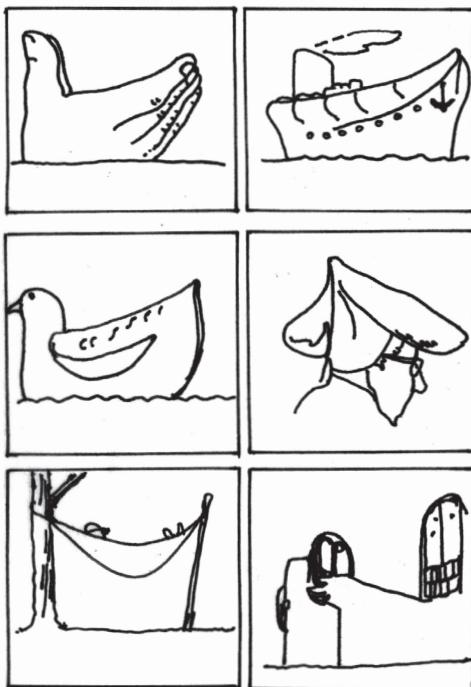


Fig 11.1: Metaphors of Le Corbusier's Ronchamp based on drawings by Hillel Schocken in a seminar on architectural semiotics at the Architectural Association,<sup>89</sup> and a guy on a hammock

**Architects use metaphor to provide order and meaning to the built environment.**

If architecture could be said to be discursive, one way would be through metaphor.

Metaphor is where one substitutes one thing to stand in for another so it can be understood.

It makes sense to use metaphors and analogies to help explain domain-specific or otherwise difficult-to-explain ideas or forms to someone not trained to see like an architect.

We use them to help others understand what they don't know, and to explain unfamiliar things to people in terms or images they can readily understand.

At its best metaphor helps make the not-understandable understandable – especially to non-specialists (non-architects) by speaking of one thing in terms of another. At its worst, it serves as a substitute or even a crutch for critical thinking.

Metaphor is important to help you understand – to understand something that you don't know in terms of something that you do.

For example, when making critical points, architect Eric Owen Moss provides analogies, explaining the way – by combining two analogies – he would like architectural thinking to be.<sup>90</sup>

The use of analogies and metaphors is also important to help explain something you know, for example your design, and to explain or communicate it to someone who is not as familiar with it.

Because metaphor can be thought of as a shortcut to meaning, too often we use metaphor – and metaphoric thinking – as a form of verbal shorthand for thinking in lieu of presenting facts or communicating the truth about something.<sup>91</sup>

This is especially true when we resort to similes in architecture. As Figure 11.2 shows, when the multistorey headquarters of a basket maker is in the shape of a basket – or a music school resembles a grand piano – the idea is too literal. Similes are too literal – where the architect hasn't enabled abstract thinking – to serve the more poetic purpose of metaphor. Here the comparison between things (e.g. building = basket) is too direct, where a building becomes the constructed version of a thing itself, and not something that implies something else.

When stretched beyond credibility metaphors can misinform or mislead.<sup>92</sup> Israeli psychologist Amos Tversky considered metaphors to be cover-ups and false storytelling,<sup>93</sup> especially when compared with more rigorous scientific thinking.

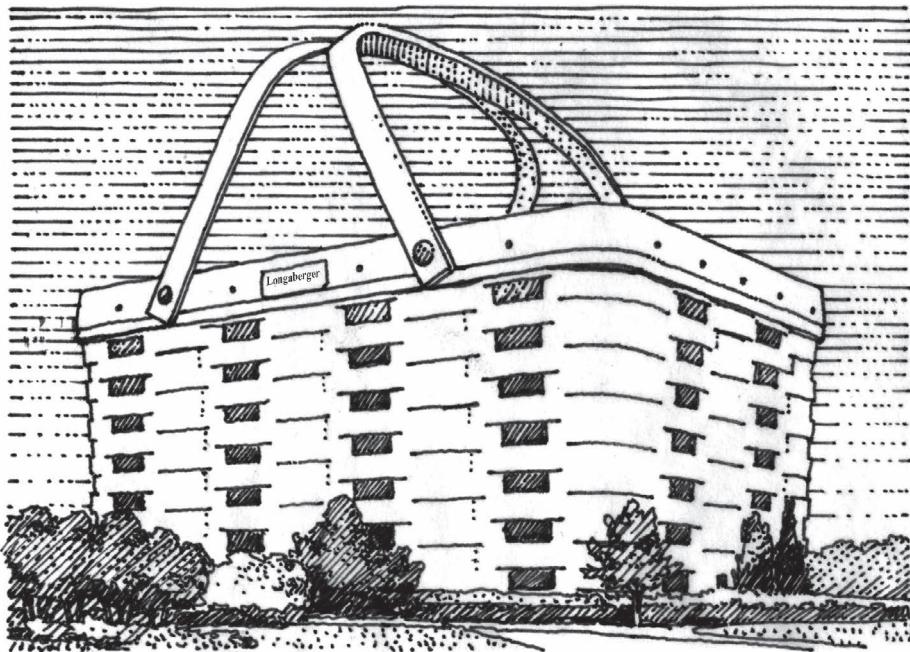


Fig 11.2 Longaberger's old headquarters building in Newark, Ohio, USA

Far from serving as a fallacy, metaphors are critically important in expressing the element of poetry in architecture. For metaphor, at its best, can explore and express the poetry of architecture.

From the earliest ages, architects used metaphor to provide order and meaning to the built environment.<sup>94</sup> Yet metaphor as a stand-in for critical thinking is lazy thinking.

Nothing is a substitute for critical thinking.

### ASK THIS

Why does analogical thinking appear in the critical thinking and not, say, the creative thinking section of this book? Because metaphor can be misused as a stand-in or substitute for thinking clearly and communicating directly.

### READ THIS

*Metaphor: An Exploration of the Metaphorical Dimensions and Potential of Architecture* by Simon Unwin. Consider this volume as an addendum to Unwin's foundational book, *Analysing Architecture*.

# 12: Describe Explain (Rationalise) Justify

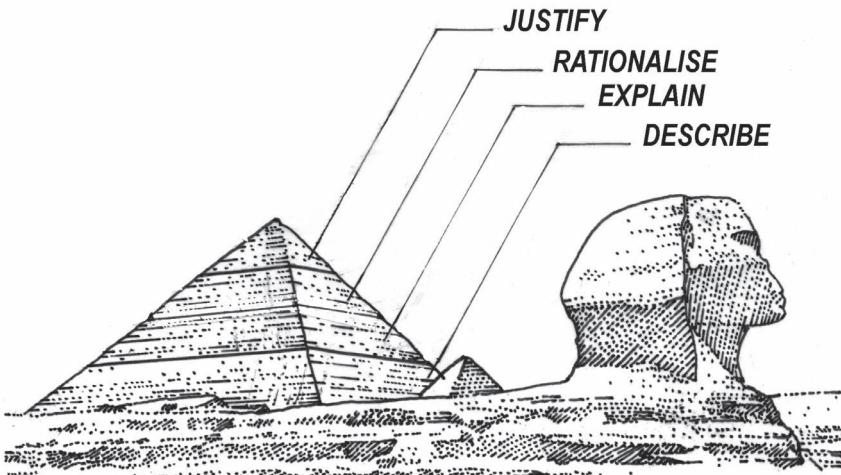


Fig 12.1: Justifications for our architectural acts are built on a solid foundation of reasons, explanations and descriptions

**Architects only need to justify their decisions when challenged, but a good critical thinker prepares for this inevitability.**

Here are two bits of wisdom that pertain to most presentations architects give, from formal crits to design competitions.

The first: Your project is only as good as your weakest image.

A weak image undermines the argument you are making on behalf of your project.

And the second: Know what you are being asked – the so-called *question behind the question*.

The emphasis can be subtle but important. Take the question: *Why did you do that?*

Where's the emphasis? Look at the context of the question. What came immediately prior?

**Why** did you do that?

Why **did** you **do** that?

Why did **you** do that?

Why did you do **that**?

It is important to know what you are being asked to do.

To help you build a thinking repertoire, here are terms to become familiar with so you know what is being asked of you:

### **Describing**

Are you being asked to describe your project? Then literally report what you see: plans, elevations, sections, whatnot.

### **Explaining**

Are you being asked to explain your project? Then you are being asked to share how you arrived at your solution. The emphasis is on *how* – not on you. Occam's razor is often used to find the simplest explanation that fits all facts.

### **Rationalising and Self-Justifying**

Are you being asked to rationalise your project? That's a trick question – because you will never, ever be asked to rationalise why you did what you did. If you respond to a request for an explanation in terms of yourself, you are self-justifying: you're providing a rationalisation. This is sometimes referred to as post-rationalisation, where you are rationalising after the fact as opposed to providing reasons and evidence before you act. Rationalisations are important – they're the stories architects tell themselves for why they do what they do. Just be selective whom else you tell, and consider what you hope to gain by doing so.

### Justifying

Are you being asked to justify your solution? This is rare. You can provide a description or explanation unprompted, but almost no one offers a justification for *why* they did what they did – their solution – without being prompted or asked to do so. A reviewer might ask something like *Tell us how this is a viable solution for the problem you were asked to solve?* In such a case it would be inappropriate to respond by describing the project – they clearly see what you presented; how you arrived at this outcome. They are in essence asking *Why this and not something else?* Your response is a justification.

When justifying your solution, you can appeal to certain authorities: climate, context, economy, aesthetics, codes, etc.

We learned in a previous chapter that architects argue effectively when they appeal to reason, the emotions and ethics.

But a justification would be an appeal to values held by others: especially the paying client – whomever commissioned the project or created the project description – and the *non-paying* client or larger society that will support and use it.

The building might have been oriented a certain way to save energy – to make use of the sun. But the people on the street are unlikely to know this. They will wonder why the building turns its back on its neighbours.

A crit is where reviewers ask of your project a series of questions.

- It is where your project is vetted, scrutinised, questioned, poked and prodded.
- And sometimes it is subjected to public merriment and ridicule – the veritable spanking machine.
- It puts your idea through the ringer to see if it is strong enough to withstand the test of gravity, typology, energy, climate, sustainability, context, regional fit and materials.
- And it finds whether *you* are strong enough to withstand a test of resilience.

In a crit the burden of proof is on you.

So, *have a reason* for doing what you are doing, a reason why you did what you did.

Don't just put a function somewhere because you have the space in your building – make it deliberate, purposeful.

Just like Bloom's taxonomy, introduced earlier, which offered levels of thinking and learning objectives, these steps represent levels of questioning, parts that make up an argument for your solution.

Some responses are more persuasive than others. You want to use the more effective ways to argue your points.

Because they are more effective ways to argue for your idea, you want to use reasoning, logic, evidence, justification, explanation, demonstration – and avoid less-effective self-justificatory behaviour.

Employers and tutors don't just want to take your word for it – that you think critically, creatively and collaboratively – they want to see *evidence* of it in your writing, in your work, in your speaking and in your projects. In other words, in your *behaviour*.

The time may come when clients require architects to justify design decisions by using evidence and hold them accountable by using data: proactive architects will be prepared for such a future.

#### TRY THIS

Responses to reviewers' enquiries are almost always examples of the socialisation of your idea. Think of a review or crit as your idea's coming-out party, where your solution goes from private and personal to public.

#### TRY THIS

Tell a story about what your building will do. Walk the client down the path. Create a narrative. The decisions will appear to be sequential, inevitable. Stories have momentum and their own inherent logic. *I did this then this* is not a story: it is a self-justification. *This led to this which led to this* is a story.

#### ASK THIS

When you are asked a question during a crit, how do you know what is being asked?

#### ASK THIS

Who benefits from your decision? And who will be left out?

**ASK THIS**

Imagine your design is built. Looking back – as though in a rearview mirror: how is the building used? Received? Put yourself in the shoes of a future inhabitant or passerby. What impact does the building have on others? Was this what was intended?

**ASK THIS**

Ask yourself, *What am I being asked?* To justify yourself? Or your decision? To defend your project? To defend yourself?

## SECTION 2: FACTS, FALLACIES AND PHOTOSHOP

## 13: Fact or Fiction?

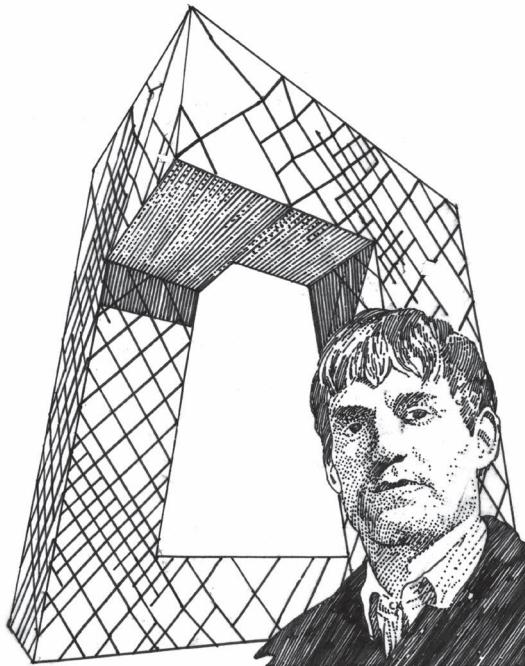


Fig 13.1: Ole Scheeren in front of CCTV

**Architects are like investigative reporters who scrupulously explore details to verify facts.**

Architect Ole Scheeren likes to tell the story of how, when his team was working on the CCTV tower in Beijing, China, many in the office had never worked on a project of that size (their previous largest project was a Prada store), and they felt it was important to understand the scale they were working at. To understand the project's size in terms of human scale, he had his team cut out 10,000 cardboard people and add them to the physical model. In doing so, he had his employees go from imagination to reality, fiction to fact. Architects deal with real people, places and things. Despite the considerable virtual and digital tools available to him, with simple cardboard Scheeren had everything he needed at hand to get his point across.

Meanwhile, we all know the benefits of trees in cities. Urban trees help to save energy, lead to better air and water quality, reduce stormwater run-off, store carbon and increase property values. And a large, healthy tree removes approximately seventy times more air pollution per year than a small, newly planted tree.<sup>95</sup>

In fact, there's even an easy-to-remember acronym on the four primary ways that urban trees affect air quality:

**T**emperature reduction and other microclimatic effects

**R**emoval of air pollutants

**E**mission of volatile organic compounds and tree maintenance emissions

**E**nergy effects on buildings<sup>96</sup>

But, fact or fiction, what about the claim that greenery may also make cities safer, especially in low-income, blighted areas?

A growing body of research suggests buildings surrounded by lots of foliage saw 56% fewer violent crimes. Let's briefly explore that claim.

By comparing aerial photos and police crime reports, researchers calculated that buildings still surrounded by lots of foliage saw 48% fewer property crimes, on average, and 56% fewer violent crimes than buildings with low levels of vegetation. In one city, tree loss was associated with an uptick in property crimes, assaults and violent crimes

To be clear, the analysis doesn't prove the trees caused the phenomenon. But a small but growing body of research supports the idea that trees can have a calming effect on crime.

If you shared this claim, you might be asked what, exactly, makes foliage a possible deterrent to delinquency? Researchers have a few ideas:

Some say trees might signal that the area is well cared-for, similar to the 'broken windows theory' which suggests that disorder invites crime.<sup>97</sup>

Some say green spaces make an area inviting and can lead to more informal surveillance, or 'eyes on the street'.<sup>98</sup>

Other theories point to the well-documented calming effect of vegetation, or the idea that greenery promotes trust within a community.<sup>99</sup>

Let's look at another fact – this one an example of critical thinking in green architecture:

Fact or fiction? Cutting down trees to make buildings does not sound environmentally sensitive.

That, of course, is not a fact but an opinion – in part because mass timber wood could be harvested from sustainably managed forests,<sup>100</sup> but as importantly, the sentence should have clued you in on what rendered the sentence someone's opinion: the phrase 'does not sound'.

Fact or opinion? Wood is more dangerous to build with because it is more flammable.

There's the question: more dangerous for whom? But generally, it's an unsupported fact, i.e. someone's opinion, because the evidence doesn't bear it out.

It is a fact that while wood is combustible, structural members of treated engineered wood in a fire form an insulating layer of char before the strength of the member is significantly impaired, making it not more dangerous to build with.

How about the oft-heard claim that wood is stronger than steel?

Pound for pound, wood *is* stronger than steel.<sup>101</sup> But the source of the quote shows that the claim is made not by a researcher or scientist, but by a manufacturer, i.e. someone with a conflict of interest who might benefit from your believing the claim.

Facts are admittedly hard to prove, but prove we must. In one test, wood was slightly better than steel in relation to fatigue and stress of a simulated earthquake,<sup>102</sup> but one test does not a fact make.

On the other hand, science demonstrates that untreated wood is rarely as strong as metals used in construction,<sup>103</sup> and while we're on the topic, it is true that wood can be *transformed into* a material that is stronger than steel.<sup>104</sup>

That a structure supports a building, except of course when it doesn't,<sup>105</sup> or that a roof is intended to protect the structure from the elements are both examples of facts.

Let's now explore the claim that architecture – through elements like space, light, geometry and materials – can impact our mood.

Taken at face value, it is not an evil claim with malicious intent. No one is deliberately trying to dupe you by getting you to believe the claim – however increasingly cited – that architecture can impact people's wellbeing and moods.

Numerous studies document *healthy building* impacts such as reduced illness and absenteeism among workers, higher worker productivity, higher test scores among students, and greater workplace satisfaction.

Natural light, for example, can help hospital patients to recover and school pupils perform better.<sup>106</sup>

But still, despite articles stating that *numerous studies show* ... what is the science behind such a claim? What, in other words, are the facts?

We know that people in modern societies spend 90% of their time indoors.<sup>107</sup> We also know that buildings can impact a person's health.<sup>108</sup> IRL the information we find is not black and white – it still requires us to make informed judgements, for example by finding and citing a tutor whose research is legit.<sup>109</sup>

### TRY THIS

Follow this line of thinking concerning indoor air quality (IAQ). One of the responses to the energy crisis of the 1970s was to seal up our buildings in order to reduce heating and cooling loads. But an unintended consequence of doing this was stagnant air. We know that indoor air is on average two to five times more toxic than outside air.<sup>110</sup> This led to the rise of sick building syndrome,<sup>111</sup> so we allowed our buildings to breathe more. But an unintended consequence of this was raising heating and cooling loads. Passive House (Passivhaus) does not recommend that we seal our buildings (they are better insulated and much more airtight than regular builds). Will airtight buildings lead to another rise of 'sick' buildings? One can always open a window, but opening a window wreaks havoc on the mechanical consultant's mechanical system. People can unintentionally leave windows open. And so on ... This is the kind of back-and-forth thinking that architects do when making difficult decisions.

### TRY THIS

Some problems are inconclusive: open vs closed office plans? Which lead to increased productivity and wellbeing? Happiness? Gensler recently redesigned its Chicago offices as open. Research this topic and see if you can find conclusive evidence one way or the other. Note: Some generative design tools are being used to design office layouts but lack common sense as criteria for selection.

**ASK THIS**

What is a fact? Is a fact something that is based on objective reality and, using evidence, can be proven to be true?

**ASK THIS**

Next time you have a design assignment, and are considering shopping for a design online, consider the source. Where did you get your ideas? Ching? Google? Instagram? Your imagination? Many find projects that they like online and *Ctrl+C Ctrl+V* the project, using it to serve as inspiration for their design. Did you read up on the project to understand why it is the way it is, why certain decisions were made? What its location is and the influence the region had on its design? For example, Alvar Alto's work doesn't make sense out of context, because Alto was all about context. So, copying his building details verbatim doesn't make sense in another context.

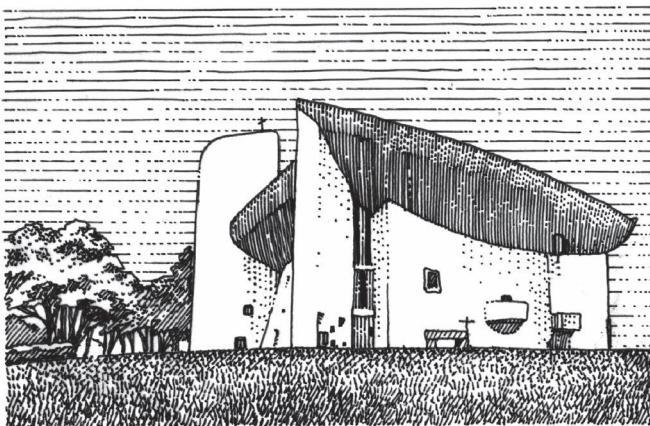


Fig 13.2: Notre-Dame du Haut, or the chapel in Ronchamp by Charles-Édouard Jeanneret, or Le Corbusier?

**ASK THIS**

Because it departed from his architectural principles and machine aesthetic, Ronchamp is unlike anything in Le Corbusier's oeuvre. Therefore, Le Corbusier must not have designed Ronchamp, seen here in Figure 13.2 but instead – and this is a fact – the architect Charles-Édouard Jeanneret designed the site-specific chapel at Ronchamp. Yet, that Le Corbusier designed Notre-Dame du Haut, the chapel in Ronchamp, France, is an irrefutable fact. So how do we explain the discrepancy? By realising that Charles-Édouard Jeanneret was Le Corbusier's name at birth before he changed it and so they are one and the same.

Having fun? Let's do another one.

### ASK THIS

For 50 quid: fact or fiction? The Olympic stadium designed by Jan Wils for the 1928 Games earned the architect an Olympic gold *in architecture*? Fact. How do we know? During the first four decades of the modern Olympic Games, 151 medals were awarded for the arts ... including architecture.<sup>112</sup> We find a reliable, trusted source – then another and another – until we're assured the claim is corroborated and no longer refutable. That's how.

### ASK THIS

Fact or fiction? The designer of the Vietnam Memorial in Washington DC, Maya Lin, is the niece of the first female architect in modern China, Lin Huiyin? Find more than one reliable resource that either backs up or refutes this claim. Start here.<sup>113</sup>

However trivial, these architecture facts that seem untrue are true – and are indeed facts – because they can be proven with evidence. And not just because the internet says so.

There is corroborating evidence from reliable sources in the form of written biographies and history books, historical designations that provide proof beyond a reasonable doubt.

Regardless of source, discriminating architects-to-be should get in the habit of being more like investigative reporters who scrupulously explore details, verify facts and probe original sources for themselves.

Separating facts from intuition, rationalisations and specious heresy requires us to demand quality information from quality sources.

Architects have the responsibility to try and separate information that's relevant and useful from less helpful distractions.

Just like your parents told you to *consider the source* when someone said something that upset you, *consider the source* is excellent advice when seeking data, information, knowledge and wisdom.

Too often we conflate information with opinion. In fact, only 9% of fifteen-year-olds can tell the difference between fact and opinion.<sup>114</sup>

## 14: Facts Matter

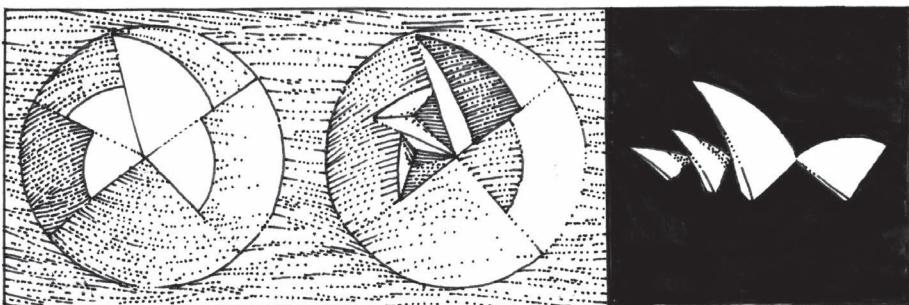


Fig 14.1: Jørn Utzon claimed that the final design of the Sydney Opera House's shells was inspired by peeling an orange. True or not, the solution can be demonstrated in this way

**Architects trust,  
but verify.**

True or false? A cow's weight can vary by up to 75 pounds in a day.<sup>115</sup> Ducks and bees can see ultraviolet light?<sup>116 117</sup> The last country to outlaw slavery did so in 1981?<sup>118</sup> The advantage for STEM (science, technology, engineering and mathematics) graduates fades steadily after their first jobs, and by the age of forty the earnings for graduates in social sciences or history have caught up.<sup>119</sup>

As you might have guessed, these are indeed facts – and are all true.<sup>120</sup>

But all, except perhaps the last two, are also trivial. Nice to know perhaps to impress your studio mates – but not really must-know information.

Now, let's try a few more.

True or false: Penn Station is today the busiest transit hub in the Western Hemisphere, through which more than 600,000 commuters pass each day?<sup>121</sup> The twenty warmest years on record have all come in the past twenty-two years?<sup>122</sup> The number of airline passengers worldwide has more than doubled since 2003?<sup>123</sup> Across the world, only 9% of all the plastic ever made has been recycled?

Just like the first group, these also are all true.<sup>124</sup> But you might find these to be more applicable to your area of study or career – especially if you are designing, say, for transit in NYC or an air terminal in another city.

Facts matter to architects because architects are educated, trained and responsible for the health, safety and welfare of the public.

Seventy per cent: the percentage of energy use in UK buildings devoted to heating. Nineteen per cent is devoted to cooling, 7% is devoted to hot water, and 4% is devoted to lighting.<sup>125 126</sup>

Architects are drawn to and many collect facts – relevant facts – such as the ones above, well in advance of needing them, that help support arguments they make on behalf of their designs.

In a world surrounded by *alternative facts*, architects don't take facts, statistics, metrics and data at face value – they verify that the source is a reliable one.<sup>127</sup>

When considering whether or not to reference a fact, architects recognise the need for common sense, to think for oneself – independently, while considering other sides.

And they make sure that the fact is relevant for their intended use. Because while facts matter, as important is your ability to evaluate them.

**TRY THIS**

While writing this chapter, a meeting I was to attend across the country, to address the impact of climate change on the future of architectural education, was cancelled. The host said the cancellation was due to budget cuts: they were being sensitive of spending at this time. Another reason they could have given for cancelling the trip that wasn't mentioned: meeting virtually vs in person can help save costs while reducing the carbon footprint, given the purpose of the meeting – a relevant reason for not travelling. Think of a problem that you have or announcement you have to make and come up with multiple reasons why. While all may be true, one may have more of an impact when you consider the situation, timing and audience of your message.

**ASK THIS**

You're designing a tower in a residential neighbourhood. The neighbours are against having your tower built due to increased traffic it will cause – but realise this argument didn't stop previous towers from being approved for construction. The neighbours hire an architect who determines that your tower will cast a shadow on a nearby playground for two hours a day, and a psychologist who attests that children's growth and mental development can be stunted when they are unable to play in sunlight. You are not an expert on child development, so cannot speak to whether their claim is true. What questions could you ask that would potentially undermine the expert's claim?

## 15: Evidence-Based Ideas



Fig 15.1: The burden of proof is on you – the architect. The more credible your evidence, the better

**It is down to the architect to present evidence in support of their design decisions.**

When it comes to building design, what is meant by evidence?

Evidence refers to information that rationally supports a design decision in the form of a hypothesis or point of view.

Evidence-based design then is simply when you base your design decisions on evidence.

Evidence doesn't have to originate in science, an industry-endorsed website, or from an authoritative resource such as a reference book.

Unlike forensics, design ideas can come from many sources – including oneself.

Architects use evidence all the time. Evidence can come from you – your intuition, your experience – and doesn't have to come from a rigorous investigation of credible sources.<sup>128</sup>

## Show me the evidence

Some architects prefer to have data drive the design.

Some architects prefer to come up with a design, then provide evidence later.

The thing to avoid is post-rationalising design decisions – where excuses are offered to back your ideas in lieu of evidence. Most clients don't want reasons but results.

While some firms invest in research, collecting data via sensors and other means, most projects don't warrant or allow for lengthy, involved analysis and testing to support decisions. As with justification, you usually only have to provide evidence when asked.

The thing is, when asked, the burden of proof is on you. You don't want to support your design decisions with opinions and heresy when you can back them up with facts.

That said, you need to consider your audience, as it has been demonstrated that even facts don't always change people's minds.<sup>129</sup>

Even when evidence for your ideas isn't requested or required, having it can only improve your design decisions – both for yourself and others.<sup>130</sup>

### ASK THIS

Is the requirement to provide evidence for one's ideas too limiting and rigorous an expectation for an art form such as architecture?

In architecture – which is a science and an art – what is considered evidence?

## 16: Information Gathering

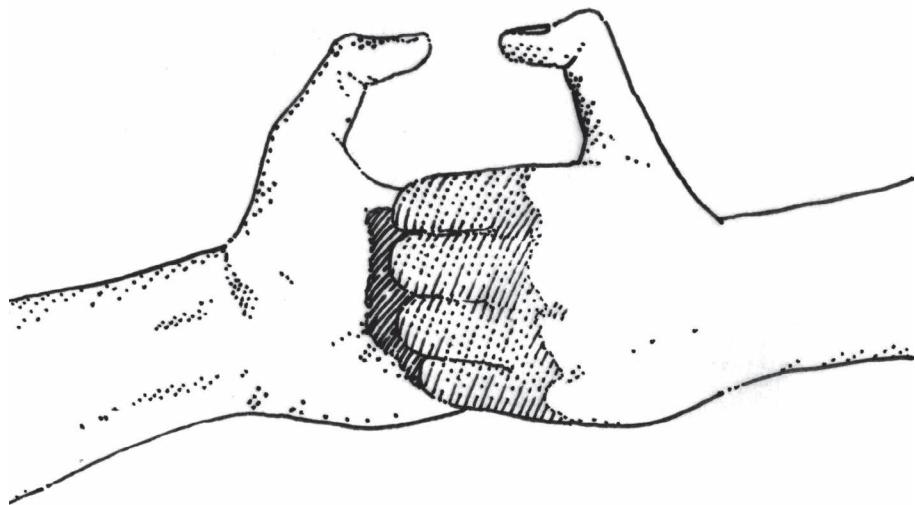


Fig 16.1: The opposable mind, like the opposable thumb, demonstrates the brain's ability to hold two conflicting ideas in constructive tension

**Architects move  
from not knowing  
towards knowing by  
gathering information.**

When faced with a problem, engineers seek a solution. Architects add an element between the problem and solution that makes all the difference: an idea, sometimes referred to as a big idea. Then they iterate – or refine – the idea. In a sense, the design process becomes a kind of *refinery* for ideas. The architect gathers information and is expected to synthesise all of the information obtained from numerous sources.

Students need to graduate with one more tool in their virtual toolbox: an ability to gather information, then integrate it seamlessly into their projects,<sup>131</sup> recognise misinformation when confronted with it, and differentiate reliable from superficial sources.<sup>132</sup>

When your tutor or employer says they want you to think critically, what they primarily want is for you to develop into an architect who can tell truth from lies and fact from fiction.

Simply put, when you work on a project you are going from a state of not knowing to knowing. When gathering information, don't settle for the first answer you find. See things from multiple perspectives – including points of view that are at odds with your own.

Like the fact that people have opposable thumbs – a characteristic of primates that allows digits or fingers to grasp and handle objects – the idea of the *opposable mind* is that we can hold two contradictory ideas in our mind (for example, your idea and that of your tutor) and still be able to function. The brain's ability to hold two conflicting ideas in constructive tension is an important skillset, enabling decision makers (such as architects) to synthesise new and better ideas.<sup>133</sup>

## What information?

Architects work with information found from reliable sources including online sources and other types – such as yourself – in the form of intuition, experience and prior knowledge, but not preconceived ideas or preconceptions from their past.

A few useful tips for analysing online sources:

- Scrutinise the domain name
- Read the 'About' section
- Look for a lack of quotes
- Is the person quoted a reputable source?
- Don't share or spread false content

'The most essential gift for a good writer is a built-in, shockproof, (bull) shit detector,' said Ernest Hemingway.<sup>134</sup> With perhaps the exception of the colourful language, the same is true for a good architect.

Architects defend their design ideas – sometimes referred to as their design intent – with instinct and intuition. They are increasingly backing up their design ideas with public and private data, because data is becoming a universal language understood and, when reliable, trusted by all.

### TRY THIS

Architects consider opposing arguments or views that contradict their own even if they make them feel uncomfortable. This is what is meant by *cognitive dissonance* – the discomfort one feels when simultaneously holding two thoughts that are in conflict.<sup>135</sup> F. Scott Fitzgerald called this the test of a first-rate intelligence, ‘the ability to hold two opposed ideas in the mind at the same time, and still retain the ability to function’.<sup>136</sup>

### ASK THIS

Architects scrutinise. They are amiable sceptics who don’t take things at face value. They want to understand what makes things work. So, when given a problem to solve, ask: What do you know? What do you know to be true? How do you know? What is the source?

### ASK THIS

Name three things that the leveraging of data can accomplish in architecture and design. Why is it necessary for architects to back up their design ideas with data? What makes data a particularly effective means for explaining, defending or justifying one’s design decisions?

### READ THIS

Professor Melissa Zimdars offers many more in-depth tips for analysing news sources in *False, Misleading, Clickbait-y, and/or Satirical ‘News’ Sources*.<sup>137</sup>

### READ THIS

*Seeing and Making in Architecture: Design Exercises*  
by Taiji Miyasaka

## 17: Seeking Clarity

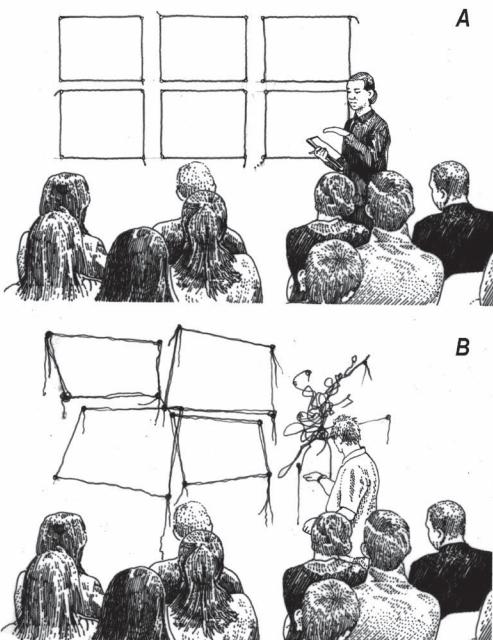


Fig 17.1: Two students pin up for a review. One student's work is presented in a clear and straightforward way. The other?

**An architect is  
someone who makes  
sense of the 10,000  
things that go into the  
making of a building.**

A student pins up their boards for a review. Their design work is presented in a clear and straightforward way.

A second student is unprepared, their presentation unfocused, with no coordination between the plans, elevations and sections; they are missing information that would help reviewers understand the project more quickly and assuredly.

The focused and disciplined presenter has something a lot of people lack: coupled with empathy (considering the reviewer's time and energy) and a deep understanding of the assignment (what was asked of the student), not just in general terms but also specifics, is the ability to think clearly and communicate what they come up with in a clear way.

If your building is hard to navigate, if its circulation leads people into a rabbit warren or on a wild goose chase, so they never arrive at their destination – your goal as the architect must have been to obfuscate. Why else was the building designed this way?

I tell my students that 10,000 decisions go into the making of a building. That's quite a mess.

When you start a project, think of the mess of data or information gathered about the project as a tangle of yarn.

Each line or strand (in the mess) represents something that needs to be accommodated.

Each is either an adjacent, related or competing force.

Each represents criteria that need to be prioritised.

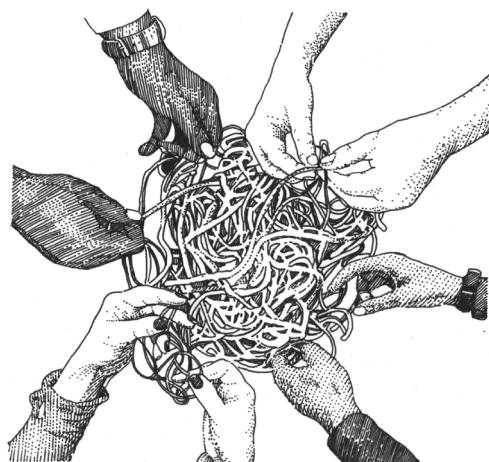


Fig 17.2: Knitters with hopelessly tangled yarn – *detanglers*

## How to wrangle this mess

Thinking like an architect is a bit like being a data wrangler, where data + wrangler = detangler.

As Figure 17.2 illustrates, knitters with hopelessly tangled yarn are *detanglers*.<sup>138</sup>

Architects are too. For that is what you are, a data detangler.

Making disparate pieces of data manageable, understandable and meaningful.

Your goal is not to keep the mess from getting out of control – but to make sense of the mess.

You are also a bit like a lion tamer when you are taming a mess.

In detangling the mess, you are seeking clarity, always looking to clarify and to simplify.

The same goes for architects who need to review what they come up with – what they design – with a critical eye, and remove the offending parts, the parts that do not add to the whole, the parts that obfuscate and don't make clear.

Architects don't solve anything by throwing more stuff at a problem to see what sticks. By removing things – by playing a veritable game of pick-up sticks with their design – architects arrive at clarity.

### TRY THIS

There's a tendency at the start of your career to put every idea you ever had into your project. I have walked through architects' first projects that look like Museums of Every Idea the Newly Minted Architect Ever Came Up With in their Sketchbook. It is OK to be eager – designing your first building and seeing it built is an extraordinary experience. But take a breath. As you mature as a designer, you realise that there will be more than one opportunity – this won't be your only chance – and you become more selective in what you put in and what you leave out.

---

**TRY THIS**

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Another way to seek clarity is to follow the classic advice for writers: *kill your darlings*. Writers are advised to find their favourite line and delete it. The thinking is that a favourite line or paragraph made it into the final draft because the author particularly liked it or is otherwise (irrationally) attached to it, and is therefore blind to the fact that the (offending) words don't add to but take away from the completed piece: an example of how *all writing needs to be self-editing*.

---

**ASK THIS**

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Looking at the mess under a magnifying glass, you will see that some strands are more important than others. But in what way? To whom? Each strand in the tangle cries out for attention: honour me! In this way you can start to build a wish list for your building.

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**ASK THIS**

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Clarity starts with you. First and foremost, your intention has to be clear. Do you intend to *mean* – to connect, to make clear – or to obfuscate? People assume that what the architect did was intentional, whether it was or not. You might as well make what you do intentional.

---

**ASK THIS**

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How do you communicate with yourself? It will be a *tell* (like in poker) for how you communicate with others. Are your sketches clear? Are your annotations or journal entries clearly articulated? Even if not meant for public consumption – they are for your own eyes alone – what kind of conversations are you having with yourself? What is the quality of these chats? Are you being clear to you? If yes, you are more likely being clear with others. To be clear with others you first need to be clear with yourself.

**ASK THIS**

You are about to present to the jury. Are you about to make their lives hard – or easy? How hard have you made finding answers to questions they may have about your design? How clear is the information you are about to present? Are the plans oriented the same way? People like to work with (and support, and hire) those who make their lives easier – not unnecessarily harder. That's not to say your project needs to spell everything out and be obvious. The best art and architecture is rich enough to work on several planes. Aim to be like Shakespeare – where you address the plebeians – the base, the masses – using straightforward information simply expressed, but also more advanced or educated patrons. Be like Rudyard Kipling in his poem 'If': 'If you can talk with crowds and keep your virtue, Or walk with Kings – nor lose the common touch'. Ideally, your work communicates clearly enough to address and speak to all audiences.

**READ THIS**

*How to Make Sense of Any Mess: Information Architecture for Everybody* by Abby Covert

## 18: Fallacies and Myths

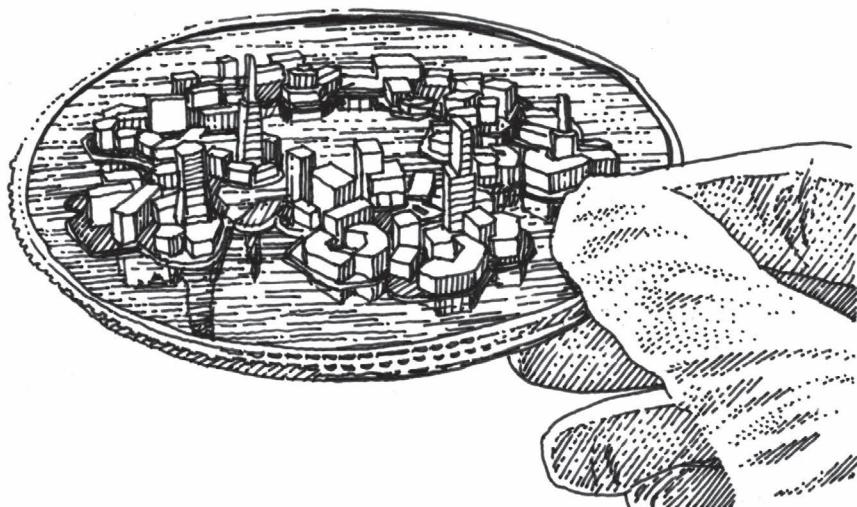


Fig 18.1: Floating city in a petri dish. Are floating cities a good plan for the future – or magical thinking?

**Architects familiarise themselves with fallacies in thinking so they can catch themselves and others who resort to them.**

Recently, in response to the climate crisis, architects, students and other visionary types have been floating the idea of floating cities. Are floating cities a good plan for the future – or magical thinking? Practical or unrealistic? Supporters say that it would be magical thinking to *not* consider floating cities.<sup>139</sup> What do you think? Why? Floating cities may in the past have been seen as whimsical or fanciful – but are they worth another look?

More people are moving to cities. There will be a need to house more people in cities as seas and populations rise, and people are displaced. Perhaps building offshore habitats comprising many of the same services and places afforded by the world's best cities will address these needs? Time is short and we need to strategically look at realistic and effective solutions.

Fallacies are statements that are logically false, but which often appear to be true.

You want your design to be approved and also liked, so you use what you can to gain approval. Your brain resorts to using half-truths or altogether untruths – using fallacies to support your argument – whatever it takes.

Aristotle listed thirteen fallacies; today, over 100 have been identified.<sup>140</sup>

Many fallacies rely on appeals: to tradition, to fear, to pity, to novelty, to authority.

Architecture tutors are susceptible to myths based on erroneous information about the brain. For example, it is widely assumed that students learn best when they're taught according to their preferred learning style. Most architecture students, for example, prefer to learn visually. But this idea is false. Research<sup>141</sup> suggests that there is not only no evidence to support the idea that people learn best when taught in their preferred learning style, but that doing so may actually hinder learning.<sup>142</sup>

## Debunking myths

It's easy to buy into the hype, especially concerning a new product or technology. Take for example smart cities such as now cancelled Google spin-off and Alphabet company Sidewalk Labs in Toronto, Canada. It is a smart city that uses sensors, data and ever-present cameras in an increasingly complex network to increase their efficiency, safety and sustainability, while raising questions about privacy and bias due to prevalent use of algorithms for automated decision making. Architects can't afford to take hype at face value, instead needing to question and when necessary debunk myths put forward as 'the next thing'.<sup>143</sup>

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**TRY THIS**

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According to *The Debunking Handbook*, an effective debunking requires three things. To avoid sharing and exposing the misinformation, the rebuttal or disproval should focus on essential facts rather than the myth. Precede any mention of a myth with the word *alleged* or a warning to notify readers that the information you're about to mention is not true. Lastly, when refuting the myth include an alternative explanation – especially one that accounts for significant qualities in the initial misinformation.<sup>144</sup>

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**TRY THIS**

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Familiarise yourself with fallacies in thinking so you can catch yourself when resorting to them – and catch others when they use them on you, so you're not swayed.

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**ASK THIS**

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What technology would be needed to help create floating cities? What would the project's merits be? What are the challenges? Where should the first floating city be built? Where is the greatest need? How would it be paid for? Hint: All three of these last questions can be answered with the one fact that in most countries offshore waters can be inexpensively leased.<sup>145</sup> Does it make sense to place the greatest populations in the path of increasingly lethal storms rather than on dry land? Does it make sense to focus on solutions in response to climate change rather than putting our attention, creativity and resources into stopping climate change?<sup>146</sup>

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**ASK THIS**

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A fallacy in architectural design may include the belief that traditional architecture is nostalgic, sentimental, Disneyesque dishonest pastiche, while modern architecture, in contrast, is honest and authentic. What does it mean for architecture to be honest?<sup>147</sup>

**READ THIS**

Professor and former architecture school dean Douglas Kelbaugh writes of seven design fallacies that can be found in professional practice and in studio culture at most schools of architecture, in *Seven Fallacies in Architectural Culture*.<sup>148</sup> A few of the seven self-imposed and externally driven fallacies consist of The Forgotten Middle – where architects serve only the rich and poor; The Solo Artist – where architecture is practised primarily as personal expression; and Mandatory Invention – on the difference between originality and creativity.

**READ THIS**

*Why People Believe Weird Things: Pseudoscience, Superstition, and Other Confusions of Our Time* by Michael Shermer

**READ THIS**

*The Debunking Handbook* by J. Cook and S. Lewandowsky

**READ THIS**

Robin Evans's *Translations from Drawing to Building* represents a debunking of the common architectural myths associated with notions of drawing buildings and building drawings.<sup>149</sup>

## 19: Assumptions and Beliefs

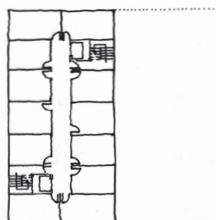
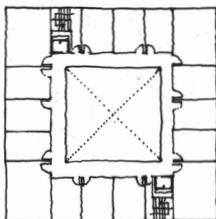
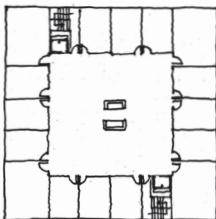


Fig 19.1: Alternative hotel plans

**Architects let what they are already familiar with inform what is new and unfamiliar.**

You're given a 40m x 40m site and asked to design a high-rise hotel with sixty guest rooms. You decide to build out the site by making the first floor the size of the site: that's good urban design. After laying out the ground floor public spaces you start laying out the typical guest room floor. At first you do so using the entire site. Rooms need light, so you put them along the perimeter. But there's all this space in the middle! You have 85% more space on each floor than you need so you add a few sofas and make the core a lounge. The sofas look kind of lost. Do people hang out outside their private guest rooms with other hotel guests? You never have – but maybe other people do? Make it circulation? Wait, make it an atrium. OR – instead of trying to solve a problem that you created – make the guest floor footprint smaller than 40m x 40m!

At first, the typical guest room floor was given the same footprint as the ground floor, 40m x 40m, because it was assumed that you needed to build out the site on the upper floors rather than ask how big the floor plate needed to be based on the rooms + circulation: which turns out, without an atrium, to be *much* smaller than the first floor building footprint. Less area on the upper floors means there ought to be more money to spend on the ground floor public spaces shared by all.

This is one example of how the assumptions we make can shape our thinking process when we design.

And how often the problems we solve are those we created in the first place.

Why does this happen? You wouldn't deliberately give an answer in a maths or science class that was 85% off.

This happens when designers are not aware of the alternatives or options available to them (e.g. redesign), or because they lack curiosity (e.g. What do other hotel guest room floors look like?), because they lack rigour and critical thinking, or because they feel like they don't have agency (believing *it is what it is.*)

Don't blame yourself for making faulty assumptions: assumptions are necessary. Like hypotheses in science that you prove or disprove, they're different from facts and you need to recognise when you are making one.

To think critically requires you to recognise your own point of view, and the assumptions that frame how you look at and interpret the problem you are trying to solve.<sup>150</sup>

Recognise the difference between a belief and argument. Beliefs are preconceived ideas and can keep you from innovative, creative thinking – especially when the beliefs are wrong, are not held by others, or are unnecessary. Beliefs can hold you back, keeping you from seeing what is there, envisioning what is possible and attaining insight.

Get to know your beliefs; become familiar with what you believe and why. You are not a blank slate. You bring with you life experiences. Don't discount them – they are your strength. Instead of seeing yourself as a blank slate, with no beliefs or prejudices except those that must be scrubbed clean before your true education can begin, recognise that there is value in the experiences you have had prior to entering architecture school or the profession.<sup>151</sup>

For one, you are or will be designing for non-architects. Since you are currently or recently were one yourself, you will never be able to relate to your project's users more than you do right now. This point of view is your superpower – don't discount it.

Don't throw the baby out with the bathwater, but instead let what you are familiar with inform the new and unfamiliar.<sup>152</sup> Simply by having lived in the world, begin with the premise that you actually know more about architecture than you know about almost anything else.

Our core values inform our worldview and how we think by influencing the way we interpret information. We have a tendency to cling to our beliefs even in the face of evidence that contradicts them. We feel comfortable sticking with our beliefs in the face of challenges to them – as when you have a desk crit, and you receive feedback that may contradict an idea or thought that you value or hold dear.

Your beliefs don't represent objective reality. They're made up of partial truths, selected facts and subjective experiences. Your beliefs blind you to opportunities to improve your design, and from exploring valid possibilities. Because beliefs are subjective and personal, we associate with them, and come to feel that we are inseparable from them. In order to change our beliefs, we need to change ourselves, and that requires work.<sup>153</sup>

There's a saying: *Unless the pain of not changing is greater than the pain of changing, I'm not going to change.* In other words, change only happens when the pain of staying the same is greater than the pain of change. That's why change is so hard – and why banking on changing ourselves is not always a good bet.

### TRY THIS

Like assumptions, beliefs can deceive. It's hard, but try to understand what beliefs you hold. Beginning in the early 1950s, radio pioneer Edward R. Murrow asked people from all walks of life to write brief essays about their most fundamental and closely held beliefs that became a popular five-minute radio programme. Write a *This I believe ...* statement for yourself, listing what it is you believe, and asking what are your most closely held beliefs.

**TRY THIS**

In lieu of holding on to beliefs that might work against you and all you want to achieve, consider *pragmatism*. Beliefs are limiting and self-limiting. When making an important decision about yourself or your career, instead of asking what you believe, pragmatism asks: What would work for you? What would be nurturing? What would be growth promoting? Do that instead. Instead of trying to change your beliefs, get to know yourself better: what motivates you, what your likes and dislikes are. When challenged, reframe what you do in terms of pragmatism.

**ASK THIS**

Does doing what you are about to do work for me? Will it help me or my project move forward? If yes, irrespective of everything else, do it. Go with the suggested change. Don't ask: Do I like it or not? Or, does it fit my worldview/philosophy or not? Instead ask: Does it work?

**ASK THIS**

Are memories a type of belief? As they are private, your memories may be personal and not shared by others, so question them. Are there shared memories? Part of the collective unconscious? How do you know? Referencing projects you've seen and places you've been to, memory can play tricks on us so can be unreliable: what we remember may not be what happened. How important is historical accuracy in the memory you are referencing, leveraging or using to inspire or inform your idea?

**READ THIS**

*Liminal Thinking: Create the Change You Want by Changing the Way You Think* by Dave Gray

## 20: Biases

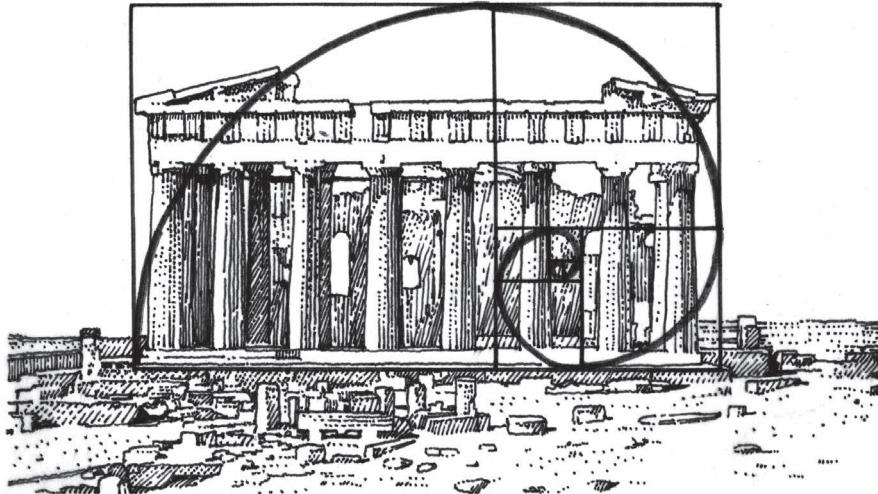


Fig 20.1: Was the Parthenon designed using the golden ratio – the hidden maths that allegedly explains beauty?

**Architects turn  
their biases from  
compulsions  
to preferences  
and choices.**

Was the Parthenon designed using the golden ratio – the hidden maths that allegedly explains beauty? Or is this an urban legend with little or no science to support it?<sup>154</sup>

Before we answer that, what's a bias? If a reader in the UK said they wouldn't read this book because it was written by an American, that would be a bias. Their bias? Well that depends, but some might say that, with rare exceptions, American authors or US architects have nothing to offer a UK architect.

So why look beyond our own biases? Doing so provides us with diverse points of view and perspectives, enabling us to become more well-rounded designers, not to mention better humans.<sup>155</sup>

When architect Robert Adam describes the three fallacies of classical architecture, he is only really defending a preferred style. It's his word – as an authority – against yours (a comparable novice) that classical architecture is relevant, doable, buildable and desirable.<sup>156</sup> But that's his bias – it proves nothing.

I once had an architect colleague who only would work on modern buildings – which she defined as contemporary buildings with flat roofs. The problem was that at that time our firm did primarily traditional architecture. She didn't last long. What she needed to do was turn her bias for modern architecture to a preference (that, or go and work for a firm that only did modern architecture).

Like assumptions, biases are important and even necessary. They're one of the ways architects distinguish themselves – and enable prospective or potential clients to tell them apart. But architects need to turn their biases into preferences, or at least a higher-order bias that is less a compulsion – where you adamantly *must* do something – and more of a choice.

The problem with approaching your assignment with biases is much like doing so with preconceptions. It allows for less innovation and fewer fresh ideas. Instead of reframing a problem, someone who approaches a problem with strong biases doesn't make room for new ideas. They are less likely to listen or seek out ideas from others. In doing so, they demotivate others around them because they appear to already have their solution. That solution may please and, importantly, convince them, but will it do so for others? Or address others' needs? Working from one's biases doesn't leave room for empathy – or empathising with others and their needs.

Biases of course aren't limited to humans. Attempting to solve problems with technology doesn't preclude the possibility that there will be biases inherent in the data or baked into the algorithms we use to generate building designs. This is a good thing to be cognisant of as we move forward.

Oh, and the golden ratio? It makes for a cool graphic but is total made-up nonsense.<sup>157</sup>

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**TRY THIS**

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One way to overcome biases is to ask questions. In this book, question asking may seem like the panacea for whatever ails you. That's because it is! Challenge your assumptions and biases – and those of others – by asking penetrating questions.

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**TRY THIS**

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When asked to design a home or chair, beginning design students tend to reference houses or chairs that are favourites of theirs or that they are familiar with, and end up replicating them in their own designs instead of letting go of familiar examples. That is why their tutors will try to get them to let go of preconceived ideas, biases and assumptions, and address the unfamiliar. Every time I assign beginning students to design their dream home, most design a suburban split-level home similar to the one they grew up in – because that is all they know. Your tutor's job is to help you to see beyond the familiar. They help students to let go of preconceived ideas and biases by keeping them off-balance.<sup>158</sup>

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**ASK THIS**

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This is something architects also need to consider: if using a generative design tool, what assumptions and/or biases were baked into the algorithms? Also consider what data was used to come up with optimised design solutions. How do you know? Always ask: *Optimised for whom?* Biased data and algorithms can lead to biased conclusions.<sup>159</sup>

## 21: Facts, Fake News and Photoshop



Fig 21.1: One architect has taken the extreme step to ban renderings from their design process

**Instead of over-promising and not delivering, architects under-promise and over-perform.**

Due in part to our rendering tools' ability to stretch the truth or render designs in terms of all-out lies; in part because the rendering fixes an idea of the design when in the process it is still very fluid; and in part because they discourage a collaborative approach to design, at least one architect has taken the extreme step to ban renderings altogether from their design process until the final design stage,<sup>160</sup> opting instead to present models, sketches and collages which can accommodate changes, unintended inaccuracies and mistakes. Perhaps in time we will see more of this among other firms?

Firms are increasingly designing in Photoshop, setting client expectations, misleading themselves and others on what they can deliver.

They don't do this deviously, but due to expediency. It's just easier and faster. If the project doesn't get the green light, nothing is lost.

The problem comes when the firm is given the go-ahead to move forward and the design must become a viable building. Some firms discover that what was presented in their renderings over-promised and cannot be replicated in drafting or modelling programs. In such cases they have to back-pedal with their client, or hope the revised design – including its parameters such as height restrictions and unit count – will be overlooked.

Today there's arguably an over-reliance on technology. Designing using the computer can be constraining, yet designing in Photoshop can have the opposite affect – where it's too easy to lie to ourselves and, worse, to others.

As technology improves, so does the seeming completeness or realism of a design, however early in the design process or under-cooked it may actually be. Research shows that the more complete drawings appear, the more clients and others with a vested interest in a project assume the design to be final or complete. Such a misreading of the design – and the architect's intention – can lead to a reduction in interest in engaging and collaborating, since it assumes that most of the important decisions have been made. In most cases, nothing could be further from the truth.

And the firm that banned renderings from their design process? Ironically, to capture the spirit of their design process, they now use Photoshop in the making of their collages.

## 22: Magical Thinking in Architecture



Fig 22.1: Magical thinking can be found not just in architecture, but in many life events, when there may not be a clear or obvious explanation for why something occurred

**Architects are critical thinkers and avoid attributing outcomes to magical thinking.**

A fellow designer explained to me how to get the client to pay for a lake in my project. *Put two lakes in it*, he explained. *The client will inevitably remove one and you'll have your lake*.

If only it were that easy! Tutors and school administrators complain that there is too much magical thinking in architecture. Like the *Seinfeld* episode where someone explains something that happened, skipping over the unmentionable part by saying 'yada yada', too often designers blur over, cover up or don't adequately explain, let alone justify, the inexplicable magic – the *yada yada* – that takes place in the design process.<sup>161</sup>

I did this, then this, and *voila* – any questions?

The concept of magical thinking was made popular with the publication of Joan Didion's *The Year of Magical Thinking* in 2005, an account of the year following the death of her husband.

Magical thinking can be found not just in architecture, but in many life events, when there may not be a clear or obvious explanation for why something occurred. For example, when a child miraculously recovers from a dire illness, we sometimes attribute their otherwise unexplainable recovery to various interpretations. Among the possible occurrences that could have contributed to the recovery of this child we might mention blind luck, the emergency medical personnel who attended to them, their family's insurance coverage, those who so generously contributed to the online campaign, the selfless people who assisted them, the fact that they live in a country at a particular time in history when life-saving technology and medicines are available, among several others. The possibilities are seemingly endless. Too often, we forgo critical thinking and go to the convenient explanation, irrespective of its validity.

Magical thinking can occur when strong emotions are involved, which are more likely to result in distorted and inaccurate perceptions.<sup>162</sup>

Architecture too encourages magical thinking. It is after all a combination of art and science, and art can excuse a lot of bad behaviour – and, also unfortunately, thinking.

Architects – for example, when they offer hoped-based outcomes in lieu of planning – sometimes fall back on old habits and offer magical thinking when the time and hard work of actually thinking is what is called for.



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# SECTION 3: DECISION MAKING

## 23: Good Decision Making

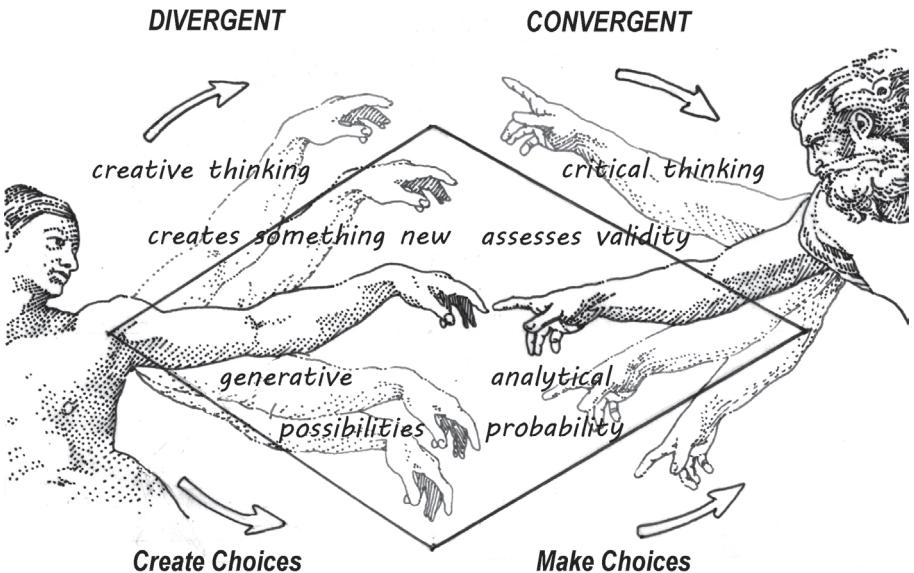


Fig 23.1: Think of the divergence/convergence phases as a tool for making effective decisions

**Architects have to make or facilitate a series of decisions based on trade-offs.**

If a typical person makes approximately 35,000 choices per day<sup>163</sup> and 2,000 decisions every waking hour,<sup>164</sup> and if 10,000 decisions go into the design of a typical building, why is it that architects can't design them in five hours?

Because, unlike the automatic and habitual decisions that comprise most of our choices, the decisions that go into the making of a building must be critically weighed by the architect.

Critical thinking is tied to decision making in that thinking critically results in our deciding what to do or trust. And decision making is tied to design in that design is informed by the decisions we make.

What, then, makes for a good decision?

You are making an assured decision when you are able to identify and comprehensively understand the situation you are designing for and determine which alternative solutions most effectively address the situation.

## Facilitating decision making

Architects aren't always the decision maker, and less so now than in the past. More often, their role is to help someone else make a decision. In this case they act more as decision identifiers – identifying what decisions need to be made – and decision facilitators than decision makers, and can reframe their role accordingly. Frequently, architects will come up with alternatives and variations and will present them to help the owner decide, or as often help your boss or team leader decide, by identifying and weighing options and the pros/cons for each. The architect's task – their most difficult task – is always selecting or helping someone else to select.

The reality is that architects don't design in a vacuum. Their designs are realised by using other people's resources, including land and money; by following others' laws and ordinances; by working within constraints ranging from availability of materials and labour to the bank's willingness to extend a loan. Due to these realities – taking all of these factors into consideration and more – architects often have to make compromises, where they are choosing between two less-than-ideal options or recommending the better option for someone else to decide on.

But critically thinking architects have to base their decisions and conclusions on something. As we've seen, they tend to base their design decisions on facts, experiences and assumptions. We need to approach problems with some assumptions, as they help us to progress and move forward. But the problem with approaching an assignment with baked-in assumptions is that we need to question our assumptions to ensure that they accurately represent reality and aren't preconceived ideas that will keep us from innovating and trying something new.

Architects can also base their decisions and outcomes on observations and beliefs. The problem with approaching your assignment or solving your problem with beliefs is that a belief can be misguided, stifle a good idea or otherwise limit your thinking.

As we've seen, the decisions architects make are significant and deliberate, not minor, insignificant, unconscious, automatic or habitual – like what we decide to eat for breakfast or what show to watch. Because they aren't working alone, architects have to formulate their decisions then try to convince others to go with them – or do all they can to help others to make them.

Because the decisions architects identify, make and facilitate take concentration, real thought and have consequences for others – significant consequences, often having a direct impact on the health, welfare and safety of the building's inhabitants, neighbours, the public-at-large and even future generations not yet born – they can't take them lightly or make them out of habit.

It is important to remember that architects, being human, make better decisions on a good night's rest and less assured decisions when stressed, overworked, or hungry – so have a healthy mindset, and take frequent breaks, or better yet make important decisions when your mind and body are fresh to avoid decision fatigue. In a well-known example, a prisoner is more likely to have parole approved by a judge in the morning than when their case is heard in the afternoon.<sup>165</sup> Following are the usual culprits that get in the way of making good decisions:

### Multitasking and distractions

Ever catch yourself saying you don't have enough time to accomplish a certain task? We waste a lot of time – not by procrastinating or avoiding what we need to do, but by overtaxing our cognitive system. Most people lose 28% or 2.1 hours a day of productive time to constant interruptions and the time it takes to recover and return to the task where we left off.<sup>166</sup>

There is a real need to remove unnecessary distractions when making important decisions. Clifford Nass, a researcher at Stanford University, suggests that rather than making frequent switches, you should try to dedicate twenty minutes to a single task, then switch to the next. He calls this the twenty-minute rule.<sup>167</sup>

### Anger and other strong emotions

Architects need to be able to control their emotions, remaining calm and level-headed, not letting emotions get the better of them when making decisions. While their best work is often infused with emotion – it is not their emotions per se, but with the recognition that what they are designing is for other people. Thus decisions need to be made with others' feelings in mind

– not the emotions, whether anger or righteous indignation, they may be feeling at that particular moment.

## Too much information

We are increasingly buried in data, and need to be able to manage the flow of information that bombards us day in, day out. Designers famously don't know when to stop 'researching', where researching itself becomes a form of procrastination (writers do this too!). When it comes to making assured decisions, having too much information and too many options to choose from can be paralysing and immobilising.<sup>168</sup>

## Biases

As discussed in a previous chapter, our biases can affect the way we make decisions, so we need to be on the lookout for them. Architects tend to be optimistic by nature, as would anyone be who expects their designs to be built. Optimism is fine – both a job requirement and a liability; it's when it becomes expected that overconfidence can cloud our clear thinking and negatively impact our decisions.

We need to develop an understanding of how biases can distort our reasoning. *Confirmation bias*, the tendency people have to embrace information that supports their beliefs and reject information that contradicts them, for example leads us to ignore evidence that contradicts our preconceived notions,<sup>169</sup> whereas another bias, *groupthink*, causes us to go along with the crowd, and *loss aversion* makes us too cautious, and so on.

If they are to inspire, and help transform lives of those who live in and among the results, architectural decisions require an element of intuition. Many architects' decisions are based on intuition, even when purportedly arrived at using lists of pros and cons, appearing to be informed and not made flippantly. Architects especially have to watch for biases when relying on their instincts or intuition to make decisions by testing their intuition and occasionally going against their gut instincts.<sup>170</sup>

It may be surprising to discover that your big decisions are often less calculated than your small ones,<sup>171</sup> but we often find that we have to make or facilitate big decisions in less-than-ideal circumstances that can keep us from considering things thoroughly.

With so many ways to decide, it is hard for architects to decide which is the best way to decide!

When designing architects' decisions often unfold in stages, a divergence phase (where information is sought and alternatives developed) might be followed by a convergence phase (where options are pared down and recommendations or a selection made.) One can think of the divergence/convergence phases as a tool for effectively making decisions.

In the past few years, we have been advised by Malcolm Gladwell to make decisions in a *blink*, by Michael Mauboussin to *think twice*, and by Nobel Prize recipient Daniel Kahneman to think *fast and slow*.<sup>172</sup> Thinking fast – automatic judgements that stem from associations stored in memory – and slow thinking – what we have been calling deliberate thinking – are both necessary: the first for immediate, instinctive decisions where we need to react quickly (like stepping out of the way of a moving car). But in architecture, the more deliberate kind of thinking – slow thinking – is called for to make sound decisions that stick.

## Making more informed decisions

In a project's earliest phases, a great deal of time is spent evaluating your design, ensuring it follows regulations including building codes and zoning ordinances, and delivering information required by your client. In school, and in your first job out of school, it's important to learn what takes place in these project phases, and to be able to experience them for yourself. But once you've experienced them, why wouldn't you want to use a computational- or generative-design tool to help determine this information, one that would free you up to spend more time doing what you are there to do – namely design? Why, in other words, wouldn't you want to leverage technology that can help you evaluate thousands of designs fast and provide the information you need to make an informed decision?

## Crowdsourcing decisions

The averages of multiple guesses are usually more accurate than the best guess by an individual. Why then not harness the collective intelligence – intuition, judgement and wisdom – of the crowd as a baseline to arrive at decisions that matter? When making decisions on their studio projects, architecture students have been known to poll their friends – though they often do so until they hear what they want to hear (see *confirmation bias*, above.)

### TRY THIS

No matter the decision process used, a gut check on important decisions would be prudent. Of the criteria used in making a decision, common sense is too often not among them.

### TRY THIS

Architects can make more informed decisions using simulations and AI. You can work in a software environment that you are accustomed to – CAD, BIM, etc. – or in a standalone program. Either way, leveraging these tools, you will be able to make or help others make decisions faster and more assuredly.<sup>173</sup>

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**TRY THIS**

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There are simple decisions that still manage to confound us. Take, as one example, the thinking that goes into deciding where to cut a section through a building. Unless you are asked or required to do so, it is unnecessary to cut a building section through a lift shaft or through structural columns. Think about it: a section is a kind of detail – where you are showing how the building comes together – and all detailing is joints, where two materials/components/systems come together. So, instead of cutting mindlessly through materials or columns, cut through a wall. And not just any wall. Cut through a wall with windows or doors. If it is a multistorey building where one floor is the same as the next, don't mindlessly repeat them: use cut lines. And don't show a cut line through the entire plan – where it may conflict with or obscure other information – but abbreviate it just at the walls. Only show something once. This is good advice as redundancy creates mistakes but is also an unwise use of time.

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**ASK THIS**

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How did you decide to study architecture or become an architect? Did somebody influence you? What were the circumstances? Was it a drawn-out and calculated decision?

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**ASK THIS**

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What does it mean when it is said that architects don't make any decisions – they make recommendations? What is an example of decision identification? In what way(s) can architects serve to facilitate decision making?

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**READ THIS**

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*The Wisdom of Crowds* by James Surowiecki. In the book Surowiecki explores the idea that large groups of people are smarter than a few, no matter how smart or how much better at problem solving they may be. He gives examples where large groups of people foster innovation, guess the number of jellybeans in a jar, arrive at good decisions, and predict the future better than individual experts.

## 24: The Four Questions

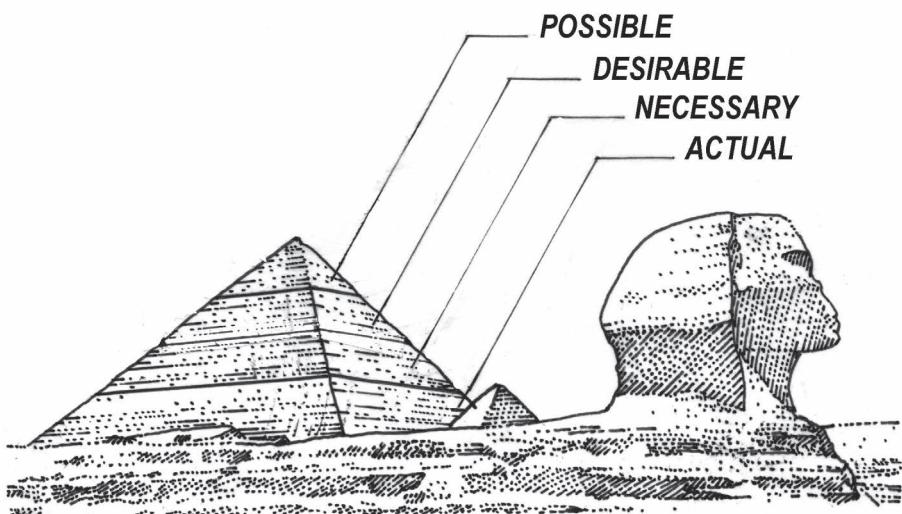


Fig 24.1: Architects try to make sense of their projects by asking four questions

**At the start of every project architects ask what is actual, necessary, desirable in order to discover what is possible.**

Bombarded with a lot of information at the start of every project, architects try to make sense of it all. One way they do this is by organising data and other inputs into categories. Whether explicitly or implicitly, architects try to make sense of their projects by organising the responses to four questions:

- What is actual?
- What is necessary?
- What is desirable?
- What is possible?

How do you know the answers to each of these questions? You ask questions in the form of information gathering and research.

For the question *What is actual?* you enquire into what is meant by *site* and *context*. To the Scandinavian architectural firm Snøhetta, asking questions of site and context is considered *prepping* and *zooming out*, providing a factual basis for, and having a significant impact on, the quality of their resulting creative ideas.<sup>174</sup> Architects – unless they are paper architects – have a particular place in mind that they are designing for. Is it limited to the property lines within which your building will be placed? Most likely, it will extend beyond in terms of the flows that come to your site (people, traffic, deliveries, sunshine) and those that flow out (rain run-off, light pollution, views).

Associated with reality capture and analysis, the question *What is actual?* asks, just as it sounds, what exists – in both the site and situation – that you will be designing for and/or building in? What is the literal context of your immediate site? Are you building in a historic district? Are you building in a flood plain? A residential neighbourhood? A rural or dense urban site?

To ask *What is actual?* is not only a place-specific question. What is the larger context – the historical, political, environmental and social context – of your project? These are all part of the question *What is actual?* What often happens in school is that the larger contexts are ignored when you don't start with this question. You will know when it – and not your project – becomes the focus of discussion at your crit.

Most projects are different because they have a unique site, circumstance, climate, culture. Your responses to the question *What is actual?* represents constraints that you can then seize upon and turn into opportunities.<sup>175</sup> Design involves a reflective conversation with the situation.<sup>176</sup>

It is natural to want to jump in and start designing as soon as you're given an assignment. But most architects find that the design process can only begin in earnest only after the given parameters, constraints and inputs – site information, client information, building type/typology – for a project are gathered and assessed.<sup>177</sup> For example, Australian architect and emeritus professor Alec Tzannes placed particular importance on needing extensive analysis and a full understanding of all parameters associated with the project prior to beginning to think creatively about a design solution.<sup>178</sup>

To understand what is actual, architects sometimes go virtual to both capture and simulate reality out of convenience, to save time, but also to look at circumstances more holistically and comprehensively. Technology enables architects to look at a multitude of constraints, inputs and options they otherwise might not have the time or capacity for.

The world needs architects – the Earth, our continent and country needs architects – to address national issues. Your region needs architects to represent what distinguishes one locale from another, to make sure that buildings belong to a specific place and time. Your county or borough needs architects, your city needs architects, and especially your suburbs. Architects create works that are inseparable from their environments and the way we think about them, at the same time expressing and infusing local or regional character so that their buildings appear to belong to the place where they reside. Architects may be comfortable with change but recognise that they first have to make change palatable for and acceptable to others.

For the architect in practice the question *What is actual?* includes what type of project you are proposing: residential, commercial, institutional, mixed-use, etc., and the allowable occupant load based on use; legal constraints such as building setbacks and height restrictions; the direction of prevailing winds and both desirable and undesirable views and adjacencies; site topography and whether any parts cannot be built on; the make-up of the soil below ground and what the implications might be for foundations, etc.

If the question *What is actual?* is realistic/phenomenological, then the next question architects ask to make sense of the mess of information *What is necessary?* is practical/pragmatic.

The question *What is necessary?* – where the architect tries to nail down every discoverable detail – is straightforward. What is the bare minimum that if delivered in response to the design problem or assignment would be acceptable? What is needed to minimally fulfil the obligations of the client's brief?

*What is necessary?* is an especially important question today as architects are increasingly seen as a luxury, and architecture is perceived as something unaffordable by the masses, even as basic shelter and housing remains a dire necessity for many. Human beings the world over have built homes with nothing more than their own two hands. Until recently, the world existed without architects. But architects – for all they do – are seen by some as an indulgence that most cannot live without. As purveyors and perpetrators of good design, architects are truly needed: good design is not a luxury, but a necessity.

Architects are essentialists who tap into what is necessary, what is core. And they provide something more by searching for what is essential – not by embellishing the frivolous and unnecessary. It was an architect after all who coined the phrase *less is more*.

Architects use what they have available to them and strive to do more with less. Architects try to make the most with what they have and are given – even if it is not expected or asked for. If they did not, the built world would be confined to making shelters. Like Helmut Jahn, we strive for an architecture from which nothing can be taken away. Architects thrive on less, and becoming one represents a case where less is truly more. Architects recognise that in tough times better architecture can be the result. That constraints may in fact lead to *better* architecture. This is important because the opposite could occur – were architects to believe that fewer resources result in lesser buildings, less pride of place – with all of us being the worse for it.

Where the questions *What is actual?* and *What is necessary?* are questions of what is realistic and practical, the next question *What is desirable?* represents an enquiry into the emotional and aspirational.

Ever since the Bible declared that *Man shall not live by bread alone*, people have aspired to live beyond necessities. At the start of every project, architects ask themselves: *Given what is actual and necessary, what is on everyone's wish list?* Architects strive to fulfil these often more emotional than rational aspirations.

After all, Vitruvius's three design principles that guide the architect's creation of space are commodity, firmness and delight (*firmitas, utilitas* and *venustas*) – or, alternatively, structural integrity, usefulness and beauty – all of which can be found in the majority of buildings throughout time.<sup>179</sup>

Vitruvius could have stopped short of three principles: *You had me at commodity and firmness*. The added element of delight is what makes architecture something more than mere building. Architects strive to make architecture that delivers commodity, firmness and delight, where the actual and necessary address commodity and firmness, and desirable and possible satisfy delight.

Constraint and uncertainty are the two existential conditions for design to take place. What is actual and necessary addresses constraints, while what is desirable and possible addresses uncertainties.

Designers are comfortable with ambiguity and uncertainty, a required part of the design process, where there are no known, right and wrong answers.

While others can ask, the architect working with their team answers *What is possible?*

Just as architects can envision what isn't there – veritably seeing through walls – they can also imagine possible futures, scenarios based on the consequences of their architectural acts, their imagination, and also on what they have come to understand about the world. They can project what has not been built into situations and ask: *What will the potential impacts*

be? For this, the question *What is possible?* has a spiritual or transcendent component: the *quest* in the word question. They may never be able to anticipate all possible futures – but if thoughtful, persistent, and patient they may anticipate many of them.

Answering *What is possible?* is the architect's ultimate purpose, one that cannot be replaced by machines. The architect's job is to give the client not what they want, but what they never dreamed they wanted; when they get it, they recognise it as something they wanted all along.<sup>180</sup>

With the advent of climate change and the expense of ground-up construction, it is projected that we will see an increase in the adaptive reuse of buildings. Architects will increasingly be asked *how else can this existing building be used?* There will be more and more of this, as reuse of existing buildings and infrastructure is more environmentally friendly: the most sustainable building is an existing one. And a greater percentage of the projects an architect will work on during their career will be existing buildings – whether renovating, restoring/preserving, reusing, rehabilitating or reimagining.

While the questions *What is actual?* and *What is necessary?* are questions requiring critical thinking, the questions *What is desirable?* and *What is possible?* – because other people need to be involved to help determine what is desirable and possible (desirable and possible *for whom?*) – represent creative and collaborative thinking: the subjects of the next two sections.

### TRY THIS

In practice, when presenting alternative designs to the client, the first scheme is usually what they asked for. By giving them what they asked for you assure that they've been heard. Next, give them two other schemes that represent ways to solve or resolve their problem: Here is what you asked for and ... here is this ... and *this*. Under-promise and overperform. In my experience, once a client sees what is possible – the third scheme – most will abandon their original idea. Just make sure you can live with any scheme you present.

### TRY THIS

Expand the meaning of *What is actual?* beyond the site by expanding your awareness of the physical, social and emotional environment.

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**ASK THIS**

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How can buildings designed for a specific site address issues on a national or global scale? How can architects ensure that the buildings they design appear to belong to the sites where they reside? Since buildings represent change (from what was there before), how can architects make change palatable and acceptable for others?

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**ASK THIS**

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Name a situation in which engaging an architect is a necessity. If working with an architect is not a necessity, give three reasons why someone would nonetheless want to engage an architect. In what ways is engaging an architect a luxury and an indulgence that most cannot live without?

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**ASK THIS**

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What are the attributes necessary to an architect's identity? Why are architects interested in finding the simplest and most essential way to do something? By designing to what is essential, can a project be somehow more, not less, than it would otherwise be? How so?

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**ASK THIS**

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In what way is less *more*? How does Mies's dictum *less is more* support our desire to design and build sustainably? What is the real benefit in following it? Does it take creativity to do more with less? Does it take an ethical stance, or conscience, to do more with less? Why do architects thrive on less? Do others? What role do constraints play in enabling an architect to work creatively?

## 25: Good Judgement

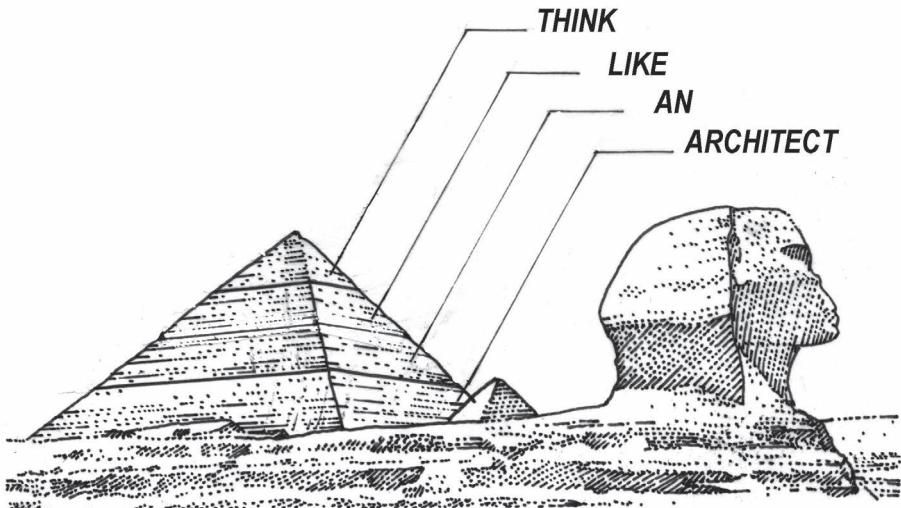


Fig 25.1: Developing good judgement in all things is a worthwhile use of a future architect's time and resources

**Architects improve their design judgement by building their experience, knowledge and intuition.**

We don't talk too often about judgement anymore – having all but replaced it with decision making – but we ought to.

Practical and applied knowledge have taken the place of what are seen as more effete or highbrow subjects – including correct usage of grammar.

Would you sooner say, *The worst cricket player around here is I?* Probably not. You'd sooner say, *The worst cricket player around here is me*, right? And yet, the first is an example of proper grammar, while the second is an example of good judgement.<sup>181</sup>

Developing good judgement in all things is a worthwhile pursuit and a good use of a future architect's time and resources.

Architects are still valued and even sought after for their professional judgement, so it is probably worth spending a moment refamiliarising yourself with this concept.

An architect's professional judgement is based on three things: experience, knowledge and intuition.

You could even write it out this way:

Professional judgement = knowledge + experience + intuition

The problem when first starting out with your architectural education or practice, of course, is that you are lacking in all three.

Knowledge comes from experience and exposure to information.

The problem with experience is that, through no fault of your own, you usually are operating at a deficit in experience at the start of your academic or professional career.

And intuition of course is not magic, but direct access to internalised experience and knowledge.

Architects who work in a dashboard on their monitor, with immediate feedback on their design moves in the form of data visualisations, pie charts and bar graphs, not only find that their intuition is informed by the data, but it is improved as well.

Two people can experience the same thing and have two different experiences in part because of where they are developmentally and the filters they have in place – what information they let in and what they block. That is why two students can have completely different reactions to a design studio course. Similarly, despite each drawing's shared precedent in a precedent study, it happens that no two will turn out alike.

It is not often discussed this way, but one of the outcomes of design studio is to help you, the designer – through near-constant feedback during crits – develop your judgement.<sup>182</sup> Design judgement is a critically important capability for anyone charged with synthesising disparate views, inputs and objectives from a diverse array of stakeholders.<sup>183</sup>

### TRY THIS

You've heard it before, and I'll repeat it here: it would behove you to read more, to experience more, and internalise what you read, do and learn along the way. All experiences, good and bad. Billionaire entrepreneur Warren Buffett spends five to six hours a day reading. Reading enables you to access and internalise the experiences of others. As a reader, you are of course at an advantage in that you can learn from others' experiences. When you read, you are in essence living life twice.

## 26: How to Prioritise

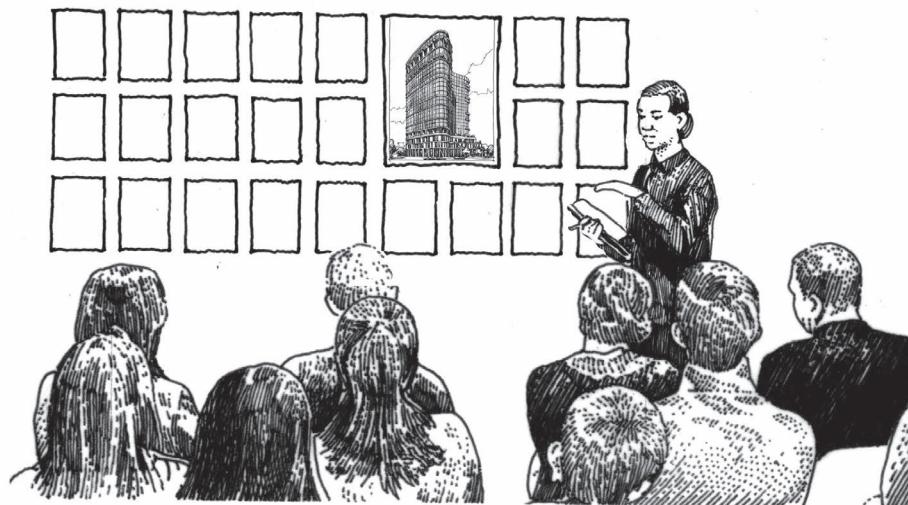


Fig 26.1: To prioritise means to identify what is pertinent and relevant

**Architects have  
an unspoken social  
contract to make  
life better.**

I often see students check all the boxes for what is asked or required of them, except one: prioritising.

By that I don't mean identifying which is urgent, which is important and so on in terms of time, but what is pertinent and what is relevant?

Just as physicians swear to uphold the Hippocratic Oath and its critical dictum *first, do no harm*, so design professionals follow what Will Alsop referred to as an architect's social contract to make life better.<sup>184</sup>

What criteria do you use to prioritise your design work?

As has hopefully been made clear, architects' work depends on rational criteria found in critical thinking.<sup>185</sup> They reference these objective criteria when deciding what information is important to others. But it is not until the architect gives the outcome a gut check – engaging their instincts, intuition and emotions – that they know what the hierarchy ought to be.

### TRY THIS

Too often we are prisoners of our ordering systems, the non-printing light-blue guidelines that organise our design layouts – all good – but have you circled back and asked: What is the first or most important thing I want them to know about my project? Have I emphasised that using light/dark, size, position or colour? Why bury your best work in your portfolio because of your decision to present your work chronologically – to accurately tell your story as a designer over time, where your best work is likely to be presented last – rather than in reverse chronological order or, alternatively, grabbing the one or two images that say the most about you and your design ability and placing them up front where the table of contents normally goes: *no one will miss the table of contents*.

### TRY THIS

Using the terms from the previous chapter, at the lowest level, base your decisions on constraints or what is *actual*. At mid-level, necessity and desirability; at the highest level, prioritisation of your ideas, answering the question *What is possible?* After the other questions have been answered, this is where your core competency is as an architect, and where your value and strength reside.

**ASK THIS**

Is there a hierarchy? Have you prioritised one image over another? Is one image more important? What is the second most important? And so on. In journalism, there is a saying: *don't bury the lede*, i.e. the story, the main point that you are trying to communicate. We do this in our presentations and portfolios mainly as a result of not asking ourselves what is important, then prioritising.

**ASK THIS**

Too often students throw whatever they have drawn or modelled up on the wall and, like spaghetti, hope it sticks. Instead, determine the relevance of what you are about to present. Of each drawing. Ask yourself: Is there any redundant information here? Do two drawings essentially say the same thing? Does one of them say it more clearly, coherently or strongly? Your presentation is only as strong as the weakest image. Which images can you remove – and, in doing so, make your presentation not weaker but stronger? Remember the dictum *kill your darlings*. Identify your favourite, most clever image, take a deep breath, remove it, and then ask yourself if your presentation is stronger for it. Figure out what information is most relevant to the decisions you need to make. Have the discipline to reject even exceptional ideas if they are not relevant for the problem at hand – you can always save them for a future project.

**ASK THIS**

One way to prioritise from the start is to start with the end in mind. Ask: Will this information end up in the final project or presentation? How do you know? As you develop your ability to anticipate consequences of your architectural acts, you enlist this muscle to envision or visualise what your final presentation will look like. Use decision-making devices by creating hierarchies, setting priorities and selecting filters. Ask: Is the information nice-to-know or must-know? Present the must-know.

## 27: Consequences of Decisions



Fig 27.1: Architects know that their architectural acts have downstream consequences and take responsibility for them

**Architects understand that their actions have consequences and work to imagine and anticipate what they are.**

One thing that distinguishes design in architecture school from designing in practice is that, perhaps beyond an impact on your grade and character, there are no consequences for your decisions. But to learn to make decisions that stick, from the time they begin their architecture studies students need to consider the consequences of their actions.

Architects know that their architectural acts have downstream consequences and take responsibility for them. To consider the possible impacts – both positive and negative – of architectural acts that take place in school, we need to project out far beyond our projects into the outer world and enlist our imagination. Architects justify their decisions in part based on the consequences of their architectural acts.

To anticipate the consequences of their architectural decisions, architects need to think clearly. They need to be able to project from their decision out into the future, and ask: what consequences will this have on people who I do not know; on inhabitants and the building users; on neighbours; on the public at large; into the future – on people not yet born?

We of course cannot know entirely, but we can imagine, and on that base our best professional judgements.

## Consequences and foresight

The ability to anticipate the future impact of a course of architectural action or decision making is foresight. Project consequences of your architectural acts and decisions into the future, adjust and respond accordingly.

Architects look to the beyond. Beyond the immediate problem. Beyond the immediate issue at hand. Beyond the immediate surroundings – to look at the impacts of what they're creating on the world beyond. Architects often ask themselves what the consequences are for any course of action. Architects are said to be thoughtful and ethical in that they are concerned with the consequences of their actions.

### TRY THIS

Think about future consequences of your decisions. If you do this – what will the outcome be? Don't stop with the first thing that pops into your head. Stick with this question and take it further. What else? What are you blind to? What haven't you considered? Who else will be impacted by your decision? What other consequences will there be? Reference similar projects you've seen and places you've been to.

**ASK THIS**

Based on one of your design projects, consider questions to ask before you make decisions. How might your project impact the site where it is located? Consider all of the possibilities, throughout the seasons, during day and night, weekdays and weekends. What impacts might there be beyond the site, on its immediate surroundings? Neighbourhood? Community? City or region? What are they? For whom? How might your responses to these questions – a form of feedback loop – potentially impact the design of your project?

**ASK THIS**

What are potential consequences of deciding to slope a roof steeply? In terms of adjacent neighbours? In terms of the region you are building in? In terms of cost, labour and material availability? In what ways do architects look beyond the immediate problem they are asked to solve or project they are asked to design? What can potentially occur if the consequences of an architect's decisions aren't considered?

## 28: Self-Editing



Fig 28.1: Many of the best architects learn to edit as they go, and find that self-editing becomes not an impediment to their creativity but instead plays a crucial role throughout the design process

**Architects self-edit by focusing not only on the content but on the negative or white space.**

A few years back, at another university, I served as a reviewer of presentations on the importance of working with integrated teams. There is a built-in efficiency in working in an integrated manner and I was looking forward to seeing what the students came up with. Three students on the first team took turns speaking. The first student presented, then the next, each student repeating information already delivered by the previous student. Despite their words and excellent PowerPoint slide deck, it was apparent that the students hadn't learned a thing because their delivery wasn't integrated. They didn't look at their topic and ask themselves: Does the delivery support or detract from (or even completely contradict) the topic?

If you were to only take away one thing from this book, it should be for you to become your own best editor. Practice at self-editing leads to automatic self-correction. If you can self-correct as you go, you'll save time, energy, resources – and those of others. Having received feedback from a desk crit or from a test score, your response ought to be to find the relevant take-aways and self-correct. Self-edit your drawings to prepare for desk crits, and be ready with questions. Reference your tutor's suggestions from your last desk crit or pin-up, asking yourself: *how did I respond, and why?*

We're often taught in school that editing is a separate phase from ideating, best left for the end of the design process. But many of the best architects learn to edit as they go, and find that self-editing becomes not an impediment to their creativity but instead plays a crucial role throughout the design process.

One way architects self-edit is to focus not on the content – the words and images – but on the negative or white space on the page, sheet or presentation board. Increasing the amount of white space communicates confidence to the viewer – that the person presenting is able to zoom out and use the whole space available to them, not just focusing on the images or messages. They recognise that the negative space is part of the message as well.

This also goes for the *white space when speaking*: using pauses and silences to your advantage.

Focusing on the negative space – on the silence as much as the noise – is similar to Nobel Prize-winning playwright Harold Pinter's use of silence as poignant and meaningful content – the pregnant pauses in his scripts being referred to, fondly, as 'Pinter pauses'.

Architects avoid the tendency to fill every white space with something. They try not to repeat the rookie mistake of putting everything they know into their design or presentation. Be selective – life is long, and there will be other opportunities.

A rule I tell my students: only draw what you know. Or, to put it negatively, don't draw what you don't know. Drawing what you don't understand will come back to bite you. With 10,000 decisions that go into every building

design, you aren't expected to know everything. Ask questions if you don't know something.

Self-editing requires self-awareness and some self-reflection but not self-criticism: when you self-edit you are looking critically at your work, not you. Self-editing isn't about beating yourself up but turning your critical eye on your own thinking, ideas, project, decisions in order to achieve a more purposeful and assured outcome. So self-edit ruthlessly – just be easy on yourself.

There is no better way to communicate to your tutor that you understood than to show them a sketch where you tried it and either incorporated the suggestion, rejected it, or came up with an alternative way to go. Your tutor wants to know they were heard. They are not talking just to hear themselves talk, nor sending you on a wild goose chase for sport, but to improve your prospects. If your tutor makes a suggestion they do so because they think it might improve your design. Don't reject it outright, even silently. Don't forget what they suggested. Immediately after your desk crit write a summary including suggested next steps: this is good preparation for practice.

### TRY THIS

When self-editing, look dispassionately at what you produced – as though you were seeing your work for the first time through another person's eyes. Walk away from your work – take a break – then, when you return, look at your work objectively. Professional writers have been known to put their writing in a drawer for forty-eight hours, then take it out and review it with a fresh pair of eyes. Move on to another task while you wait. Or give this a try on the off-chance you complete your work with time to spare.

### TRY THIS

You are expected to review and edit your own work but, unless specifically told otherwise, there is nothing wrong with engaging another point of view. Ask a classmate, studio mate, roommate or friend to look at your presentation layout and help identify opportunities to make your message clearer. As a rule of thumb, don't share your first draft until you have had a chance to review it yourself. You will only learn and benefit from another's input if you first have had a go with it yourself. Critical thinking involves not only the awareness of others' thinking but the constant monitoring of your own. I have seen students present two identical plans as well as plans side by side that were at two different scales or showing a concrete slab 600 mm thick when it should be 100 mm thick: apparent to me – the tutor, critic or reviewer – but apparently not to the student. There is a need for information to be socialised: this is where having another pair of eyes can help.

**ASK THIS**

Before showing your work to your tutor or reviewers, have you:

- Coordinated?
- Revisited previous comments and suggestions?
- Shown your work to a classmate or friend for their input – another pair of eyes to catch things you might have missed?

**ASK THIS**

You've designed an eight-storey building and are asked to present all eight floor plans. If you have eight floor plans displayed side by side, do you need eight north arrows? Maybe one is enough? If three of the floor plans are identical, do you need to print all three, or label one *Floors 3–5*? We are bombarded with information from the time we awaken until the time we go to bed. Architects try not to contribute to information overload by looking to simplify wherever possible; removing redundancies that can complicate their message; and, generally reducing the amount of information in their communications, including when presenting.

**ASK THIS**

What is it your tutor wants you to know? If your tutor makes a design suggestion, try it. Then, the next time you meet let them know that you tried it or looked at it. You don't have to use their idea – but as a courtesy, and because they have your best interest in mind so it would benefit you to do so, consider their suggested idea or change to your project. Most students don't do this, and their tutor wonders if they were even heard – or, if heard, were understood. Some students self-report that they are not in studio (or school) to learn – but to embellish their portfolio, improve their job prospects or simply to graduate.

## 29: Think Like César Pelli



Fig 29.1: César Pelli's ability to contend with a vast array of facts and figures in his head is an ability that most architects can develop

**Architects strive to manage an increasing set of variables and alternatives in their head.**

César Pelli was an Argentine architect who designed some of the world's tallest buildings and other major urban landmarks. He also happens to be a graduate of the architecture programme where I teach. Two of his most notable buildings are the Petronas Towers in Kuala Lumpur and the World Financial Center in New York City. He passed away in 2019.

Why should architects strive to think like César Pelli? For two reasons: his ability to contend with a vast array of facts and figures in his head, and his refusal to support the *systematic generation of useless alternatives*.

Pelli's ability to contend with a vast array of facts and figures in his head is an ability that – if they make it a goal – most architects are able to develop ten to fifteen years into their careers. Pelli warned of the computer's *systematic generation of useless alternatives*, and architects subsequently being buried in alternatives from which they were then responsible for choosing an optimised option.<sup>186 187</sup>

One difference between emerging professionals and students, and more senior design professionals is the ability (or not) to manage an increasingly larger set of variables in their head. César Pelli was able to keep many pieces of information in his mind, balancing and weighing each one against the other, editing out pointless or impractical alternatives, preventing his team from going in a dead-end direction.

Theoretically, we treat the design activities of ideation and judgement separately, but in reality – especially over time, as one matures as a design professional – they happen virtually simultaneously.

César Pelli's thought process isn't something he was born with, but an ability he developed over a long career. Your goal is for this to become second nature. Strive to think like César Pelli.

### TRY THIS

Find something you would like to make part of your thought process or design repertoire. To commit it to memory, write it down. Instead of highlighting a passage in a book, research has shown that informally quizzing yourself on the content is a more reliable way to learn. Create a checklist of the information you want to learn, then turn this into a mental checklist. You will learn over time how to consider all factors, criteria and consequences for each path in your head – simultaneously – and be able to edit out unpromising paths *before* you spend time and energy heading down them. Eventually you won't need to rely on doing a Google search; by building your thinking muscles you will be able to rely on yourself, by going through this thinking process in your head, owning it and making it part of your experience.

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**TRY THIS**

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The information in this book is not meant to stay in this book, but be put into practice and action. Whether as actionable information, applied knowledge, or news you can use, the goal is for you to read it, *grok* it (understand it intuitively), then forget it. Why forget it? The most important knowledge for design professionals to understand is tacit knowledge – things you know but can't necessarily explain, like how to tie your shoes. In order to learn, we have to internalise information, and one of the best ways to learn something is to know when to let go of it, trust the process and access the information when you need it: the same process you go through when studying for an exam that isn't open book or open note. Here, forgetting something doesn't mean it is erased clean from your memory, but rather it is internalised so it can be accessed later, becoming part of your behaviour – your ultimate goal.

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**READ THIS**

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*Moonwalking with Einstein* by Joshua Foer

## 30: Aim to Be an Amiable Sceptic

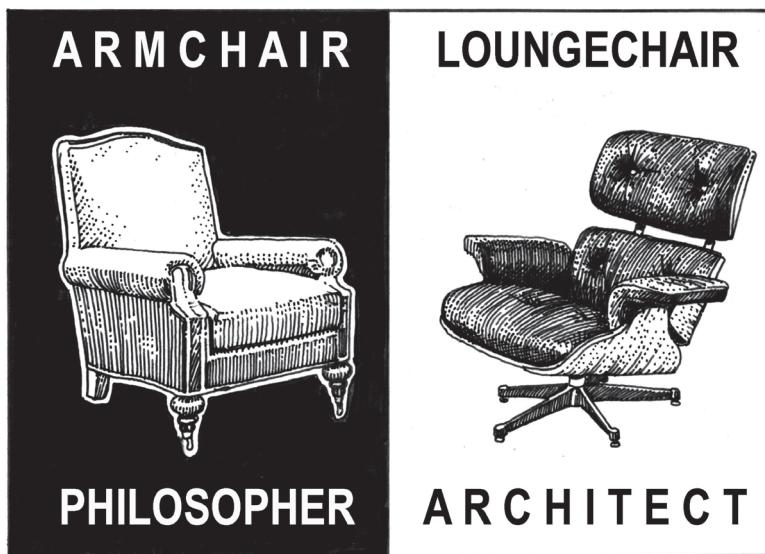


Fig 30.1: Architects as *amiable* sceptics will also be needed to provide a healthy dose of common sense

**Architects strive  
to be independent  
thinkers while  
engaging others in  
decision making.**

Thinking for yourself is not the same as venting, speaking your mind just to hear yourself talk, or saying whatever is on your mind: *you being you*. It's about not being beholden to anyone, avoiding groupthink and standing up for what you believe, however unpopular, in the name of factfulness, honesty and what you see as truth. A year after the first *Star Wars* film came out, on a television talk show American astronomer and author Carl Sagan critiqued the popular movie saying that it got science wrong – and, worse, accused it of white supremacy and chauvinism.<sup>188</sup> *That* is independent thinking!

In previous chapters we've suggested that engaging with others in the design process could be helpful. That advice doesn't preclude us from also recommending that you learn to think for yourself. One doesn't cancel out or contradict the other – they're complementary.

Architects are nothing if not independent. They're also independent thinkers. They have a reputation for not accepting advice from others ... something that an author who writes books doling out advice to architects – and their publisher – ought to keep in mind.

The recommendation to think for yourself is less about disengaging from or otherwise disregarding the input and feelings of others, and more about thinking independently and striving for self-reliance.

When starting out in architecture school, students find themselves in a time of social, intellectual and creative self-discovery. It can be an exciting time, but also one that can be filled with self-doubt and uncertainty. How can you think for yourself at a time when you are just starting to learn about your area of specialisation? You come to discover that the first years of your architectural education are actually more about establishing self-initiated enquiry than learning discipline-specific tasks.<sup>189</sup> Learning to become an architect is ideally a process where tutors trigger the growth of self-reliant, self-driven thinking by students.<sup>190</sup>

Thinking for yourself is less about external sources – such as Google, Instagram, your network – than learning to rely on your inner resources: your ability to question; your imagination and ability to come up with original thoughts and ideas and to project those into the future; and, your lifetime of experiences, memories and impressions.

If you look at design studio like a competition – where at the start of every assignment students jockey to come up with the Next Big Idea, as opposed to an opportunity to learn from both successes and errors, to grow as a designer, to gradually come into your own, building self-confidence – you might short-circuit the learning process by shopping for a design on Instagram, ArchDaily or Google images. I say this because I sense the pressure students feel under. As a professor in the United States, in studio I recognise many of the student projects from online sources: where students feel they are under such pressure to come up with a strong idea that they don't even bother shopping for design inspiration in the library – as many of

my peers did in a previous generation – but take the more expedient route of fishing for a design online. These students curtail or delay their development as designers in that they, in many cases, don't even consider themselves as a source of original ideas.

Sagan's example is who you want to strive not to be – work to become your own person – but to be *like*: thinking about everyday familiar things in ways that no one else has. *That* is independent thinking.

With the rise of technologies such as artificial intelligence it will be all the more important for architects to rely on their own critical thinking, especially when the temptation will be to rely on algorithms and generative design tools for answers and design outcomes. In such circumstances, architects will need to think for themselves, independently, not taking the machine's word as the final arbiter. Architects as amiable sceptics will also be needed to provide a healthy dose of common sense – something missing from current design technology offerings.

To be self-directed and to think independently, accept the fact that you are not a passive receptacle to be filled with information. You have agency – with the ability to act on the world. Take responsibility for your education and who you will become. The sooner you come to this realisation and acceptance of it, the steeper your career trajectory.

### TRY THIS

The next time you are given a design assignment, before automatically going online in search of inspiration, pour a cup of hot chocolate, coffee or tea, find a comfortable seat somewhere, open a Moleskine, sketchbook or roll of tracing paper, and empty your mind of any preconceived ideas you may have for the project. Some designers believe that among these initial ideas is The Big Idea, whereas others see these for what they are – preconceived notions that are largely obvious and unoriginal. Think of this exercise as emptying yourself of stale thoughts and ideas; by committing them to paper, you free your imagination up for new, more original thoughts. If you can stay seated sketching every idea that pops into your head for twenty to thirty minutes, you may find that an unexpected idea occurs to you – something you would never have thought of if you went with the first thought that popped into your head. Sometimes an original idea will occur later, after this emptying exercise, while on a walk or in the shower, when you aren't thinking about your assignment and the pressure is decidedly off, even for a moment – voila, the idea appears. In either case you end up with two gifts: one, an idea for your assignment; but, as importantly, you will find that you have relied on yourself – that you are a reliable resource you can count on for ideas, that you can and will turn to again and again throughout your career. This is a thought that doesn't occur to most of your peers, whose go-to habit is to see what's online.

---

**TRY THIS**

This is the time in your life when to get to know yourself, your preferences. Sure, seek help and feedback, but in the end, you decide: *that* is how you grow and evolve as a designer. Live (and hopefully not die) by your decisions. Then afterwards, take a breath or a sip of tea and ask yourself: *Based on how it turned out, based on feedback received, how would I do it differently next time?* That is how you evolve as a designer.



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Fig 31.0: Creative thinking as a go-to tool in your toolbox

# PART II: CRITICAL CREATIVE THINKING

**Architects think creatively.** Architects think of ways to explain their ideas in terms that non-architects can understand – in a layperson's terms. They do this to assure project progress, moving the ball forward, improving upon what came before. To do this, they work iteratively – not in circles spinning their wheels, but in a spiral working towards a solution. Ultimately, they use their head and heart to address people's reason but also to appeal to their emotions, their needs and wants.

## SECTION 4: CRITICAL CREATIVE THINKING

# 31: Critical Creative Thinking

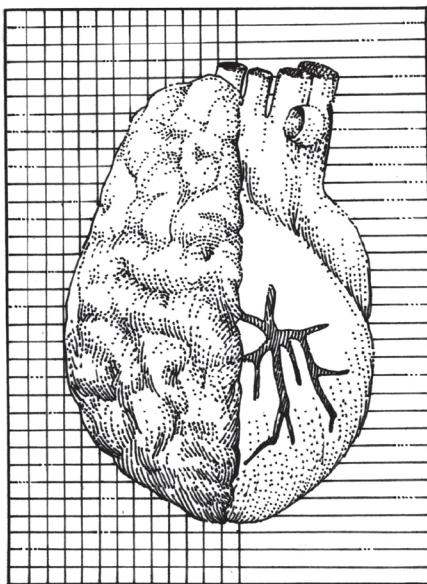


Fig 31.1: As an art and a science, architecture involves both rationality and emotions

**Architects rely  
on critical creative  
thinking to draw  
on both sides of  
the brain.**

Say you were asked to translate a two-dimensional abstract painting into a three-dimensional object with a series of spaces – a pretty typical translation/abstraction project found in many beginning design programs. How would you go about doing it?

Most students would look at this assignment and produce a 3D extrusion of the painting.

But not you – that would be too literal or obvious an interpretation of the assignment.

What is a non-obvious way of interpreting the assignment?

The intent of this project is not for you to produce a 3D extrusion of the painting.

Instead, recognise that you are being asked to decide for yourself which are the most important attributes of the painting, and you might translate these ideas into 3D form.

This assignment, you conclude, requires you to interpret the painting as you see fit, distilling the painting down to the core issues, then using the 3D abstraction to communicate these ideas.

Using this example, how does one consider design assignments in terms of critical thinking?

As you can see, applying creative thinking *critically* results in a very different outcome from producing a 3D extrusion of the painting!<sup>191</sup>

Architects and other creative types are often advised that reasoning and judgement can mess with creative output, so should be sequestered for a later time, ideally after they're done ideating.

Yet in this time of rapidly developing design and delivery technologies – including parametric, computational, generative design tools and robotic fabrication – it is critical that we consider creative thinking as fundamentally a critical thinking process, not something separate from it.<sup>192</sup>

That's why this section is called not 'creative thinking' but *critical* creative thinking – because we don't abandon the critical thinking we learned in the previous section. And because, as we'll see, critical thinking isn't a separate phase that comes at the end of the design process, but is something that we access and engage with throughout.



Fig 31.2: Think outside the building

Architecture, as an art and a science, involves both rationality and emotions. We need both, and solutions need to address both. While we have come to associate creative thinking with idea generation and critical thinking with analysis, in practice the two – analysing and synthesising, critical thinking and creative thinking – occur at the same time.<sup>193</sup>

Neuroscience bears this out. Architects aren't more right-brained than left-brained – or more left-brained than right-brained. The cerebrum is divided into left and right hemispheres. The two sides are connected by the nerve fibres of the corpus callosum. Returning to our question, they need both, with the corpus callosum – the bridge between the left and right sides of the brain – connecting the two hemispheres. As astronomer, cosmologist, astrophysicist and author Carl Sagan wrote, 'to solve complex problems in changing circumstances requires the activity of both cerebral hemispheres: the path to the future lies through the corpus callosum'.<sup>194</sup>

If we were to watch our brain under an MRI, we might think that when we are being creative the right brain lights up, and when we are, say, solving a maths assignment the left side lights up – but the reality is that both light up in each instance. The reality is we need both.<sup>195</sup> Creative thinking draws on both sides of the brain – involving multiple brain regions – and that's why the brains of architects and other creative types are so unusually well connected.<sup>196</sup> In fact, the connection between critical and creative thinking is especially strong from the time when one first starts out in architecture school.<sup>197</sup>

As pointed out in the previous section, critical and creative thinking increasingly take place simultaneously, or nearly so, as one advances in one's career. While creativity is seen as the most important skill in the world,<sup>198</sup> for architects critical thinking is never far behind.

If your goal is to design paper architecture – unrealistic, unbuildable, theoretical – then perhaps start with creative thinking. Innovation is sometimes referred to as *useful* creativity. So is innovative architecture – fact-based, grounded in reality and by gravity – even as it aspires to transform the lives of those who inhabit it. Critical creative thinking depends on working within constraints while seizing opportunities.<sup>199</sup>

Critical thinking and creative thinking are sometimes expressed as divergent and convergent thinking, where with divergent thinking architects seek to understand, expressed by doing research – asking *what more can this be?*, and *how can I expand this?* – whereas convergent thinking zeroes in on a solution, narrows the field, and evaluates options.

Creative thinking involves learning to generate and apply new ideas in specific situations, seeing existing situations in a new light, identifying alternative reasons, and seeing or making new connections that generate a positive outcome. Architects engage in creative thinking to differentiate themselves and their designs, to continually improve, to be both more efficient and more effective, to make something of their time, and to advance novel ideas in the name of progress.

If creative thinking is the process of generating new ideas and possibilities, *critical* creative thinking sees creativity as a thought process as well as a design process.<sup>200</sup> Critical thinking requires one to think for oneself, questioning usually accepted ways of understanding things and avoiding uncritically accepting the ways others commonly see things. The difference between critical and creative thinking is the difference between IBM's 'Think' and Apple's 'Think different'. To think creatively means to *think differently*.

### TRY THIS

With your next assignment, think independently, for yourself. Think not in terms of another's ideas – whether from the internet, sneaking a peek at a classmate's or studio mate's ideas, nor based on what you think your professor wants – but ideas from you and you alone. Be alone with your writing/drawing/modelling instrument of choice and the paper/monitor. Pour a cup and wait. *Thinking means concentrating on one thing for long enough to develop an idea about it.*<sup>201</sup> This is how, over time, you build confidence and a reputation for being a creative thinker.

**TRY THIS**

First perceive critical aspects of a painting; analyse these aspects to understand their meaning and impact in the painting; choose which aspects are most important; and lastly, decide how to best communicate them in three dimensions.

**ASK THIS**

This<sup>202</sup> illustrates how you can think critically about each design assignment you are given by asking: What are we being asked to do here, both literally – superficially, on the surface – and also more deeply?

**ASK THIS**

Isn't there the fear of rejecting a good idea before it had the chance to be thoroughly vetted? At first, when you are starting out, perhaps. But as you develop your ability to think like an architect, your flow of ideas is free of evaluation and judgement – until it isn't. The two phases – critical thinking and creative thinking – remain separate: over time, architects just become better self-editors and judges of ideas that are relevant, pertinent to the task at hand.

**ASK THIS**

What does that even mean – to *think outside of the box*? It means to be able to see what others don't (yet) see – but once you do, and show them, they will. Ask: What is really being asked here? What are others not seeing? What is another way of interpreting what is being asked here? What is this most like or similar to – and how would it be solved in that context?

**ASK THIS**

If you could only choose one, given the choice between critical thinking and creative thinking – criticising and creating – which would you choose? Fortunately you don't have to choose – you can have both. Design studio ensures that you are exposed to, and if you work at it, develop, each virtually at the same time as the feedback loop is almost instantaneous.

## 32: Why Critical Creative Thinking?

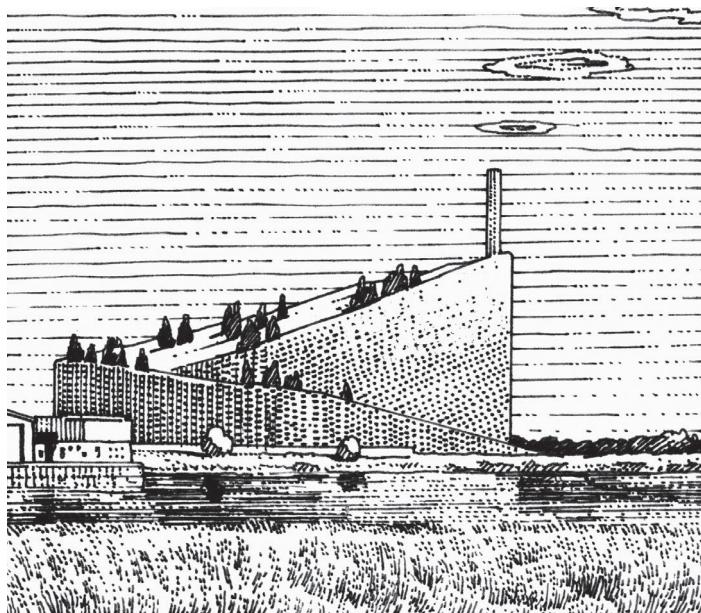


Fig 32.1: BIG's CopenHill waste-to-energy plant doubles as an urban ski slope for those in and around Copenhagen

**Architects don't let everyday problems distract them from addressing major, wicked problems with non-obvious solutions.**

Located in an industrial area near the city centre, Bjarke Ingels Group's CopenHill waste-to-energy plant first opened in Copenhagen in 2019. What's different about this new plant is not only that it aimed to become a model in the field of waste management and energy production, but that it also doubles as an urban ski slope for those in and around Copenhagen.

The design of a building is not exclusively a creative act. Architects not only have to be creative in terms of novelty, but have to solve major – intractable, complex, unsolvable, wicked – problems as well as minor problems: where to locate the mechanical room or breakfast nook, the sill height of windows, or what the roof slope ought to be – or what other uses the roof could have.

A big part of creative thinking is to challenge assumptions – our own and others' preconceived ideas – by asking questions such as: Why is it this way? And, does it need to be this way?

So, why *critical* creative thinking? Is it because creativity without the critical component emphasises art over science? Architecture doesn't have the luxury of being able to ignore the elements, living conditions, building codes, budgets, gravity – nor the opportunity to serve the larger community.

Or is it because these two ways of thinking are complementary and equally important,<sup>203</sup> because man cannot live by reasoning alone? Hopefully by now you're on board with the idea that creative thinking is not separate from critical thinking. They're in sync – *simpatico* – and are compatible. As Carl Sagan wrote, 'mere critical thinking without creative and intuitive insights, without the search for new patterns is sterile and doomed'.<sup>204</sup>

It is because creative thinking is table stakes for being invited to play the game of architecture. To succeed at the game, you have to apply what you learned in the previous section to creative thinking.

The heart of the architecture curriculum is the design studio and what students learn there is less about how to design buildings than about learning a thinking process – a way to address design problems so you are more likely to arrive at an optimal outcome.<sup>205</sup>

This thinking process requires students to think about their thinking – referred to as *metacognition* – where the student actively thinks about their design process *in situ* in the midst of designing. Anyone who wishes to solve meaningful problems with original discoveries or wants to learn to think differently and gain an edge over their routine way of problem solving would do well to reflect on their design process. Supportive tutors encourage the development of metacognitive abilities in their students, recognising it as a critical part of critical creative thinking and growth as a designer.<sup>206</sup>

Australian architect and emeritus professor Alec Tzannes believes that teaching people to think is missing from architectural education. From his experience he thinks that being aware of one's own design methods leading

up to conceptual realisation of an idea 'lubricates and facilitates the process and creates the basis of creativity'.<sup>207</sup>

### TRY THIS

Donald Schön wrote about a range of professionals who self-monitor, calling them *reflective practitioners*, and saw design as a reflective activity in which the designer has a reflective conversation – a form of metacognitive thought – with the situation.<sup>208</sup> There is no faster way to develop as a designer than to be the sort of designer who reflects on their decisions as they are made. Make a habit of thinking about your thinking as you design.

# 33: Challenges of Creative Thinking

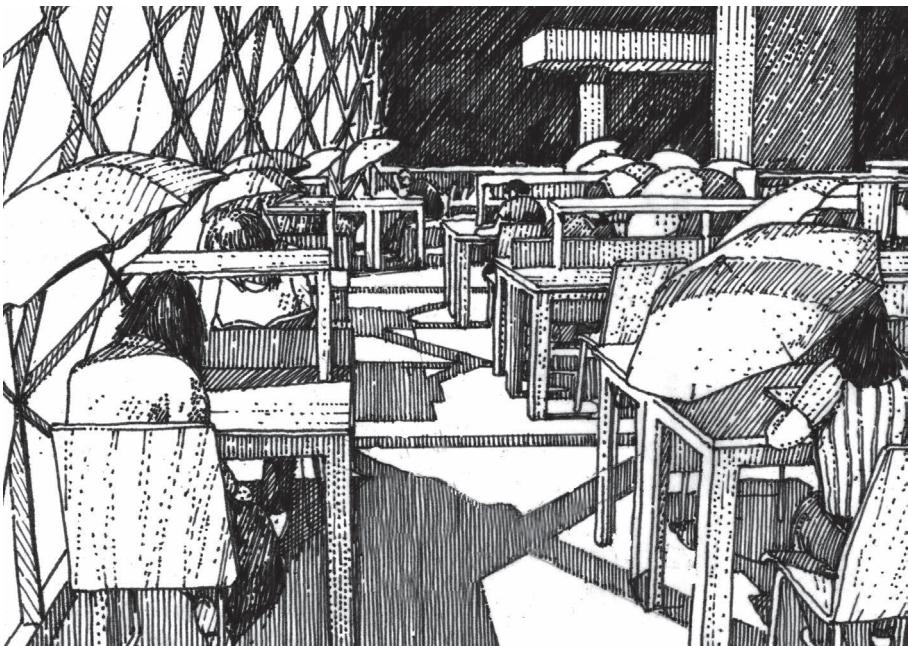


Fig 33.1: When the Shenzhen Library opened in China, umbrellas also opened

**Architects use their comfort with ambiguity and uncertainty to their and others' advantage.**

When the Shenzhen Library opened in China, due to glare and heat from the sun patrons were forced to shelter under umbrellas. For the superstitious, opening an umbrella indoors brings bad luck. For others, it is an inconvenience. For still others, using umbrellas indoors is just part of the culture. But was it a failure of empathy on the part of the designers with the student patrons? Was it a failure of imagination? Or a failure of asking questions: How will the space be used? Is glare a concern or an issue? Or ... do people in Shenzhen just use umbrellas indoors?

A student's first studio represents a new way of thinking and working. This in itself can be challenging – especially for those who relied on memorisation to succeed and counted on there being a right and a wrong answer to get ahead – neither of which count for much in studio. While most students expect to learn how to design buildings of different types and scales in studio, architecture students will tell you that what they learned in design studio is to make form, translate concepts or foster human interactions.<sup>209</sup>

The benefits of creative thinking in studio are many: learning the iterative process; first-hand immersion in design thinking; camaraderie among studio mates; the perseverance of repeatedly trying; working with faculty to arrive at solutions you never thought possible. Perhaps most beneficial of all, creative thinking is a renewable resource: it never runs out – though it helps to make it part of your routine and use your creative muscles often. But there are also challenges.

As we saw in the previous section, the challenges of critical thinking – that it is exhausting, hard, deliberate and involves others, that it is unfamiliar, too rational, has too many rules, requires action, takes focus – are different in number and kind from the challenges of creative thinking. But creative thinking has challenges, nonetheless.

Here I will focus on one such challenge: design – and creative thinking – is largely subjective and open-ended. The open-endedness of architectural problems and assignments – exacerbated by the ambiguity and uncertainty inherent to the design process – can create anxiety in some students. Students respond to this uncertainty differently. Some architecture students lower their anxiety by opting to seek out and emulate (or in some instances all but copy) an existing design online so they can compete and move forward in studio. In this way, they are largely abdicating creative thinking; they are not thinking but imitating. Others learn to live with some anxiety until – working with their tutors, talking with their studio mates – their designs materialise, and answers fall into place.

Unlike other subjects students might study, there are no right or wrong answers in architectural design – there is no one way – only better or worse solutions. This open-endedness is a complaint of many who study architecture; its subjectivity one of the most-cited reasons for why students drop out. Ironically, even if you are comfortable with uncertainty you will come to learn that your clients and the public in general are more

comfortable with certainty and need to communicate in their terms – thus the further importance of *critical* creative thinking.

It's hard to come up with a novel, original design. Then add to that the requirements of the brief and all of the additional burdens our designs aspire to accommodate: a tall order, and asking a great deal of anyone who is working on becoming an architect. What a student may consider novel their tutor may have seen a thousand times, and instead of being encouraged to abandon their borrowed design some students will persevere only to be dismissed months later during a mid-term or final review by a reviewer who has also seen that particular scheme a thousand times before. Today, with social media and the breadcrumbs of the internet, it's almost impossible to obscure one's sources of inspiration.

There is a palpable tension between conserving resources and using what is available. This may come as a surprise to some, but even with the shortage of natural materials and resources, one contrarian lesson I've learned from a career in architecture is to use what you're given – the whole site, the whole programme, the whole schedule, the whole budget. The good architect isn't the one who heroically uses half the budget and schedule, but the one who uses up what they are given for the best of all concerned: paying client and non-paying client (i.e. the public). Unless you have a good reason not to use up all available resources – i.e. conserving resources, materials, labour or energy – you are expected to best serve your clients by making the most of resources, including budget and time, that have been made available to you.

A further challenge of creative thinking is learning to work creatively with others, either on team projects or on shared parts of individual projects, such as building a model of the site or completing a site analysis – which will be addressed in the next section.

## ASK THIS

Another challenge is for creative thinking to accommodate innovative form and all of the other needs made explicit by the client's brief, while also doing the right thing for those who are impacted by your design. In other words, ask of your design these questions: Does your design have a negative impact on the environment or lead to the decarbonisation of the built environment? Does your design contribute to urban sprawl or increase urban density and access to public transportation while reducing the necessity for additional infrastructure and cars? Does your project contribute to the health and wellbeing of its users, inhabitants and future generations? Does your design – irrespective of what you were asked to design – address the need to house billions, many of whom cannot afford market-rate housing – in the years to come? Design may be subjective, but we must get beyond saying we did something because we like it. It is assumed that you like what you did – why would you design something you dislike? – and it should not be offered as a reason for why you did what you did. That you like it is a self-justifying rationalisation, never a justification for doing something. Your reasons for doing what you did can and should be expressed, a belief that is in contrast to the subjectively based *I did it because I like it* approach to design which some beginning design students – and not a few seasoned practising architects – assume to be sufficient.<sup>210</sup> It is OK to be passionate about your ideas, but for others to appreciate your passion you have to think not only creatively but critically. Critical thinking teaches you to anticipate reasonable objections to your ideas.

## 34: Comfort with Ambiguity and Uncertainty

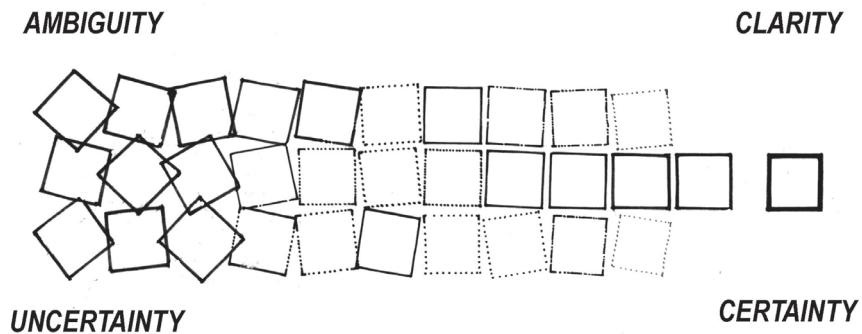


Fig 34.1: Architects are comfortable with ambiguity and uncertainty while others look for clarity and certainty

**Architects are asked  
to do impossible  
things they know  
nothing about.**

If the first section – critical thinking – was about understanding, this section – creative thinking – is about discovery and the importance of building confidence. The fact that you are comfortable with ambiguity ought to be a point of pride, because it is a distinguishing characteristic of the architect. Soon after enrolling in architecture school you come to learn among roommates and those you grew up with that not everybody is comfortable with uncertainty – but you are, and it is one of your standout superpowers.

## Hold that thought

Many architecture students have a tendency to go with their first idea. But studies show that to make decisions that stick, we're better off delaying choices for as long as practically possible. According to Frank Partnoy in *Wait: The Art and Science of Delay*, prepared professionals understand how long they have available to make a decision, and then, given that timeframe, they wait as long as they possibly can. People are hardwired to react quickly, yet are often better off resisting the urge to go with their first idea.

The length of time you can hold an idea in your head while vetting it – putting it to the test of scepticism and scrutiny, not to mention questioning by others and sometimes even public ridicule – is a direct indicator of an idea's strength. And also your comfort with ambiguity. If you killed an idea as soon as someone verbally shot holes at it, you would never know whether it was a worthwhile idea or not.

Architects need to keep everyone's needs, wants, aspirations and wishes – their ideas and ideals – in mind throughout the design process, like trying to keep so many balls in the air at one time. As discussed, architects primarily deal with wicked problems, which are ambiguous and don't have an obvious solution. On the one hand, the longer you keep a question open – the more likely that you'll arrive at an amicable, insightful or creative solution. Few, though, have this luxury. While Le Corbusier wrote that 'creation is a patient search', with today's reduced timelines, schedule crunches and fast-track projects, creation needs to be more like an *impatient* search. Architects rely on data, but creative thinking challenges them to welcome what is still undefined.

As we saw in the previous chapter on challenges, it is easier for some students to handle the ambiguity inherent to architecture design studio than others, and there are theories as to why that's the case.<sup>211</sup> Some students complain that assignments aren't explained clearly or with enough specificity – when the point of the assignment is to be open-ended, so students can interpret what is expected of them. Some students harbour conspiracy theories and try to second-guess the tutor, trying to figure out what they are looking for<sup>212</sup> or sweet-talk them into sharing the right solution – when the point of the assignment is that there is no right answer. Nonetheless, students who until that point in their academic career have been focused primarily on STEM subjects try to understand open-ended design assignments in right or wrong terms that are more familiar to them:

'How can everyone come up with different solutions to a problem and everyone be correct?'<sup>213</sup> For some, ambiguous assignments in architectural education come as a shock.<sup>214</sup>

What students really want is certainty, direction and an end to the open-endedness. After being given an ambiguous assignment by their tutor, ostensibly to help develop their imagination and creative thinking, some will request that they just point-blank tell them what to do. Ideally in writing. And make that triplicate. These students miss the clarity of studying for quizzes – at least then they knew what was expected, correct and incorrect. What students don't realise is that over time, especially as they progress with their designs, their self-provided decision-making criteria are often replaced with reality-based less-open interpretations and criteria: what works in this situation; how it relates with the context; what will keep it from falling down; what is most relevant and warranted to do here, etc.

Here's a recent email I received from a student who had been given no instructions, just general guidelines for an assignment:

*Dear Prof. Deutsch,  
The assignment sheets are well written, but the example photos/models are never very accurate of the assignment and this leads to a lot of confusion.  
Signed,  
Just tell me what to do*

What I want to tell them:

Taking photos of previous assignments/students' work is not a substitute for thinking.

Little by little, these students come to realise that they don't need everything pinned down and perfect from the get-go. That having some parts of their design indeterminate will not kill them, and that what does not kill them makes them stronger.<sup>215</sup> That living with some anxiety is necessary and OK as long as it doesn't get out of hand. That they should learn to trust themselves and build confidence in the amount of anxiety they can handle. And in doing so, they will learn how to remain in an ambiguous state, to live with this uncertainty, for as long as possible. Students look back on their initial experiences in design studio, and what they remember most is being shocked by the lack of instruction or direction on assignments, the uncertainty about their tutor's intent or expectations. Students persevered despite this uncertainty – and some because of it – while it proved too ambiguous for others. What's important for the architect is to remain agile, not fragile.

### TRY THIS

As the semester progresses, watch to see if your professor gradually introduces more or less ambiguity into the project assignments.<sup>216</sup>

## 35: Design Thinking in Architecture



Fig 35.1: Two architects examine an untangled thread of yarn

**Architects consider design thinking less a process than a mindset, one that may lead to intangible results.**

There's a joke where one fish asks another fish, 'How's the water?' The other fish replies, 'What is water?'

Just as humans cannot see the air that surrounds them, because water is all they know, it's easy for fish to forget it's there.

Architects are like fish in that they are trained in design thinking through the iterative design studio experience (Tim Brown, the CEO of IDEO, went so far as to say that 'architectural education is the best systems design education in the world'<sup>217</sup>) – they're arguably<sup>218</sup> the original design thinkers and are surrounded by it – but you wouldn't know it from architects themselves.

Because architects more often focus on objects (buildings) over processes, and don't like to follow linear methodologies (they're too inhibiting) – and perhaps also because they don't engage as much as they ought to in public discourse outside of their architecture circles – architects are not associated with design thinking: but they ought to be.

Architecture students learn first-hand the back-and-forth, divergent/convergent iterative process via desk crits in studio, converging towards a solution; an experience that can't be replicated nor replaced by a diagram or article in a business journal.

Architects engage in design thinking when they gain a deep understanding of the environment and the user's context – when they ask, what is actual and necessary? – requiring field work in the user's environment, but also empathy in terms of the extent to which they try to understand the user and their situation.<sup>219</sup> Architects also commonly participate in design thinking when they ideate, visualise, prototype and evaluate solutions to address the user's explicit and implicit needs, through their iterative process. For it to be design thinking, the emphasis is on people.

Design thinking in business, product development and marketing – three areas that have taken design thinking and run with it – hasn't helped the architect much where their goal is a new product or service, not a place that people will use and that will serve as the backdrop of their lives. Where design thinking really helps the architect is where they scale up and creatively address problems beyond the individual building.<sup>220</sup>

The important thing for architects isn't that they are swimming in design thinking and don't realise it. It's that their doing so gives them an edge in addressing complex issues and wicked problems – messy problems without obvious solutions – due to their ability to not just problem solve but identify problems worth solving, then apply critical creative thinking to turn issues such as addressing homelessness into opportunities.<sup>221</sup>

There is a duality at the heart of what makes an architect an architect, and design thinking is nothing if not a duality. The architect exists as a balancing act between two extremes: practicality and dreaming; necessity

and luxury; actual and virtual; science and art. Yet architecture isn't an either/or proposition, but the careful balancing of extremes. It is for this reason that architects can continue designing buildings but also social systems, businesses and solutions to intractable problems like climate change, ageing and the need to house the homeless, using the same critical creative thinking to address not only private architecture but our age's most hard-to-solve urgent public problems like pending ecological catastrophe.<sup>222</sup>

Design thinking requires you to step back and see problems in a wider context, one that requires you to empathise with people and their circumstances over yours. Historically, an architect would design a building and say, 'I designed the building to your brief and design intent as you requested.' Today, a design thinker might reply, 'Do we even need a building?'<sup>223</sup>

Take the case of a school district that engaged an architect to design an addition to their school building that was in need of additional classroom space.<sup>224</sup> Architectural projects often begin with a defined problem that embodies its solution – namely, a building. By contrast, defining the problem based on insights gained through empathising with the client and users, design thinking stresses discovering the right problem to solve over finding a predetermined solution.

Leveraging design thinking, instead of proposing alternative building designs, the architect might conclude that what is needed is not an addition to the school but a tweaking of the teaching schedule to make better use of the current school classrooms. Here, design thinking is less a process, methodology or set of steps to follow than a mindset; one that may result in an intangible outcome.

## 36: Designerly Ways of Thinking



Fig 36.1: Three architects examining a tangle of information

**Architects think in a way that is worth studying, preserving and applying to problems large and small.**

So, hopefully by now we've established that architects think differently from others. They have more ways to think at their disposal, and when they think they do so as both a process and a mindset. But there is an additional way architects think that can have an impact on the resulting design.

For architects, design can be a wrestling match between abstract ideas/form/appearance – line, plane, mass, volume, form, point, shape, time, scale, space – and more practical ideas/reality/necessity – climate, materials, site forces, constructability<sup>225</sup> – between the ideal and the real, resulting in either a healthy tension or outright conflict.

This concept of thinking comes from Nigel Cross's influential 1982 essay, 'Designerly ways of knowing: design discipline versus design science,'<sup>226</sup> which tried to distinguish between scientific ways of knowing and the ways that designers gain knowledge, asserting that design has a legitimate body of knowledge.

Similarly, a designerly way of *thinking* asserts that the way architects think is worth studying, preserving and applying to problems large and small. This book is a case in point.

A designerly way of thinking keeps both the ideal and real in balance throughout the design process until a agreeable solution is arrived at.

Additionally, a designerly way of thinking:

- implies that an open mindset is required to see possibilities others might miss, overlook or not consider
- means to think in terms of bringing something new into the world, even if what you propose is a modification to or adaptation of something that already exists
- keeps those in mind who will be impacted by the design, especially those who are under-represented or don't have a seat at the table
- keeps all voices, forces, constraints and impacts in mind as deep into the design process as possible
- exhibits confidence that the design is both a powerful force that can bring about positive change while also being synthesised into a cohesive whole
- requires a big idea that informs the project throughout the entire design cycle, guiding the design and providing a hierarchy for decisions
- looks for opportunities to delegate the mindless, laborious, repetitive (i.e. for some, boring) parts of the design process to free oneself to focus on one's core competency: namely, to design. That said, most designers benefit from doing everything at least once themselves, so they at least know what it is they are abdicating when they automate
- asks the architect to continually reconcile the ideal and real into a satisfying work
- requires metacognition – thinking about thinking – to help one see the big picture, provide support and keep the whole design process on target.<sup>227</sup>

Architects tend to see everything as a design opportunity. While non-designers might make disparaging comments – that *architects are always designing* or *architects don't know when to stop designing* – don't let that stop you. So much of our world is under-designed that it demands the attention of architects.

Think of design as a lens through which you see the world – that is a designerly way of thinking.

## 37: Design Process



Fig 37.1: In 1946 Le Corbusier met Albert Einstein at Princeton University after travelling to New York City to present his project for the UN Headquarters at the United Nations

**The architect's design process moves a project forward from concept to a piece of architecture.**

If we were to believe Le Corbusier, he committed the design assignment to memory, deliberately forgot about it for several months, then one day *voila* – Ronchamp.<sup>228</sup>

Few architects today – and I suspect even at that time – have the luxury of waiting days, let alone months, to deliver.

But Corbu's hurry-and-wait design process turned out not to be true. Architects have a tendency to romanticise or exaggerate their design process. In Le Corbusier's view, instead of doing the hard work of making drawings and study models, he *incubated* for months at a time, after which the project – Ronchamp in this case – appeared whole cloth<sup>229</sup> in a moment of inspiration.<sup>230</sup>

What actually happened is that Le Corbusier designed Ronchamp by sketching. His version of how his projects materialised made for a better story – but for the pesky fact that it was untrue.

If there is one thing to understand about the design process it is that there is one: that there is a means to develop your big idea into a viable project remains a surprise to some architecture students when first starting out.

A second thing to understand about the design process it is that there is more than one.

The critical creative thinking you bring to the design process is important, because the thought process that goes into making architecture has an impact on the resulting architecture.<sup>231</sup> While we may discuss them separately, in reality the two cannot be separated.

*Think Like an Architect* doesn't try to present a reductionist understanding of the architectural design process but addresses the tangle in all its messy glory.

Each architect has a different design process, yet as long as the outcome is deemed a success – however that is defined – they are all permissible.<sup>232</sup> Ever malleable to one's needs, the design process cannot be reduced to a formula.

Typically, architects place the emphasis on product, not process: on projects that *look like* architecture. But they do themselves – and their stakeholders – a disservice, as the design process is equal parts process and results. In an environment that is more results oriented, you may find that that a focus on process is associated with a decrease in efficiency. Some feel that a focus on process is less practical and more academic, while industry and business are more interested in results. Results are as important to those who aspire to think like an architect, but equally so is an understanding of one's process. An inefficient process, for example, even with satisfactory results, could still be improved on. To think like an architect means to treat the design process

like a design assignment – designing more effective work procedures rather than designing objects like furniture or buildings.

The design process is about how you get from a concept to a piece of architecture – the big idea of the previous chapter. No PowerPoint lecture can teach it; to learn the design process, one must *do it*.

There wouldn't be a need for a design process if architectural design was straightforward and easy. As mentioned, buildings are becoming increasingly complex and architects have to reconcile often-conflicting demands including social, economic, political and technical. These inputs that every architect contends (wrestles) with can be likened to a tangle – one that the architect must unravel to arrive at a synthetic solution: whether a building, urban plan, or anything else they might have the opportunity to design. Only the tangle can't be amicably and satisfactorily unravelled in a systematic, rational way. This, then, is the architect's design process.

While you should be encouraged to explore and implement your own unique way of solving problems, most design processes have several steps in common, going by various names: you start with a design problem, collect information about the project, then allow the information to digest. Next, the designer comes up with schemes based on this absorbed data, resulting in a solution or design direction. But these are the barest of bones, as each architect has their own version of the design process. Alvar Aalto, for example, started with childlike, instinctive sketches from which his big idea took shape. That's how Aalto said he brought the many mutually opposed issues vying for attention and resolution into a harmonious whole.

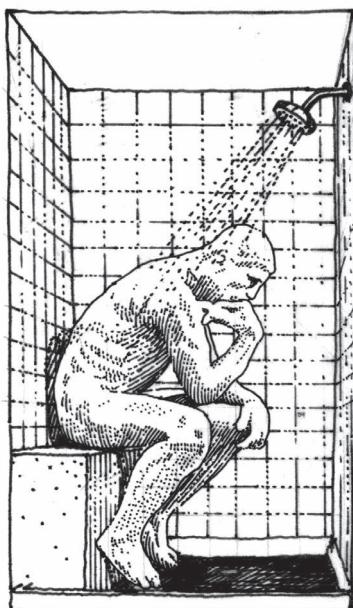


Fig 37.2: Some architects do their best thinking in the shower

**TRY THIS**

Especially as some architects still see what they do primarily as art – where they ideate first then when required justify – standardising the design process will help to create needed efficiencies and improve productivity. In the near future, with the continued rise of technology, the design process may become more routinised, where architects will be pressured to look for opportunities to automate parts of the design process – so why not identify these opportunities now before being forced to do so?

**TRY THIS**

Most students stick with their initial idea. That they do this is a basic misunderstanding of the iterative design process. Some students come up with an idea for a project and spend the rest of the semester protecting it. This is a misunderstanding of the collaborative design process – in this case between the tutor and student. ‘Some architects can probably find the right solution on the first try. I am not one of them,’ admits architect Paul Michael Davis. ‘Neither is Frank Gehry, for whom I worked at the beginning of my career. Neither, it seems, is OMA, Jeanne Gang, Morphosis, or a host of others in the canon of remarkable contemporary architects. Rather, these designers seem content to go back to the drawing board as many times as it takes to get the design right. And it usually takes a lot of tries.’<sup>233</sup> If it doesn’t work for them, why should it for you?



Fig 37.3: Some architects do their best thinking while cycling

**TRY THIS —**

No architecture lecture course can teach the design process. To learn the design process, one must do it. While each architect has their own version of the design process, one commonality is that when first starting out they think like an architect, then they make, and only with some practice and experience does thinking and making become concurrent.<sup>234</sup>

**ASK THIS —**

What's the neuroscience behind arriving at the big idea? There are two theories. One hypothesises that after a period of down time the brain has enough energy to deliver a solution. The other suggests that the down time – whether during sleep, meditation, taking a shower or bath, or going for a bike ride or walk – enables the designer to let go of mental obstacles while helping the mind to consider the assignment from a different point of view.

## 38: Make It Break It Fix It

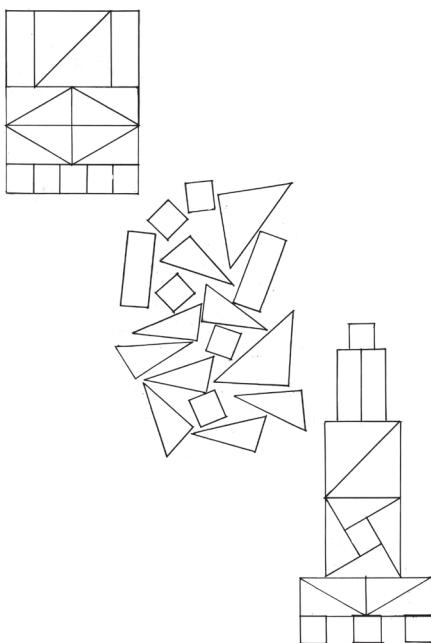


Fig 38.1: Architects are comfortable taking their initial ideas and breaking them down, then building them back up into something else to move the project forward

**Architects have the confidence to take their project apart if it means improving it as they put it back together.**

If you are not going to go with your initial idea – and we have seen good reasons so far not to – then how do you come up with a second (and third, and fourth) idea? Not by poking at it. Not by making tweaks. You break it.

One method that works for designers is to take their initial idea and break it down, then build it back up into something else. In this way a project transforms, ideally improves, and the process moves forward – spirals forward – towards a successful resolution. This is how projects progress.

At first, breaking your idea apart is a bit like taking a bungee jump: you take a deep breath, close your eyes and hope for the best. As with everything, it becomes easier over time.

Why break your idea apart? Breaking a problem apart allows you to reassess it, and then find a way to put it back together again that improves it: make it break it fix it.

To make it break it fix it – or if you prefer, design, critique, revise<sup>235</sup> – you first have to stop and assess your progress. The critique can be done on your own, but it can also occur right after a desk crit, or in practice it can come from a client or team leader. In the case of a crit, if you are honest with yourself, your tutor provided you with some good insights and ideas to improve your project: ignore them at your peril. Better to consider those that resonate with you, that you think might indeed improve your design, then break it and fix it!

Keep making it, breaking it and fixing it until you arrive a place where you are satisfied with the results.

### TRY THIS

To make it break it fix it is how the project improves and how you improve. Architects are OK with breaking things. After you do it once or twice, you realise that the world doesn't end, that life goes on. To make it break it fix it is a form of iterative design – you keep doing it until your project becomes acceptably refined, or until time (or, in practice the design phase budget) runs out. Think of your initial design as a first draft – it was never meant to see the light of day. Like the first pancake that gets thrown out to make way for an almost-OK second pancake, and a considerably improved third pancake, it is OK to make mistakes – in fact, mistakes are encouraged at the initial stages of the design process – just try to do them fast!

## 39: Recognising Patterns

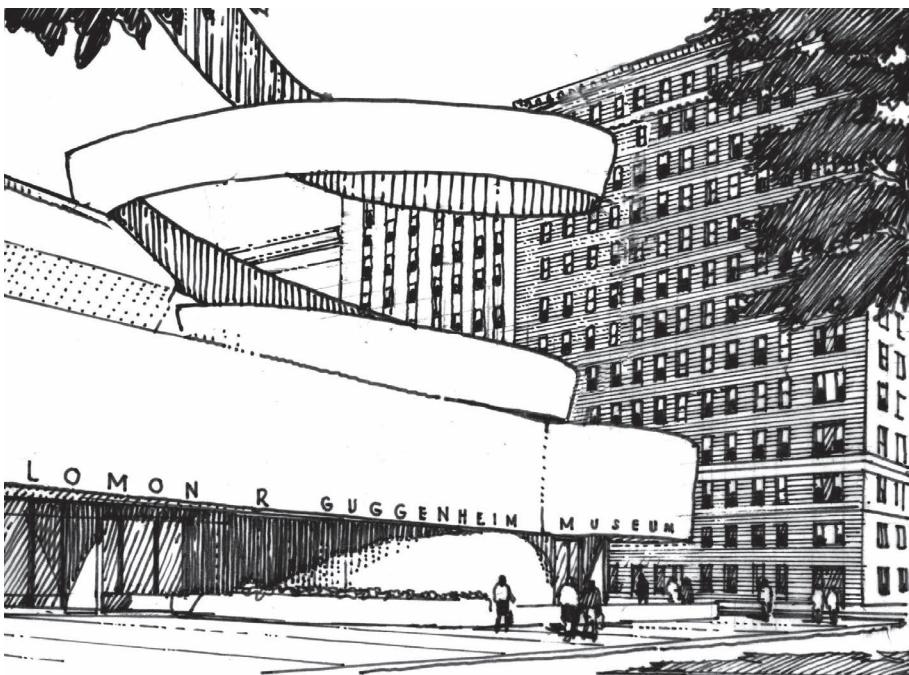


Fig 39.1: One of the most creative and transformative acts an architect can experience is the ability to recognise patterns

**Architects alternate between focused attention and a relaxed state in order to recognise patterns.**

One of the most creative and transformative acts an architect can experience is the ability to recognise patterns: to see something others can't; to relate then combine two seemingly unrelated things; to connect things that previously seemed dissociated; to see commonalities where previously none existed; and to explain one thing in terms of another so it is understood by all.

Some architects are superstitious, preferring not to describe or explain their creative thinking process.<sup>236</sup>

By alternating between a focused then a fuzzy state – first rational then irrational – one can better recognise patterns that before may not have been apparent. To achieve an optimal state requires a balance of linear and creative thinking – switching between focused attention and a relaxed state. Like the incubation stage in the creative process, getting into the right frame of mind in order to be able to recognise patterns requires making time in your day for just chilling, even doing nothing. Eventually you may be able to do this on command anywhere – but while still in school it is probably best practised away from stimulating places like the studio and distractions like your phone while lying in bed or lounging on a couch.<sup>237</sup>

Pattern recognition requires both critical and creative thinking. Some patterns can deceive – where we see things that are just not there due to wishful thinking, or when we will them into existence. Also, to see patterns requires a background in a topic – such as architecture – to know what to look for when you are seeking patterns. In other words, in order to connect the dots, it helps to be familiar with the dots you are connecting.

To put two and two together, it helps to be an associative thinker. To make associations between things, let go of the literal and rational and welcome the fuzzy logic of the dream state.

### TRY THIS

To recognise patterns, it helps to be in a loose, before- or after-sleep fuzzy state of creative thinking. When thinking creatively, architect Eric Owen Moss explained that he almost always worked in the middle of the night after having been asleep. The important thing, explains Moss, is the change of environment – from studio or the office<sup>238</sup> – where one can disassociate by thinking in a dream-like state.

**TRY THIS**

How to disconnect in a time when connecting is hard to avoid? Here are four suggestions: make a long phone-free walk a part of your daily routine; get out of your comfort zone by taking a different path to studio or work; make more time for recreational activities;<sup>239</sup> alternate between doing focused work and activities that are less intellectually demanding.<sup>240</sup>

**ASK THIS**

How are architects able to recognise patterns that are otherwise undetectable to others? How do architects make these patterns discernible or understandable? Is it the architect's job to make sense of the random and the complex?

## 40: Intuitive Thinking



Fig 40.1: The biggest argument architects have against critical thinking is that it doesn't give enough credit to intuition

**Architects develop their hunches and intuition at the same time as their rational thinking.**

Once, when still in high school, I said to a friend 'I don't think I have ever *thought!*'

'What do you mean?' he asked.

I meant that I couldn't think of a time when, given something to think about – say, a problem – I'd focused on that one thing and responded to it.

I didn't know it at the time, but I had indeed been thinking: I was an *intuitive* thinker. Thinking for me wasn't a conscious effort. Thoughts just came to me.

I didn't have the vocabulary then, but what I was trying to say was that I hadn't thought *deliberately*. That I'd never (like Rodin's statue, *The Thinker*) ever put my chin on my fist, leaned forward and, well ... *thought*.

Instead, I just came up with ideas intuitively that I would turn into cartoons, paintings, plays, songs for the piano and, yes, buildings. They would pop into my head and I would just go with whatever stuck.

Probably the biggest argument architects have against critical thinking – especially as it applies to creative thinking – is that it doesn't give enough credit to intuition.

This book emphasises critical thinking – in this section with critical creative thinking – not because the rational is better than intuition (it's *not*) but because intuition takes experience and judgement – two things beginning students lack. For what is intuition but internalised experience and knowledge?<sup>241</sup>

As Daniel Kahneman made popular as an idea, intuition is fast or quick thinking; a gut reaction or sense that something is right. As a designer, you don't want to wait until you have years of experience and have gained professional judgement before you develop your intuition. You want to develop your hunches and intuition at the same time as your rational thinking ability. Just as rational thinking alone would lead to predictable, dry, uninspired work – buildings, not architecture – so too rational thinking without emotion, eloquence or finesse would lead to logic, not poetry.

We've seen how it's too easy to romanticise how a project like Le Corbusier's Ronchamp came into being – via the architect waiting months for the moment of insight – instead of the much more *prosaic but true* series of sketches and rational decisions. Ronchamp wasn't just intuited into being.

We tend to see intuition as being the opposite of thought, but intuition is a normal and important component of thought<sup>242</sup> and has its roots in tacit learning. You can begin your design process with either rational or intuitive thinking – the important thing is that your design eventually passes through each type of thinking, often through the iterative process multiple times.

Once background information is gathered, some architects start their design process with intuition which is then verified by analysis,<sup>243</sup> while others start

their design process with data, information and rational thought, then subject it to the subconscious – where creativity starts with analysis which is then verified by intuition.

Architect Lindsay Clare deliberately avoids intuitive thoughts until he has fully understood the problem on a practical level. In this process, he first lays the groundwork, then does the necessary research, and answers what is the actual and necessary *before* addressing the desirable and possible. For Clare, the problem needs to be understood before he is free to act on what he has learned, supporting the process of an immersion into the problem prior to concept realisation.<sup>244</sup>

Thom Mayne talks about the need for spontaneity in the design process; distinguishing between intuitive logic and conventional logic; that architects are always working on the design problem in both a conscious and subconscious state; and that ideas come to him incrementally, not all of a sudden in a eureka moment. Thom Mayne prefers a randomness or ‘asymmetric thinking’, not to do anything to formalise or systematise the design process.<sup>245</sup> This echoes the architect’s preference for not using logical formulas or checklists when designing. Daniel Libeskind, who is suspicious of using a generic model for creative thinking, admits that he tries not to burden the creative process with any parameters or discipline.<sup>246</sup>

Architect Peter Wilson himself is suspicious of using design methods or checklists when designing.<sup>247</sup> While beginning architecture students just want to be told what to do – if only to alleviate the anxiety of uncertainty – by the time they are working architects they prefer to figure things out for themselves.

Architect Glenn Murcutt has likened designing to dreaming, where every line he draws is seen or visualised in his mind’s eye beforehand.<sup>248</sup> Alvar Aalto attributed much of his success as an architect to the confidence he allowed himself to have in his intuitive ability.<sup>249</sup> Meanwhile architect Peter Zumthor’s design process comes closest to an ideal balance, based on what he describes as an ongoing interplay of intuitive and rational thought, intuition and analysis, feeling and reason.<sup>250</sup>

### TRY THIS

Architect Peter Tonkin uses doodling to clarify his thinking and translate his subconscious thoughts into architectural form. You are more likely to gain insight when relaxed. In a relaxed state, use a drawing instrument to make marks on paper and see where it takes you. For Tonkin, doodling in this way is the process of letting the subconscious mind come through without consciously thinking of the logistics.<sup>251</sup> For intuitive doodling to be most effective, it helps to do some preparation and critical thinking first.

## 41: Thinking Through Making

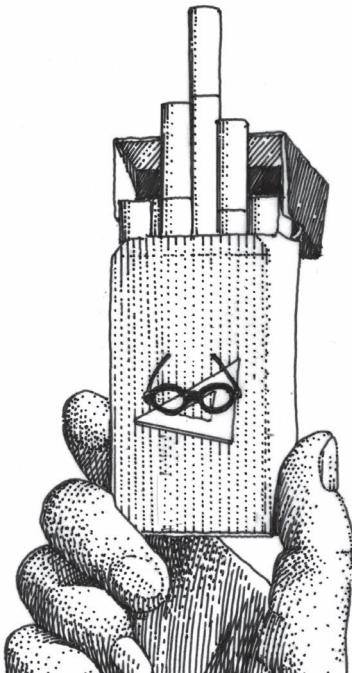


Fig 41.1: Architect Bruce Graham attributed the story of the Sears Tower's origins to a bundle of cigarettes

**Architects think through making, where the two are not separate acts but seen as correlated.**

The Sears Tower in Chicago (today known as the Willis Tower) consists of nine interlocked tubes. Architect Bruce Graham, a smoker, attributed the Sears Tower's origins to the time he had lunch with structural engineer Fazlur Khan. According to Graham, to prove the tower could be tall, slender and attractive, he grabbed a handful of cigarettes, cupped some in his hands, and slid a few past the others, demonstrating to Khan what came to be called the *bundled tube* concept the tower is famous for.

Thinking gets a bad rap. Associated with inaction, in recent years thinking has taken a back seat to doing and making. Doing, making and *applied learning* today are seen as more necessary. So much so that Pritzker Prize-winning architect Alejandro Aravena calls his think tank Elemental a *do tank*.<sup>252</sup> Even architect Steven Holl believes that drawing is a form of thought.<sup>253</sup>

Doing and making point to a return to the things themselves, where the goal isn't to think more – it's to do, to make, to create, and to have actionable, applied research that has an impact. Even the pronunciation of the word 'think' has 'thing' in it: think-er /THiNGkər/, where to think is not abstract but part of the making process.

Some architects do not see thinking as *part* of the design process – where a solution comes about by separate acts of thinking, then doing – but instead by thinking *through* doing, where the two are seen as correlated. Similarly, one develops a critical eye not through intellectual exercises but through the act of drawing. According to Douglas Kelbaugh, 'Design is a serendipitous conversation between the sketching hand and the critical eye.'<sup>254</sup>

A designer is someone who thinks through making: *thinking through making* is the way one learns in architecture school, where learning through making is haptic learning. The studio is a learning-by-doing environment, and the crit is the setting in which students acquire design skills and knowledge, under the guidance of the teacher. In architecture school – whose goal is to educate *thoughtful makers*<sup>255</sup> – you make the things you draw, whereas in practice others make (i.e. build) the things you draw.

## To make or to think?

Which comes first: thinking or making? To make first then analyse? Or to determine what you want to make and then think? In other words, is it better to think about what you intend to make? Or to make something then to think about it? Professor Matthew Brehm has argued that making – drawings, or physical or virtual study models – should be the first step, where the expectation that students first develop their thinking before they are able to act can lead to a type of paralysis.<sup>256</sup> Others contend that it is better to think and strategise before one puts pen to paper to design.<sup>257</sup> As my one-time professor, Olivio Ferrari, put it: 'Sometimes, first you think and then you do; and sometimes first you do and then you think'.<sup>258</sup>

Architects have always thought in action, through drawing and sketching, where drawing is a way of thinking; solving problems through design. Thought is seen as too abstract for some architects, including Carlo Scarpa, who needed to see something drawn, or better yet draw it himself, in order to trust the results.<sup>259</sup>

We saw in the previous chapter how architect Peter Tonkin uses doodling to clarify his thinking and translate his subconscious thoughts into architectural form. Tonkin acknowledges that the architectural goals for projects come about through what he refers to as *thinking through doodling*<sup>260</sup> and he is often pleasantly surprised to find at the end of a project that the building matches the doodles.

As an alternative to drawing, diagramming is a way of visual thinking that mediates between words and images/things.<sup>261</sup> Either way, drawing and diagramming are tools in the architect's toolbox.

Making and doing are a form of craft. And craft is at the core of architecture, writes Catharine Rossi. 'Craft contains the critical thinking that could unpack the current state of architecture,' says Rossi. '... [It] already contains within itself critical thinking that could not only help unpack its current situation, but that of architecture too. Thinking about craft today ultimately offers ways of meaningfully thinking through how we make, and unmake, a world that is entirely manmade.'<sup>262</sup>

### Thinking through our fingers

The critic R.P. Blackmur, who taught biographer Robert Caro when a student at Princeton, admonished him to 'stop thinking with your fingers'.<sup>263</sup> We have long had hand–eye coordination, but today – especially with the internet's impact on our thinking – our fingers are increasingly becoming an extension of our brain.<sup>264</sup> In fact, recent research indicates that we think as much with our hands as our head. *Embodied cognition* is the name given to the recognition that our hands play an increasingly significant role in how we think.<sup>265</sup> Architects have long known that they think with their hands as much as their brains – but psychologists are only now coming to this realisation.<sup>266</sup>

#### ASK THIS

Do you have a propensity for understanding things? Do you have a predilection for making? Do you prefer to think things through completely – where you have an outline or plan in place – before acting? Or do you have a preference for action?

**42:**

## The Ineffable in Architecture

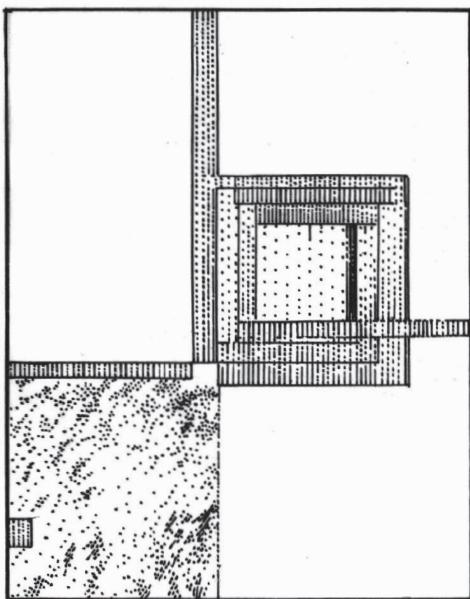


Fig 42.1: A bronze and matt gold detail set in a stone wall panel by Carlo Scarpa

**Architects see design as a reconciliation of the ideal with the real and are influenced by both abstract and practical ideas.**

Is architecture art? That was the question discussed online on 10 January 2020 on Twitter, in response to AIA National's tweet: 'Like architect Renzo Piano once said, "architecture is art".'

The response to this tweet by the Twitterati was fierce.

All three Vitruvian characteristics – structural integrity, usefulness and beauty – can be found in most buildings. We have beauty or delight because man cannot live by commodity and firmness alone.

That said, when there are larger problems to contend with – climate change, affordable housing – the question of whether architecture is art seems almost beside the point.

There is a long history of distinguishing between mere building and architecture – look no further than Nikolaus Pevsner's 'A bicycle shed is a building; Lincoln Cathedral is a piece of architecture' – and this score won't be settled here.

What this chapter asks is whether there is a place for the ineffable – something so great or otherworldly that it cannot be described in words – in architecture?

An engineer is given a problem and solves it. Two steps:

1. Given problem;
2. Provides solution.

An architect adds a third step:

1. Given problem;
2. Has idea;
3. Provides solution.

In that second step – the idea, or what we've been calling the *big idea* – are a whole lot of potential complications, time expenditure and heartbreak.

Why? Because as we've seen, ideas – imagined, created – can conflict with the reality presented by the problem that requires solving. Design, as a reconciliation of the ideal with the real, is influenced by both abstract and practical ideas.<sup>267</sup>

Where do ideas come from? Experience, the imagination, books, research; often, the architecture student – feeling they are under a great deal of pressure to come up with a solution – panics and feels anxiety. To alleviate their anxiety, they look through the most expedient and familiar websites and social media for images to inspire, borrow or steal. Students are not alone in feeling this anxiety: Pritzker Prize-winning architect Glenn Murcutt admitted to feeling a lack of confidence and nervousness when approaching a design problem, even to the point where he admitted that the anxiety of design made him ill.<sup>268</sup>

If there is a time and place for mystery – for obscurity even – architecture school isn't it. Or is it? Are students rewarded for designing mysterious,

inexplicable, *ineffable* buildings? Perhaps – and this may be a good thing as the ineffable, what makes design *good*, is the one thing that robots cannot replicate or replace,<sup>269</sup> and is what humans do best.<sup>270</sup>

Just as design is a reconciliation of the ideal with the real, so too must architecture balance between the ineffable and the rational.<sup>271</sup> As Louis Kahn so eloquently put it, ‘A great building must begin with the unmeasurable, must go through measurable means when it is being designed and in the end must be unmeasurable.’ If students are overburdened by too much reality, and not enough of the ineffable – where the focus is on function at the expense of wonder – they and their design will suffer. The ideal might be to balance and integrate the ideal and the real, the abstract and the practical, the ineffable and the rational – the *constant interplay of feeling and reason*<sup>272</sup> – where students explore creative solutions based on real situations.<sup>273</sup>

While some professors may welcome a diminution of the ineffable in student architecture, a preponderance of function doesn’t relieve the architect of the necessity of wonder.



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## SECTION 5: CURIOSITY

## 43: Curiosity

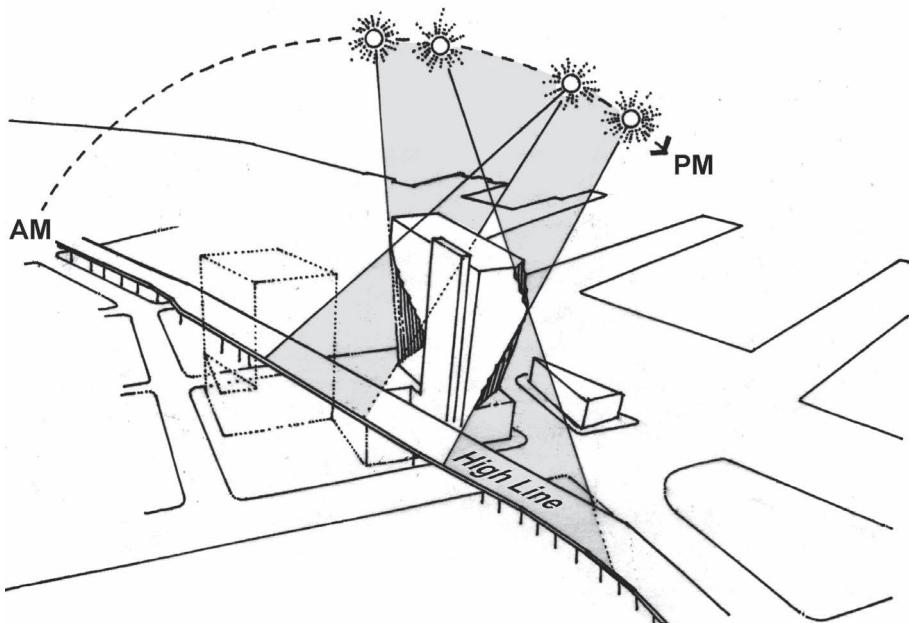


Fig 43.1: The Solar Carve office building by Chicago architect Jeanne Gang near the High Line in New York manoeuvres to let the sun through

**Architects are naturally curious, and make an effort to continue to be so throughout their careers.**

There is ample evidence of a deep and abiding curiosity throughout the architectural projects of Chicago architect Jeanne Gang.<sup>274</sup> Pick any of her projects – the Solar Carve office building near the High Line in New York and how it manoeuvres to let the sun through; the Rescue Company 2 fire station in Brooklyn that is designed around a giant void enabling the company to practise rescue scenarios; the Writers Theater in Glencoe, Illinois that energises and engages the larger community – each serves as an exploration of her persistent inquisitiveness and myriad interests.

Both architecture schools and firms are always interested in students and recent graduates who ask relevant questions, come up with new ideas, and are eager to evolve in their roles. The mindset they are looking for in their candidates is *curiosity* – the second most-mentioned attribute or quality after critical thinking that schools and firms are looking for in new candidates and hires.

To be curious means you are interested in something, *eagerly* interested in learning more about something. To be curious means there is a light on inside; that you are inquisitive and have a concern about something that drives you to look or delve into it further. Curiosity implies a motivation – to search, to find out, to know; to sleuth, to investigate, to find answers. It may seem that most people have a healthy curiosity, but as former professor and author Edgar Schein has suggested, curiosity and question asking – which are integrally related – are missing from most conversations.<sup>275</sup>

What does being more or less curious mean in terms of creative thinking? The highly curious person will seek out what makes experiences unique – for example, seeking out additional information when travelling to another country or visiting a well-known work of architecture – as opposed to seeing them exclusively through others' eyes. Then, when you return, find ways to integrate what you picked up along the way to make new knowledge that you can access and apply.<sup>276</sup>

Sometimes architects use the curiosity of a building's users or inhabitants in the design of their architecture. Alvaro Siza is such an architect, whose framed openings and layered boundaries create curiosity, drawing people in and through his spaces to explore what may exist beyond.<sup>277</sup>

When you leave school, you may want to consider adding curiosity to the criteria you use to choose where to work. In a recent survey of 23,000 people, 83% of company executives said that they encourage question asking and reward curiosity in their organisation, but in the same survey only 52% of employees agreed.<sup>278</sup> The implication being that a more curious organisation will be a more innovative place to work – but make sure that prospective employers and employees are on the same page in their assessment of the extent to which the company encourages curiosity.

Perhaps while discussing curiosity it is a good time to revisit the topic of self-motivation. Much of what architects need to know to become an architect

is learned in practice, and much of what they think is learned by practising. This book exists to serve as a resource to help you develop these skills on your own. There are critical thinkers and creative thinkers, but few bring this unique combination of thinking abilities together in one person as well as the architect.

This book is less a celebration of this fact than an assurance that this quality continues and will help you recognise the thinking capabilities and show you how to build them into your own unique repertoire or toolbox. But it can only do so if you find a way to remain curious – today, and throughout your career. It is up to you to find and maintain a sincere interest in things – some of which you can integrate into your design, others for their own sake.

### TRY THIS

The importance of staying curious for your career cannot be overstated. But also, it is critical for your development as an architect. All of us are born curious, but few are able to maintain the spark to enquire, explore and learn as we mature into adulthood. Some of us when young are discouraged from asking so many questions, while others find that question asking could be perceived not as an expression of curiosity, but ignorance. To be a critical creative thinker, and think like an architect, you need to nurture and build on this desire to understand. To be curious means to be inquisitive, not to be afraid of asking questions – to be the perpetual child asking *why* – and not be satisfied or satiated until you find an answer. For the curious, the more they learn, the hungrier they will be for information and knowledge. I am someone who learned early that I am motivated by learning. Curiosity is the opposite of being satisfied with the first idea that pops into our head. Can the first idea turn out to be the best idea? Sure – but, as we've discussed, it's unlikely – so continue the search until you discover something new. This is how we continue to innovate and bring something new into the world.

### TRY THIS

How do you know if you have above-average curiosity? One way is to try an assessment: Do you bore easily? Do you not care how something works as long as it works? Are you intrigued by the unknown? Do you prefer repetitive tasks and word searches to riddles? Are you willing to try something once to see what it is like? Do you like trying new routes to class or work and approaches to things? Do you tend to ask few or many questions? Do you enjoy meeting strangers? Do you generally hang out with the same people? Do you like to do things your own way?

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**ASK THIS**

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Are you a multipotentialite, polymath or autodidact? Like many architects, a multipotentialite is a generalist with a multitude of interests and creative pursuits. Multipotentialites have no *one true calling* the way specialists do. We have many paths and we pursue all of them, either sequentially or simultaneously (or both). Similarly, architects consider themselves polymaths – in that they have wide-ranging interests – and also self-taught or self-educated autodidacts.

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**READ THIS**

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*Curious: The Desire to Know and Why Your Future Depends On It*  
by Ian Leslie

## 44: Possessing a Growth Mindset

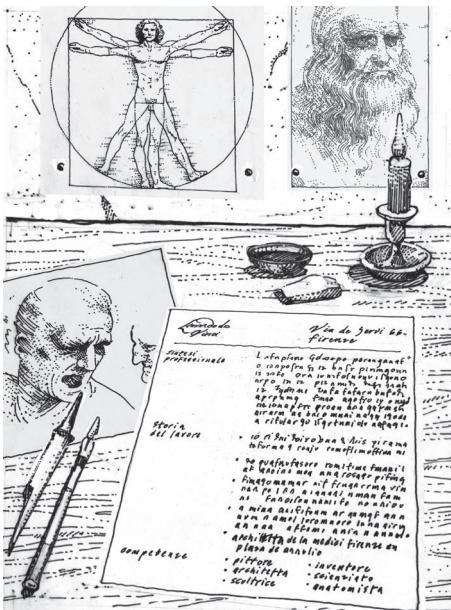


Fig 44.1: The world's first CV downplayed an impressive list of accomplishments in preference for playing up the way one thinks

**Being open to feedback, change and growth is critical to one's development as an architect.**

Who created the first CV?

I'll give you a hint. It was a jobseeker who was trying to impress a prospective employer, only this CV didn't list their achievements – it explained how this person *thinks*.

Give up? The first CV goes back almost 450 years, the employer was the Duke of Milan, and the CV writer – the CV inventor – was none other than Leonardo da Vinci.<sup>279 280</sup>

By downplaying his impressive list of accomplishments and playing up the way he thought, Leonardo was unwittingly expressing that he was in possession of a growth mindset – something that employers today look for in their job candidates.

With a fixed mindset, individuals see their abilities as unchangeable gifts that they had at birth: this is who I am, take it or leave it. Whereas with a growth mindset, students and emerging professionals see their abilities as developable and their intelligence as evolvable through hard work and feedback. They are open to – not threatened by – challenges because they see them as unlimited opportunities for growth and transformation.<sup>281</sup> In her research, Stanford professor and psychologist Carol Dweck discovered that students who believe that they can improve with effort, i.e. those with a growth mindset, exceeded and surpassed those with a fixed mindset.<sup>282</sup> Dweck coined the phrase *growth mindset* after decades of research on how children and teens become successful. Dweck's book<sup>283</sup> explains that accomplishment goes beyond abilities to students' attitudes. Those with growth mindsets see themselves as works-in-progress, while those with fixed mindsets see their abilities as static, so they avoid challenge and failure.<sup>284</sup>

With all there is to learn, no matter how innately talented one is, it is hard to imagine being an architect without having a growth mindset. Being open to change and growth is that important to development as an architect. As shown in Figure 44.2, a growth mindset is required for a 'Make It Break It Fix It' approach to design.

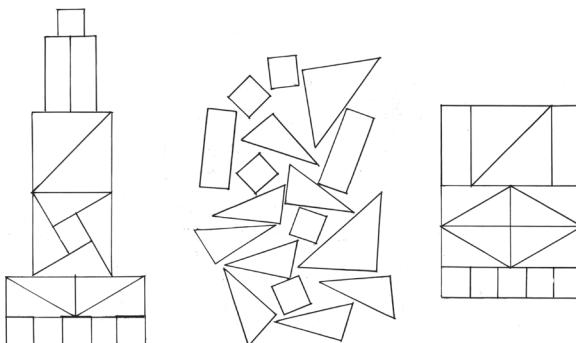


Fig 44.2: To have a 'Make It Break It Fix It' approach to design, one has to have confidence that failing fast – even when it requires one to start over and rebuild – is a better approach than making minor, incremental adjustments

## Intellectual humility

To have a growth mindset, it is incumbent on you to make mistakes. Make them fast, if you must, make them as pain-free as possible, but make them. This is part of the *fail fast, fail often* ethos.

To do so requires intellectual and creative humility – where you invite criticism. You don't need to be a masochist – like pulling off a plaster it will hurt, but like muscle building over time you become stronger where the scars are.

So, don't be unnecessarily hard on yourself. Accept that this is where you are now developmentally. Each student is different, but you will grow and expand over time – it is happening even if you don't immediately see results. To have intellectual humility means to consider the possibility that others know something you could benefit from learning. See everyone as your teacher, including your classmates: you never know who you can learn from. How to overcome a lack of humility? Curiosity. Curiosity is the antidote to arrogance.<sup>285</sup>

Architect Paul Michael Davis sees the critique of one's work in a positive light: '... no design proposal escapes without criticism. Indeed, a strong academic critique can be one of the most energizing, inspiring moments of an architect's education. In that instant of receiving and internalizing criticism, the designer grows. They see how their work falls short through the eyes of someone else – someone more trained and experienced in the subject they chose to study – and they see other possible solutions to the problem in that understanding.'<sup>286</sup>

## Growth mindset and perseverance

A growth mindset is especially important for the work of architects, since their projects can take years to complete and this requires perseverance, where perseverance and resilience are associated with a growth mindset.<sup>287</sup>

At the start of a project architects spend hours acquiring knowledge about the situation, enquiring with as many people as possible to gain a clear picture, before setting out to act on the knowledge gained via design. In these situations, architects often find they face circumstances they don't know anything about.

A few chapters back you might recall that we defined architects as people who are asked to do impossible things they know nothing about.

This *not knowing* about something or how to do something doesn't cause all architects anxiety. On the contrary, most architects thrive when given such assignments, especially where expectations are high, because each assignment is an opportunity to learn and architects are motivated by learning.

Architecture is an immersive experience. You can't look on from the sidelines, with one foot in and one foot out. There is an expectation of being *all in* – you're in it for the long haul, investing in yourself over a long period of time.

### TRY THIS

Make a shift in your design process from linear to non-linear thinking. This will require you to be open to new ideas, having the courage to make mistakes, and learning from them. Be a sponge. Be open-minded. Be receptive to new ideas – having a growth mindset requires a level of receptiveness. Architect Harwell Hamilton Harris anecdotally acknowledged this quality of receptiveness in architecture students at the beginning of their studies, but observed that their enthusiasm peaked in the second and third years then declined until graduation was in sight,<sup>288</sup> implying that one has to work at being receptive and open-minded.

### ASK THIS

While I am writing a book that suggests you should learn to think like an architect, I am teaching design studio to final-year students who do not yet think this way. On their presentation boards, one project used five different styles of trees (I pointed out four, but another student found a fifth). One project didn't show any context. How could these liabilities or oversights be overcome? *Intellectual humility*. Listen to your tutor. Remember when they said 'fit' as a design criteria? Remember 'show context'? Tutors know that they need to repeat themselves multiple times to get their point across. You know how you don't like to read the instructions that come with your IKEA furniture? This is architecture school: read the instructions that come with the assignment. Read the assignment. Listen to your tutor. Take notes when your tutor speaks. Request clarification when you need it. Use it as a checklist. Intellectual humility requires that you question yourself. Is it possible you are wrong? Are you ignoring or forgetting something? Are you blind to an obvious idea? Develop your willingness to rethink your conclusions based on new information or feedback.

### READ THIS

*Humble Inquiry: The Gentle Art of Asking Instead of Telling*  
by Edgar Schein

## 45: Beginner's Mind

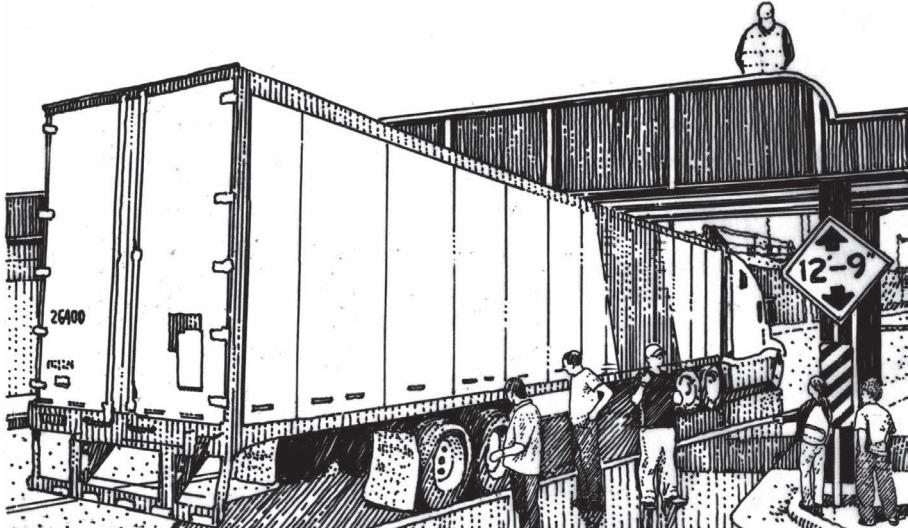


Fig 45.1: Emergency responders, firefighters, fellow drivers and pedestrians try to come up with a way to dislodge the truck stuck under a viaduct

**Architects deliberately put themselves into a state of creative ignorance so they can approach problems with an open mind.**

A truck driver who tried to pass under a low bridge failed, and the truck found itself stuck, causing traffic to back up, resulting in emergency responders, firefighters, fellow drivers and pedestrians trying to come up with a way to dislodge the truck. Should they dismantle parts of the truck or remove parts of the bridge? Each suggested a solution from their respective point of view.

A child walking by looked at the truck, at the bridge, then looked at the road and said, matter-of-factly, 'Why not just let the air out of the tires?'

This story represents the challenges we face where the best solution is often the one most difficult to arrive at because of the self-imposed constraints – our respective point of views – we work within.

It also illustrates the importance of seeing a problem with fresh eyes. And the great news is that being able to do so is not a one-time thing – the ability to see anew is a renewable resource – a mindset we can take on again and again.

Some architects will deliberately put themselves into a state of creative ignorance – or *deliberate ignorance* – in order to address complex problem solving. Architect Will Alsop was one such architect, who avoided extensive building-type research – preferring to work in a state of ignorant bliss – prior to commencing creative thinking and the search of fresh possibilities.<sup>289</sup>

## Preparing them for the unknown

The concept of beginner's mind was popularised in Shunryu Suzuki's classic book, *Zen Mind, Beginner's Mind*, where he noted two conditions for beginner's mind to arise: having no thought of achievement, and having no thought of self. In other words, to have new, innovative ideas it would behove the architect to not concern themselves with a successful outcome, nor with concern about themselves.

For example, when asked to design a home or chair, beginning architecture students tend to reference houses or chairs that are favourites of theirs or that they are familiar with. When they do this they end up replicating vs re-seeing the familiar example through fresh eyes. Their tutors – design studio teachers, studio masters, professors or instructors – when they see this occurring, try to get them to address the unfamiliar. Some tutors will attempt to address this condition – which can lead to preconceived, conventional or habitual ideas – by trying to keep students off-balance, or knocking them (proverbially) off-track. Doing so challenges preconceived notions and has longer-term benefits. In a quote attributed to Oliver Wendell Holmes Sr, 'One's mind, once stretched by a new idea, never regains its original dimensions.' One such suggestion or new idea is when tutors try to get object-oriented beginning students to see architecture not as buildings but spaces, or instead of adding-on have them carve out of form, and in doing so provide them with a whole new way of thinking.<sup>290</sup>

When architect Daniel Libeskind won the Berlin Jewish Museum competition, he felt that having no experience didn't put him at a disadvantage but on the contrary gave him an advantage, in that if you have too much experience, or any experience for that matter, you already know where you're going design-wise. Libeskind believed that without experience he was free to think differently, and able to convince others that there are other ways of doing and building things. He explains how in order to have fresh ideas he has to get rid of his expertise.<sup>291</sup>

Libeskind discusses beginner's mind in terms of the architect being a perpetual amateur, pointing out that the word *amateur* comes from a French word meaning *lover of*, where an amateur is a lover of something. He notes that Thomas Jefferson was an amateur architect, as was Alberti, especially since the profession of the architect is a relatively new invention.<sup>292</sup>

When they first start out in architecture most architects think they are at a deficit, and in some ways perhaps they are. But they are also at a distinct advantage in that they have beginner's mind, a state that they will try to re-create voluntarily throughout their career, over and over again.

The architect is charged with transforming what has come before into something that speaks to its time. For the armchair architect we have precedent studies – the acquisition of precedent, the internalisation of past architecture<sup>293</sup> – or legitimate ideas that have come before and are worth becoming familiar with, visiting while travelling, and thinking about.

### TRY THIS

As you go through the architecture curriculum you are gaining, growing, expanding, becoming deeper, more thoughtful. Some of the onus is on your tutors to ensure that you are learning, but why not go through college as a autodidact – self-taught? If you learn from school, great, but ultimately you are responsible for your own education. This mindset enables you to go where your interests are, get to know yourself, and discover what special life experiences and insights you bring to the class. Even having no experience can be seen as an advantage, in that you are experiencing beginner's mind not as a paradigm or concept to follow, but for real.

### ASK THIS

Here we are talking not just about a subjective creative act, or creativity per se. A big part of critical creative thinking is challenging assumptions and the aforementioned preconceived ideas. Tutors do this by asking questions: *Why is it this way? Why does it need to be this way?*

## 46: Observation, Mindfulness and Alertness



Fig 46.1: An architect sketching Villa Savoye on an iPad

**Architects make a special effort every day to be observant, mindful and alert.**

For the young Le Corbusier, known then as Charles-Édouard Jeanneret, the sketchbook emerged during his extensive travels as his primary tool for observing, recording and learning, where drawing became for him an essential medium for architectural training. In the first decade of the twentieth century, Jeanneret made hundreds of drawings. With each trip he gained a broader view of the world. As his interests expanded, so did his ability to document what he saw. Many architects travel, especially – in the tradition of what was known as the Grand Tour – following school. But what distinguished Jeanneret's travels from those of his classmates and fellow graduates was his awareness of *being able to begin again*, something that is apparent on nearly every page of his notebooks.

The phase during construction for architects in the US used to be called 'construction administration'. More recently, for legal and liability reasons – *administration* could be interpreted as *inspection* – it was changed to 'construction observation', taking the implied agency away from the architect. *Don't mind me – I'm just observing.* Many contracts read that, during construction, the architect will perform periodic observations.

Your goal as an architect is to provide *continuous* observation (living in a perpetual state of wonder is also recommended), and to always be in a mindful state. Doing so will lead to active listening, identifying problems worth solving, and an increase in insights and creative solutions.

*Observation* may be a weasel word when it comes to contracts, but it is a reminder of one of the architect's prime strengths and capabilities: the power to observe. To take in one's environment. To zoom in and zoom out – observing at all scales – to get a more complete picture. Make it your goal, as Henry James advised writers, to 'try to be one of the people on whom nothing is lost!'<sup>294</sup>

With the rise of new technologies, we forget that the old ways of looking and seeing evolved over millennia, for example, served us just fine. Children do this naturally, and we all need to get back in touch with how, when walking down the street, or in a park or nature, we would take in the world around us – without overthinking, judging, analysing what we saw or drowning it out with music. While learning new ways of seeing is encouraged, it is also important to not leave behind our more accustomed ways of seeing and taking in what is around us.<sup>295</sup>

The place where architects begin has to be in observing the world. When first starting out in our academic and professional careers, it's easy to miss so much of what is right in front of us because our attention is elsewhere – we are not actively looking at, listening to and taking in what surrounds us. It is incumbent on each of us to see with our own eyes, to record what we see, with a goal to understand and join the dots in the natural and built environment, between people and how they engage with each other and the world.<sup>296</sup>

Now admittedly, observation isn't as sexy as winning recognition from professional organisations and your peers. Observing seems passive – something you just do naturally – but in reality it is active (just as you can passively hear or actively listen), and it takes deliberate effort, concentration and attentiveness. What it takes more than anything is your presence.

If we're being honest, we know we can be counted in attendance in a class without necessarily being present. Your body might have showed up, but your mindful attention could well still be back in bed, lost in some reverie or going over a conversation you had the night before. What you aren't in these situations is *there*.

This is what is meant when, as one professor stated, 'you know you're starting to think like an architect when you are concerned about, when needing to mail a letter, the stamp, the envelope, and the stamp's relationship with the envelope'.<sup>297</sup> Yes, aesthetics are involved: the type of envelope, quality of the paper, whether to handwrite or type the address, what font you will use, what stamp you will use and what it may communicate to the recipient, where you will place the stamp, even whether you will actually post a letter or send an email or text. But as importantly, you find you are concerned about things that architects concern themselves with: questions about the relationship of the part to the whole; the process you use (the postmaster offers to use a franking machine, but you have your eye on that commemorative architecture stamp). All of this speaks to how an architect thinks.

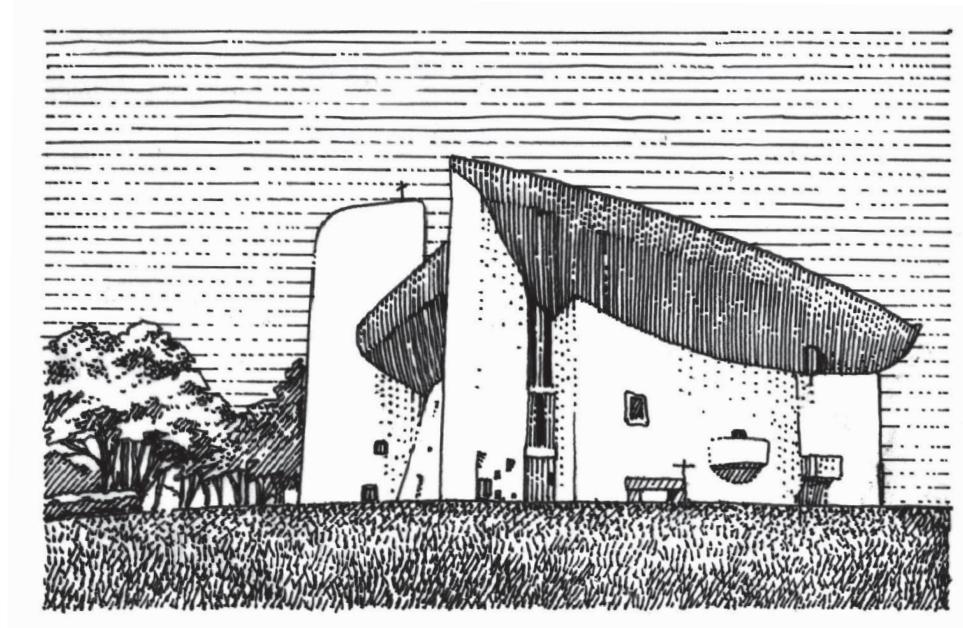


Fig 46.2: Notre-Dame du Haut in Ronchamp, France by Le Corbusier

There are only so many ways that the outside world enters our inside world. How does information come to us? Putting telepathy (ESP, clairvoyance, sixth sense) aside for the moment, through experience (including right now experiencing this book), reflecting on that experience, reasoning, communicating with others, and through observation. One of the most important ways information comes to us is this last one, *through observation* – our ability to perceive and understand the world around us: seeing and documenting details, capturing reality and mapping our world.

We do this by paying attention, by observing. You need to fill yourself up with knowledge and information, not to have preconceived ideas about things but so the mind can take two unrelated things and put them together, and in doing so bring something new into the world; so you can go beyond the utilitarian or obvious solution and approach something from a new perspective; so you can create something that meets all the criteria and also provides something more. It's not a formula, it's a mindset, a capacity you create within yourself, by bringing your entire life experience to the fore. Architecture isn't for the meek or faint of heart: it requires you to have the courage to see.

When you meditate, you concentrate on your breathing. When your mind wanders, you make note of this – you don't judge yourself or berate yourself – you just acknowledge that your mind has wandered and return to the breathing. Our mind wanders again – we recognise this – and bring it back to our breathing ad infinitum. We are able to do this because we create a gap – between our automatic thoughts and our mindful attention. Our ability to do this is like building a muscle, only it's in our consciousness. Similarly, we don't just plough into a project by rote or by habit; we create a gap in time to consider what we are doing. A gap to think about the problem or assignment. This gap requires us to let go of assumptions, preconceived ideas, and what we want to believe. This doesn't come easy to everyone. Like most effective habits that are worth considering, it takes practice.

### TRY THIS

Many students and emerging professionals feel a lot of pressure to achieve early wins, to find success fast, to build their brand. This leads to feeling anxiety and fear about one's prospects and how one stacks up, compares or fits in. The problem is that this mindset is outside-in – wanting and expecting recognition to come from outside. By doing this – and we may not even be aware that we do this – we are putting the power in others, not ourselves. You are the one thing you can control in the beginning stages of your career. While acknowledgement from others will inevitably become part of the equation for how you define success, in your early years when first starting out, it is more important to become a gifted observer and develop your ability to replicate, represent what you see, and imagine.

**TRY THIS**

Try meditation or yoga to increase awareness. Most people go through their day on autopilot – and there are certainly things we don't need to give 100% of our attention to. But through the increased awareness that yoga and meditation bring, and focusing on otherwise natural processes that come automatically to us (like breathing), we can learn to be in the moment and see opportunities that may not have come into our consciousness before.<sup>298</sup> Learning how to see what is – learning from observation – will teach you to see, really see, not to see what you think you are seeing.

**TRY THIS**

Create a gap. Among so many other benefits, meditation teaches you the importance of the gap that exists between the trigger and your response. In that gap is a space – calm like the eye of a hurricane – where you have a choice: to react automatically, or deliberately. Rather than doing something because it's the most expedient – it's what your studio mate is doing, it's what you think your professor wants you to do, it's what you've always done in similar situations, or accepting what you've read or been told – take a deep breath and spend some time thinking. One of the most powerful secrets of the universe is in this gap – and being able to recognise its existence. The gap between stimulus and response<sup>299</sup> allows us to act less automatically or habitually – like animals – and more like the enlightened human beings we are and strive to become, and recognise that we are doing so.

**ASK THIS**

Can you remember a time when you just observed – for example, looking out of the car window on a family holiday? Do you recall what you saw? How do you feel about what you saw today? William Cronon, in the introduction to his book *Nature's Metropolis*, describes the first time he saw Chicago from the backseat window of his family's car while on vacation as a child. His observations led to a brilliant career – and a brilliant book.

**READ THIS**

*Drawing on the Right Side of the Brain* by Betty Edwards

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**READ THIS**

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Read books to gain different perspectives on how to see a building. Like the proverbial blind men describing an elephant, treat these as ways to help you see anew:

*Translations from Drawing to Building and Other Essays*  
by Robin Evans

*A Critic Writes* by Reyner Banham

*Mathematics of the Ideal Villa and Other Essays* by Colin Rowe

*Modernity and the Classical Tradition* by Alan Colquhoun

*Experiencing Architecture* by Steen Eiler Rasmussen

## 47: Question Asking



Fig 47.1: Creative thinking is most readily achieved by simply asking questions, and *critical* creative thinking by asking good questions

**Architects care about the quality and character of their questions to ensure their relevance and applicability.**

In an interview for a new project, the client asked our architecture firm how many design schemes they should expect to get.

*One said the pennywise manager.*

*Three said the pleaser principal.*

*As many as you want* said the design-happy designer (that would be me).

The emerging professional – who until then had been silent, taking notes – wisely asked: *How many do you want?*

Silence. Stunned, that was it! This last response – in the form of a question – showed critical creative thinking (and maturity beyond her years).

The emerging professional's response – in the form of a question – is surprising and situational, taking into consideration the context. Her question recognises that we didn't have enough information to respond with an actual answer. Plus, it's just good marketing and customer service: it responds to a question with a question – to further clarify and to engage with the client. It was risky for her to have said – *asked* – this in front of her bosses, but why else had she been invited to the interview, if not to provide value?

Researchers asked ten-year-olds and college students to come up with a plan to protect bald eagles from elimination. Both groups came up with ideas of equal quality. Besides having better spelling skills, the primary difference between the fifth graders and the college students was that the latter had developed the capacity to ask questions.<sup>300</sup>

## Creativity and question asking

Creative thinking is most readily achieved by simply asking questions, and *critical* creative thinking by asking good questions – relevant, thoughtful and incisive questions – coupled with cultivating the ability to make sound decisions that lead to strong ideas.<sup>301</sup> The difference between architecture and building, or good and bad architecture, is related to the kinds of questions that are asked: the quality or *character* of questions.<sup>302</sup> One of the most critical skills for an architect to develop is the facility to ask relevant and perceptive questions.<sup>303</sup>

According to architect Peter Zumthor, what should be taught in architecture school is the asking of questions, because design is itself a form of questioning. The acts of creating or making things are themselves questioning.

## What questions?

Design is not just about asking questions. It's about asking the *right* questions. Relevant questions. Meaningful and insightful questions.<sup>304</sup> And not asking other types of questions, for example these that Edgar Schein identifies in *Humble Inquiry*: leading questions, statements as questions, shaming questions and rhetorical questions.<sup>305</sup> Asking pertinent questions –

and not accepting and (worse) using just any information that you come across online – is of course part of critical thinking, but also of creative thinking.

### TRY THIS

Here are the three most important words you will ever use (besides *I love you*). At our architecture school career fair most of the interview or job offers go to graduate students. I tell my undergrad students when they are told by a prospective employer ‘Sorry, we only hire graduate students’ or ‘We only hire those with graduate degrees’ to reply with these three magical words: Help me understand ... *Help me understand* what a graduate student can do that I can’t do? This three-word query frequently catches employers off-guard, and in many cases impresses them enough to invite the candidate for an interview, and sometimes even to hire them. When I served as associate director of my architecture school’s graduate programme, one of my duties was to read letters of recommendation written on behalf of applicants. One letter was written by an applicant’s employer, who wrote ‘I will never forget [the applicant’s] reply when I told him we don’t hire undergraduates. His reply – *Help me understand* – was equal parts mature beyond his years and disarming. I hired him on the spot.’

### TRY THIS

Among Edgar Schein’s suggestions for cultivating a habit of honest questioning, expanding your powers of observation, and exercising your natural ability for creative thinking in his book *Humble Inquiry*: travel to unfamiliar lands and cultures, develop your observation skills by taking courses in art or mindfulness, attend theatre productions, and write in a journal.<sup>306</sup>

### TRY THIS

Anticipate the questions students may be asked at a design review (mid-term or final). Work backwards from these questions to the beginning. Design to the questions.

**TRY THIS**

Say you're given an assignment to report on the architect Le Corbusier. There are many ways you might go about researching it: biographies, periodicals, architecture books. You soon discover that one book is no more an authority on the subject than another. Instead, you try a *rabbit holes* strategy. Come up with a bunch of questions about Le Corbusier you want answered, and then simply do whatever you must to pursue them. Here are a few possible questions: *How did Le Corbusier's architecture draw on earlier styles? How did Le Corbusier's ideas about architecture evolve? Furniture? Urban design? What were the origins of Le Corbusier's work in Paris?* 'Here is the thing: simply pursue the list of questions,' suggests economist Tyler Cowen. 'It may well induce you to find books, or it may lead you down Googled rabbit holes. Or it may lead you to ... Follow the questions, not the books per se. Don't focus on which books to read, focus on which questions to ask. Then the books, and other sources, will follow almost automatically.'<sup>307</sup>

**ASK THIS**

What do you like or dislike about your design? What design issues have/have not been addressed at this point? What areas of this design do you feel are/are not resolved at this point? What is the base concept/parti of this design?<sup>308</sup>

**ASK THIS**

Consider asking questions that are important for journalists to ask: *Why do you think of that? How did you learn that? Am I understanding this? What else should I know?*<sup>309</sup> At your next desk crit, pin-up or review, ask yourself: What was I asked to do – literally asked to do? So why am I presenting something else?

**ASK THIS**

You just sat through a lecture. Instead of passively taking down notes to review in the days before the exam, in the hours – not days – after the lecture, ask yourself: What do I think about what was said? How would I agree or disagree with this? Are there any other similar answers I can think of with alternative routes?<sup>310</sup> Such an approach improves retention better than underlining, highlighting and cramming before an exam.

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**ASK THIS**

For Thom Mayne of Morphosis, creative problem solving starts with posing questions: What does architecture contribute to the solution?<sup>311</sup> As important as it is for salespeople to recognise they've made the sale, and to stop selling, it's just as important for the architect to know when to stop questioning. Ask yourself: Have I achieved my goal (e.g. to change another person's mind, or to figure out what architecture contributes to the solution)? Then stop.

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**READ THIS**

*The Book of Beautiful Questions: The Powerful Questions That Will Help You Decide, Create, Connect, and Lead* by Warren Berger  
*Questions Are the Answer: A Breakthrough Approach to Your Most Vexing Problems at Work and in Life* by Hal B. Gregersen  
*A More Beautiful Question: The Power of Inquiry to Spark Breakthrough Ideas* by Warren Berger  
*Leading with Questions: How Leaders Find the Right Solutions By Knowing What To Ask* by Michael J. Marquardt  
*QBQ! The Question Behind the Question: Practicing Personal Accountability in Work and in Life* by John G. Miller

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**READ THIS**

*Humble Inquiry: The Gentle Art of Asking and Not Telling* by Edgar Schein. Yes, I'm recommending this book again! *Humble Inquiry* means asking questions to which you do not already know the answer and building a relationship based on an interest in the other person. Ask instead of tell.

## 48: Asking *What If ...?*

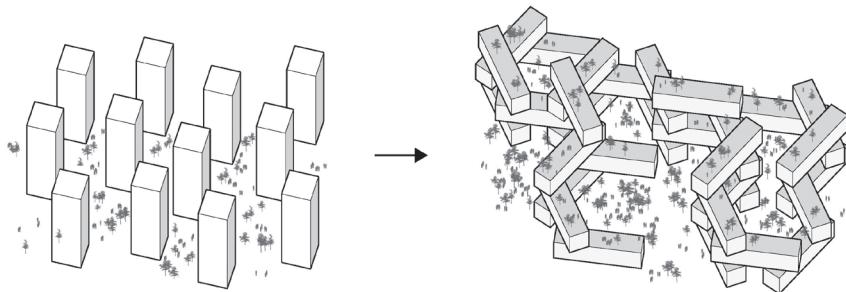


Fig 48.1: With the design of Interlace, Ole Scheeren asked how models with the density of a skyscraper could improve people's lives

**Architects ask  
*What if ...?* to lead  
to new directions in  
research and future  
development.**

Is it possible for a project to have 112% green space? In other words, can a project have *more* nature than had it not been built?

Ole Scheeren is an architect who applies critical thinking to the design process beyond the conventional extents of the making of architecture. In doing so, the firm asks how architects can rethink things for which there are no existing models.

The Interlace, a 1,040-unit residential complex in Singapore, one of the last projects Scheeren designed while at OMA, and named the World Building of the Year at the World Architecture Festival in 2015, redefines what a skyscraper can be.

Housing is an example of a project type that has become standardised and formulaic, and Interlace is an example of how – using the same components, requirements and density – something new is possible. Its organisational structure is a hexagonal grid, in which horizontal twelve-storey building blocks are stacked up to create abundant, open, interconnected and permeable outdoor courtyards.

Interlace is an example of a building that moves beyond a focus on the object to one that shapes spaces for people. Completed in 2013, atop its hexagonal plan of horizontal buildings are rooftop gardens, and below are open plazas and pool decks that encourage human interaction.

As Scheeren said in his TED Talk in 2015, if all the green space that was left on the ground was counted, subtracting the footprint of the buildings, and the green of all the terraces was added back – essentially serving as each building's thirteenth floor – this would result in 112% green space. In other words, *more* nature than had the building not been built.<sup>312</sup>

## What if ...?

Want a simple, one-sentence shortcut to thinking like an architect? Ask questions like this:

Next time you ask yourself *Should I fix my old car or invest in a new one?* instead ask *Can I get a job within bicycling distance of my residence?* or *Can I relocate near public transport?*<sup>313</sup>

In other words, substitute the either/or proposition – the trigger and response – with asking: *What if ...?*

Your tutor asks you to design a community centre with a swimming pool. Thinking divergently, ask:

What if the pool doubled as a filtration plant? Or, in off-hours, doubled as a homeless shelter? What if the building created more power than it used? What if by swimming, people generated the additional power? What if the

building educated the community on resilience? Or included a pool where local pets could swim?

The question *What if...?* was the central question asked of students in a graduate seminar on Building Envelope Design taught by architect and Associate Professor Scott Murray in the School of Architecture at the University of Illinois at Urbana-Champaign. In this seminar, students were asked to think creatively about the future, and to envision new types of building envelopes or new types of performance for which the technology does not yet exist, but which may point to new directions in research and future development. The students' quick sketch proposals involved asking a question that begins with the provocative phrase: *What if...?*

**What if the facade could act like human skin? What if glass was made of electromagnetism? What if windows could light up the interior? What if a facade could become a room? What if the walls of a building could grow? What if the facade could act like human skin?** asks Amal Tariq  
**What if glass could change its colour based on users' stress level?**  
**What if building envelopes could store rainwater? What if building envelopes could breathe?** asks Arpana Pillai  
**What if a building envelope could be made of textile waste? What if a building envelope could repel pests?** asks Marilia Sa Ribeiro  
**What if facades were Non-Newtonian Liquids?** asks Marlom Vargas  
**What if a building could moult? What if a building is a rubik? What if we can live in balloons?** asks Teng Long  
**What if buildings grew like plants? What if 'wind panels' could be used on the building envelope? What if the building skin behaved like that of an armadillo?** asks Sharanya Reddy  
**What if building skin is made of generative bio-roots? What if building envelopes could mutate?** asks Ravideep Singh  
**What if the building skin could be made of upcycled plastic waste?**  
**What if the building skin was stretchable? What if the building skin could use wind loads to generate power?** asks Raksha Magal  
**What if old tires could be pressed into bricks?** asks Rachel Sloan  
**What if it would be possible that buildings transform CO<sub>2</sub> to O<sub>2</sub>?**  
asks Daniela Beerens  
**What if the envelope is designed to be folded open or closed?**  
asks Shuquin Xu  
**What if the facade was electromagnetic? What if the building skin was edible?** asks Prathiksha Chandra Mohan  
**What if glass could perform photosynthesis process?**  
asks Ramya Pattanur Vasudevan

### TRY THIS

Give your assignment – what you are asked to do – a twist by making something more of it.

# SECTION 6: PROBLEM SOLVING

49:

# Problem Solvers, Definers and Identifiers

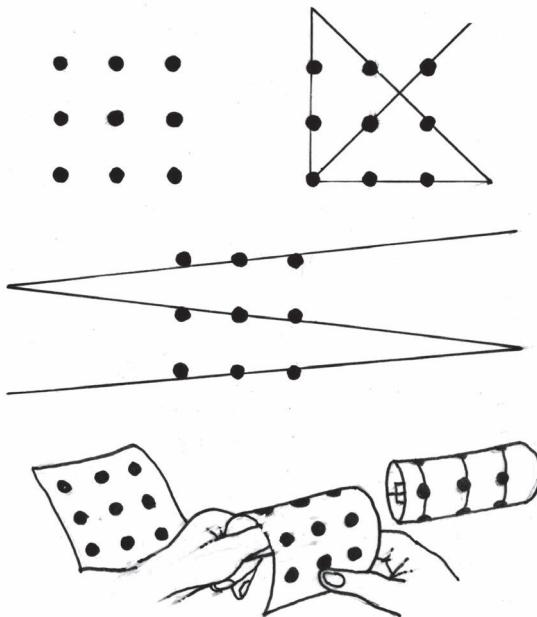


Fig 49.1: Presented with dots in a three-by-three grid, the Nine Dot Problem asks you to connect all nine dots – without lifting your pencil from the paper – using the fewest possible number of straight lines. Here are solutions for connecting the dots using four or three lines, and even one line – all by creatively interpreting the rules. Can you connect them using two lines? Email your solution to the author at [info@randydeutsch.com](mailto:info@randydeutsch.com)

**Architects are not  
only creative problem  
solvers but problem  
definers and identifiers.**

Design requires and develops decision making and problem solving, both of which are important to everyday life.

*Architects are primarily creative problem solvers and More than just designers of buildings, architects are creative problem solvers are clichés and a myth.*  
Every professional is a problem solver. What is different is *how* architects solve problems – they do so iteratively.

What is also different is that architects don't just problem solve but also problem define and problem identify. They find what problems are worth solving.

All architects face and address problems that need to be solved. And a big part of being able to think like an architect requires one to be able to solve difficult design problems throughout the planning, design and construction process. Problem-solving stages include: define the problem; generate solutions; evaluate solutions; select a solution; and, make a plan.

Yet architects are also problem identifiers. Architects recognise that identifying the right problem to solve can be 80% of the solution. Often, the problem they have been assigned is not the one – or the most important or urgent one – that truly requires addressing. Architects work efficiently and effectively to make sure that everyone is focused on the most pressing, pertinent problem. In doing so, architects identify problems worth solving.

The problems architects address go well beyond the boundaries of a building. Today, they frequently include wicked problems – those intractable, hard-to-solve problems without an obvious solution. While solving building design problems architects may also be tackling important issues such as rising sea levels, affordable housing for displaced immigrants, and preparation for natural and manmade disasters.

Architects realise that even when the problems they address appear to be solved, there is often still more work to do. Sometimes the solution solves one problem but creates others. For example, architects may create more problems in terms of the environmental impact of a newly designed building. Sometimes the architect discovers that the solution solved the problem – but not in the way that they intended – and they need to learn from this experience. Are their solutions so comprehensive that they solve the entire problem – or only parts?

Instead of thinking of what they offer as solutions – which implies a level of completeness and finality that no one can be assured of – architects see what they contribute as a positive response to a problem. In this way, architecture is about change: where architects are problem responders and architecture a catalyst for change.<sup>314</sup>

This is all another way that architects express their intellectual humility and acknowledge their limitations.

There's no point in pretending problems are simpler than they are. Critical creative thinking and problem-solving necessitate a willingness to acknowledge both the problem's and outcome's inherent ambiguity, uncertainty and complexity. Doing so will lead to the discovery of fresh ideas and outcomes.<sup>315</sup>

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**TRY THIS**

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Reframe the problem, issue or question. Zoom out – place the problem into a larger context. Look at it from a different angle.

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**READ THIS**

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*Problem Seeking: An Architectural Programming Primer*  
by William Peña

## 50: Iterative Process

Not Knowing

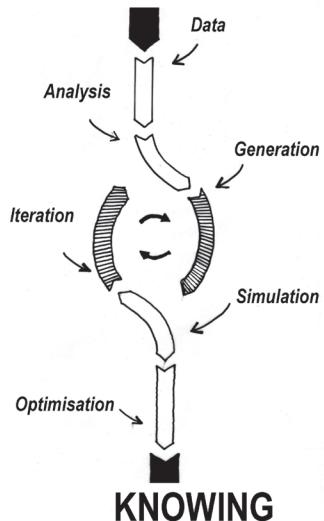


Fig 50.1: Everything the architect does takes them from a state of not knowing to knowing

**Architects see the creative process not linearly or as a circle, but gradually moving forward as an iterative spiral.**

Sitting in the sun, notebook in hand, looking at leaves and thinking of what inspired a recent design and led to a breakthrough, architect Nicholas Grimshaw explains that he is a collector of things – in his mind, where he stores impressions. He first composes in his mind before drawing on paper, then he closes his notebook and lets the idea simmer, and uses this time to think about the idea, then has another go at it.

Like a lot of architects, Nicholas Grimshaw sees the creative process as going around in circles, with the centre gradually moving forward: an iterative spiral. While doing searches out in different directions, it may feel as if you are going in circles, but you are progressing and the primary path is gradually moving forward.<sup>316</sup>

Beginning architecture students arrive with a predisposition for a linear thought process: they have an idea: then this happens, then this, and done. It is their first experience with the way one learns in studio and its culture of experimentation, and the non-linear, iterative process of design. The iterative process can trip up some students at first – with the understanding that your first idea isn't necessarily the best, and even once you think you've found a solution you continue to receive feedback and continue to evolve the design. It's the realisation and acceptance that architecture is not only a thing, but a process – an iterative process – that requires some creative destruction in order to be fully realised. As my academic colleague Associate Professor Emeritus Paul Armstrong has written, 'The iterative process of drawing or modeling, critiquing, and redrawing or remodeling is the fundamental pedagogical tool of architectural design education.'<sup>317</sup>

The iterative design process is more like a stair – a spiral stair – than a conveyor belt, and more like a spiral than a circle: you aren't just going around and around in circles, you are proceeding towards a resolution. In this way, the design process is cyclical, not linear: not cyclical as in a circle – spinning wheels – but more like a spiral, where you are receiving feedback in the form of analysis, working towards something. Architects think laterally – not linearly – and design is a process and outcome, cause and effect – where effect can become a new cause – requiring divergent and convergent thinking.<sup>318</sup>

Architect and professor Jonathan Ochshorn, when he designed and built a home extension explained his design process in terms of cause and effect. For example, at the start of the process, he points out that the site survey shows possible extension locations based on zoning, then describes the Cause: Decision to design and build an extension. Then, after looking at what he calls Options and Analysis (the extension can be placed on one of four sides of our site; west requires purchasing a neighbour's property (not possible); north garden is not big enough, etc.) leading to the Effect: Decision to design an extension on the east side of the house. Ochshorn does this – identifying cause, options and analysis, effect – for all the decisions that need to be made: Need more space; Decision to design extension on east side of house; Decision to design a floating slab foundation for the main block; and so on.<sup>319</sup>

## 51: Unravelling the Tangle

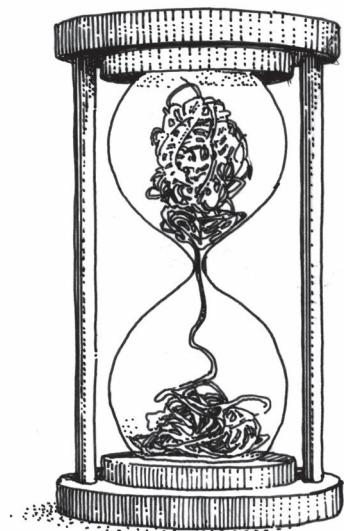


Fig 51.1: Situations that each architect confronts in the early stages of a project can be compared to a complex tangle that cannot be unravelled in a linear, methodological or systematic way

**To remain open to experimentation and discovery architects try not to be attached to a specific outcome.**

When Finnish architect Alvar Aalto faced an architectural obstacle that he found difficult to surmount he would attribute the burden to the fact that design presents the architect with contradictory information – social, human, economic and technical inputs that impact both individuals and larger groups of people – which is often in conflict. He likened this situation, a situation that each architect confronts in the early stages of a project, to a complex tangle that cannot be unravelled in any linear, methodological or systematic way.

So, he tried a different approach – one that Aalto compared to abstract art – where he took in all of the contradictory information and started to draw. Not in a technical or linear way, but by instinct, making drawings that he equated to childlike compositions. And as long as he continued to work in this instinctive, abstract way, a big idea gradually took shape, where the previous complex, conflicting and contradictory information now resulted in a harmonious resolution.<sup>320</sup>

How does this work? I experienced this many times in my career as an architect. On the one hand, the client has a commission for a new laboratory building and hands you a 1,500-page building programme containing a data entry point for every room, piece of equipment, and their ideal and less-than-ideal adjacencies. Add to this the need to deal with inputs and constraints including building codes, budgets, schedules, material and labour availability; the whole shebang. On the other hand, you are alone in a field, or what is now a car park, imagining what will go there and *yada yada* you arrive at a new building design with everything resolved. I have no explanation for how this works – it just does: as long as you trust the process.

Suggestions like *break the problem down into smaller parts* seem almost irrelevant. If I were to hand you a tangle of yarn and asked you to unravel it, *break the tangle down into individual strands of yarn* would be accurate, even obvious, but unhelpful. How exactly is this accomplished?

First – and this is required of every architect entrusted with a large, complex building design – trust that there is a solution. In other words, have confidence the 500-, 1,000- or 1,500-page building programme emphatically *will* result in a building more or less all will be happy with. Even with all the critical thinking in the world you cannot accomplish this near-superhuman feat unless you believe – i.e. envision – that you can do it. First believe, then synthesise.

Then do what Alvar Aalto did. Don't force a solution into a preconceived idea, but work with the information at hand – all of it – in an instinctive, slightly loose and abstract way. Gordon MacKenzie, author of *Orbiting the Giant Hairball*, said it best when he wrote, 'What is the biggest obstacle to creativity? Attachment to outcome. As soon as you become attached to a specific outcome, you feel compelled to control and manipulate what you're doing and, in the process, you shut yourself off to other possibilities. Creativity is not just about succeeding. It's about experimenting and discovering.'<sup>321</sup>

The perfectionism sometimes needed from architects – say, to detail a roof so it won't leak or design a stair to meet regulations and so people won't trip – won't help you here. Design is experimental – requiring more fuzzy logic than logic – until it isn't, then back and forth between fuzzy and pragmatic, unfocused and focused, dreaming and practical, until the tangle is untangled, and a building is born.

### ASK THIS

WWLCD? (What would Le Corbusier do?) Louis Kahn? What would (fill in your favourite architect) do? A method suggested by Neil Durbach for a starting point in your thinking is to anticipate how various other people might solve the problem. This allows him to quickly produce and get out of the way more conventional solutions, resulting in his being able to work toward a more precise response to the problem. There are no shortcuts; it takes work to come up with ideas.<sup>322</sup> He considers this approach more of an editing process than a collaging process, less about adding things, than about taking away or editing out.

### READ THIS

*How to Make Sense of Any Mess: Information Architecture for Everybody* by Abby Covert

## 52: Synthesis and Meaning



Fig 52.1: Alejandro Aravena's Villa Verde, Chile. Half-houses can be completed later by their inhabitants when the time comes to add rooms and expand

**Architects are synthesisers of social, functional, economic, environmental, technical and aesthetic factors.**

Chilean architect Alejandro Aravena designs half-houses – one of his big ideas – making housing affordable by designing homes where half of the house is unfinished. His *half of a good house* projects, such as Villa Verde in Chile, can be completed later by their inhabitants when the time comes to add rooms and expand. One half is enclosed, while the other half remains incomplete, to be finished by homeowners. In this way Aravena solves a wicked problem – making housing affordable to more people – through design.

Man cannot live on analysis alone, as the architect's ultimate goal isn't to take things apart but to bring new things into being that look and feel as though they have always been there.

In their design process architects both analyse and synthesise, where to synthesise means to select, decide, make a choice, bring things to a conclusion, make sense of the mess, and work towards a solution.

Synthesis provides meaning in that, unlike analysis – which is associated with investigating, probing, and taking things apart – synthesis is about combining, merging and bringing together, creating at least the semblance of something complete, connected and whole.

We have seen that design involves both analysis and synthesis – back and forth, or in the case of Cesar Pelli, both at the same time<sup>323</sup> – where the two are required, however unpredictably,<sup>324</sup> back and forth in ever smaller cycles for creative thinking.

As we've discussed, the ability to simultaneously analyse and synthesise is a superpower that architects need years to develop. Roger Martin explained in *The Opposable Mind* that most people don't want a trade-off or either/or proposition, they want a synthesis.<sup>325</sup> And architects who build the capacity to live with the tension that comes with working towards a synthesis – to hold two contradictory ideas in their head at the same time and build from there, without caving or settling for a lesser solution, will benefit in the long run.

Making meaning is important, especially in a universe that doesn't automatically provide one. For, as Simon Unwin has said, along with language and mathematics – which correspondingly deal with words and numbers – architecture, which organises space into place, is one of the basic means we have to make sense of the world.<sup>326</sup>

Instead of accepting the world as random, with disconnected objects and people, architects look for ways to relate things together to create if not a cohesive whole, the semblance of one. Similarly, architects work with meaning in their projects by relating parts to the whole. They know that it is important for people to have meaning in their lives, that the *genus loci* of a place ought to come through and be represented in architectural interventions, so it doesn't look like the project just landed on their site from outer space, but instead *belongs* there.

While creative thinking ultimately leads to a synthesis, it is a creative and some even say mysterious or alchemical process in which a mess – or, as we've been calling it, a *tangle* – is critically applied to a problem to produce an effective or optimal outcome for all concerned.<sup>327</sup>

For the architect, it is not enough to keep the building user in mind. Architects keep all in mind – paying client and non-paying client, the building user and the public at large. While they may make use of analysis and analytical tools, architects are entrusted to bring everything – and everyone – together in the end. It's in this way that they are considered synthesisers, where the resulting whole is always greater than the constituent parts. Architects transform analysis into synthesis, and in doing so, transform chaos into order, and hopelessness into something meaningful.

Architect Peter Wilson describes the act of synthesis in almost mystical terms. Working with the facts and as much information as he can find at the project start, Wilson commits all of it to memory until he intuitively understands it. Then he forgets it. And as if by chance, something catches his attention and by association he is able to give order and structure to what had been until then a bunch of parts. Doing the groundwork – of asking then answering what we have called *What is actual?* – is critical, as is an awareness that you are looking for something that will tie everything together.<sup>328</sup>

Don't take the ability to synthesise for granted – it is a rare and sought-after skillset. The ability to look at a mess and see how the disparate parts interconnect is a gift.

## 53: Perseverance

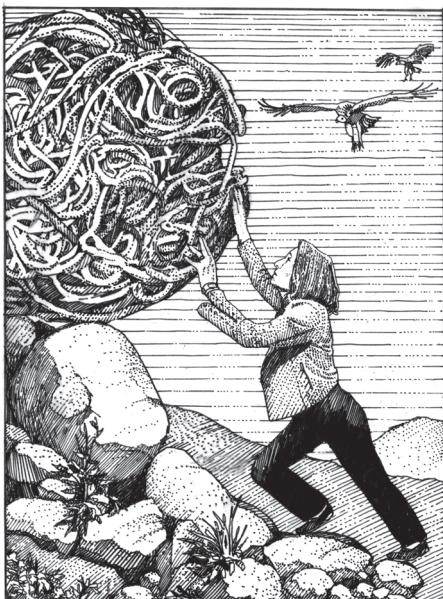


Fig 53.1: To persevere – like Sisyphus – architects must wake up each day to roll their tangle up the hill again

**Architects require patience, resilience, perspective and above all perseverance for architecture to happen.**

Imagine designing a building every day for three years. If in three years you designed 1,000 buildings, what would you have learned?

This is exactly what architect Will Alsop disciplined himself to do early in his career, to take himself well beyond what he knew and was capable of at that time.

This theoretical exercise helped him to evolve and grow as a creative designer, especially when he compared it with the two dozen or so buildings he would have designed in that same period of time had he not challenged himself with this exercise.<sup>329</sup>

Architects of course don't achieve what they set out to accomplish every time they design. Sometimes this occurs through no fault of their own – due to budget limitations or a fickle market – and other times due to a lack of curiosity or imagination. Like Sisyphus, they wake up the next day to roll their boulder up the hill again.

Buildings can be constructed seemingly overnight. Architecture, on the other hand, takes patience, resilience, perspective and above all perseverance on the part of the architect.

Our world today is designed for short attention spans and instant gratification, which makes it harder for people to do the hard work that doesn't have an immediate pay-off. Architecture – where buildings can take years to design and construct – requires the opposite of instant gratification. It requires *deep work*, or long, uninterrupted stretches of work that push you to your limits.

Once you have committed to architecture, everything you do – no matter how menial, inconsequential or tertiary – will matter to you and be enjoyable because you are working towards your longer-term goals.

It takes a determined and tenacious search for the architect to discover a design solution. And to achieve excellence in one's work requires not only talent and persistence in one's pursuit, but even an obsessive interest in the outcome.<sup>330</sup> While architects can make a good living practising architecture, most architects who persevere find that they do what they do for its own sake.<sup>331</sup> You find that you forego the flashier and more obvious perks for longer-term pay-offs of intrinsic rewards.

Albert Einstein once said, 'It's not that I'm so smart; it's just that I stay with problems longer.' Do what you do because you like it. If you do, you will persevere.

## Trust the process

There will be times when you don't feel like the project is advancing, or that you are making progress. Don't despair. Sometimes we cannot see the

progress we are making – it comes about gradually or is occurring under the surface. You may find during times when it seems like things are not advancing you have the most profound thinking. It is especially when things seem stagnant that it is most important to be persistent, to persevere – however uncomfortable it might feel. You have to trust that it is part of the process and you will be rewarded.<sup>332</sup> Get comfortable being uncomfortable. Learn how to stay.

That said, be easy on and patient with yourself. We are all works in progress. One outcome of the fact that most architects don't peak until their fifties is that there's time to learn how to do this. It becomes easier when you commit, when you are in it for the long haul.

Daniel Libeskind's Jewish Museum in Berlin took over a decade to come from design competition to plan to fruition, and his plan for the Ground Zero reconstruction took similarly long. Libeskind attributes his ability to maintain his patience and motivation to remaining positive, developing a thick skin and not falling into the trap of becoming cynical. You can't just go through the motions but have to have patience and believe in what you are doing.<sup>333</sup> Play the long game. China is producing students with some of the strongest critical thinking skills in the world, with studies showing Chinese students outperforming their global peers in reading, maths and science. But a new study by researchers at Stanford University found that Chinese students lose their advantage in critical thinking in college. That is, they excel at critical thinking until college, showing no improvement while their American and Russian counterparts did show improvement. The cause is attributed to exhaustion coupled with a lack of incentive to improve once in college.<sup>334</sup>

This speaks to the importance of gestation, incubation, scheduling down time, and giving the problem time to solve itself; time for the brain to do its magic; the importance of sticking with and not abandoning a problem before it has a chance to resolve itself.

### TRY THIS

People who persevere do so because they aren't attached to the results. They don't get burned out by their efforts because they are not attached to the outcome. I used to wake up every day and say *I am grateful that I have a job where I get to design* – and I was happy nearly every day of my twenty-five-year career designing buildings. Others would say *I will be happy if my project gets built*. Many of them got burned out and left the field. The difference was that the first was ultimately in my control, while the second put their happiness in the hands of others or even chance. A lot of factors go into whether a project gets built or not, often beyond any one person's control.

**TRY THIS**

Architecture is not a sprint but a marathon. Recognise that down time is important to ensure focus, to recover, to restore energy, to build up the willpower that is depleted from the moment you awaken.

**TRY THIS**

Push for the third third! As we've seen, the best idea is often not the first idea. One incentive for not giving in or giving up too quickly – for example in the first third of the process, and for sticking with it when creative problem solving, is that the best ideas often come later in the process, in what Tim Hurson calls the *third third*.<sup>335</sup> By persevering, there's a benefit in that you achieve a deeper level understanding and insight, but also a challenge, in that it takes time and effort to persevere.

**READ THIS**

*Working* by Robert Caro. It is hard not to be impressed and inspired by the biographer's phenomenal patience, stamina and perseverance, and you learn about what went into the writing of his Pulitzer Prize-winning biographies. Better yet, listen to Caro read it.

## 54: Impact of Technology

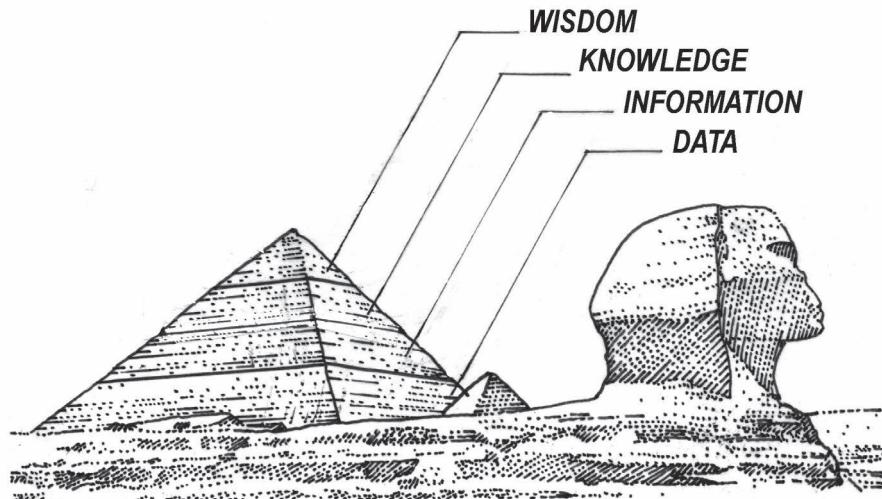


Fig 54.1: DIKW pyramid

**Architects think critically and creatively without technology, and should be able to do so even more assuredly and quickly with it.**

At the start of the semester, I ask my students to measure a house. I have them form teams of two and do this using a tape measure. Then I have them do it again – this time using a laser distance meter, with an app that measures spaces using the phone camera, or with an app that measures and then draws the spaces for you. I do this to show them that there are many ways to measure a room; why they should use one method over another; the importance of being aware of different options; to always be growing and progressing; and to always ask: *Is there a better way to do this?*

What is the one fundamental skill architects need in the twenty-first century? What is the one skill you'll need as an architect? Should we learn to code? Not necessarily.

First, I tell architects, learn to *think*.

Yes, some familiarity with coding could be helpful. But more important than learning any specific tool is to learn to think more generally.<sup>336</sup>

Architect, professor and writer Witold Rybczynski recalls a time when analogue tools such as hand drafting and model building allowed the architect sufficient time to think. ‘The fierce productivity of the computer carries a price – more time at the keyboard, less time thinking.’<sup>337</sup>

Much has been written on how first the computer and now the internet have changed the way we think, and on whether anyone benefits from this change. And thinking *has* changed.

Thinking has changed due to working with computers, but also due to the almost constant distraction of shiny new toys like video games and VR headsets that arguably make it even more difficult to truly think.<sup>338</sup> The bottom line is that we ought to be able to think critically and creatively without technology, and even more assuredly and quickly with it.

### When the computer is used as a substitute for thinking

Architectural historian and critic Mario Carpo has said that digital technologies ‘are no longer the tools for making: they are primarily tools for thinking’.<sup>339</sup> This is an important distinction, especially as architecture has leveraged technology for other uses such as form-making, communication, construction and building performance. There is a fear that, by letting the computer do the thinking for us, it makes us lazy – *just google it*. In architecture, we have seen how the rise of CAD, BIM and various modelling tools have atrophied the ability to hand-draw. Where due to our modelling tools there are fewer people today who can visualise in their mind. One can only wonder what other abilities we currently possess will atrophy with the introduction of even newer tools. Even the way we use language has changed *because internet*.<sup>340</sup>

Soon AI and generative AI tools will help architects expand their human cognitive capabilities, and machine learning will augment the architect-client relationship by providing additional insight. But they will be no substitute for what the architect can contribute, offer and provide to the design process. We have a tendency to blame technology for all of our shortcomings – including our inability to think creatively. So instead of abdicating what architects do to machines, a better use of our time and energy would be for architects to focus on what they do best – while enabling our technology to do what it does best.

This will be the case because a lot of our decisions will be based on data, with companies rewarding employees who leverage data – and think regarding data<sup>341</sup> – when working in BIM and other tools. But outcomes are only as good as the data we put into our models, so making sure the data we use is compatible will be important. But more important will be our ability to think – and to ask questions of the data: starting with what it will be used for, and why.

In the midst of recent advances in data analytics, artificial intelligence and other technologies, it is important for architects to not just turn everything over to machines but to rely on their own reasoning<sup>342</sup> and especially their creative thinking ability. The human brain is just too powerful and valuable to carry out routine acts. Instead it should be used for creative thinking.

### TRY THIS

Architects will need to do something to differentiate themselves from those who purport to provide similar services in less time, at lower cost. They also will need to differentiate themselves from each other. Add to this the very real possibility that they will need to differentiate themselves from computers, machines, robots and algorithms. As this book argues, architects differentiate themselves by learning how to think critically, creatively and (in the next section) collaboratively when problem solving. As we increasingly rely on machines to carry out basic tasks, *thinking* will give architects the advantage.<sup>343</sup> In the section on critical collaborative thinking, we'll discuss how the most reliable outcomes can be achieved when computers and humans work collaboratively, assigning tasks based on each other's strengths.

### TRY THIS

Tools for thought. Architects have tools for drawing and modelling that help them design and document. Why can't they have tools that augment human intelligence and help them think? What tools, you ask? They're called books. But unfortunately, like hand sketching, they too have fallen out of favour.

**ASK THIS**

New autonomous design tools are emerging that aim to automate much of the design and documentation processes, enabling architects to speedily and effortlessly configure working and living spaces in the early design stages to increase efficiency and productivity, saving time and money. Are the tasks that the autonomous design tools replace so repetitive and tedious that they ought to be given over to algorithms to complete? If these new tools are able to lay out efficient floor plans, should architects be relegated to designing building enclosures? For places where people live, do the tools prioritise decision making in terms of affordability?<sup>344</sup>

**ASK THIS**

Moving ahead, the important question will be: Will architects be able to integrate and balance the combined advantages of human and artificial intelligence?

**READ THIS**

*The Death of Drawing: Architecture in the Age of Simulation* by David Ross Scheer

## 55: Detangling Wicked Problems



Fig 55.1: Ole Sheeren's Interlace

**Architects should apply their unique way of thinking not only to buildings but to challenges facing society such as poverty, inequality and segregation.**

You're interviewing for a job and your prospective employer asks you: 'How many piano tuners are there in Chicago?'<sup>345</sup> They are not being cruel – they want to know how you think in action.

While the topic of wicked problems is covered in this book's introduction, it is such an important topic for those who hope to think like an architect that it is worth revisiting.

More than a half century ago, Nobel laureate physicist Enrico Fermi would dare his University of Chicago students to estimate absurd quantities without looking anything up. Perhaps the best-known 'Fermi question' was to estimate the number of piano tuners in Chicago.<sup>346</sup>

As for the interview question, no one expects you, architect or otherwise, to know any statistics about piano tuners. Googling the answer isn't the point (and besides, there is no answer to be found).<sup>347</sup>

The interviewer just wants to know how you think. And how you think – if not yet, then by the end of this book – is like an architect.

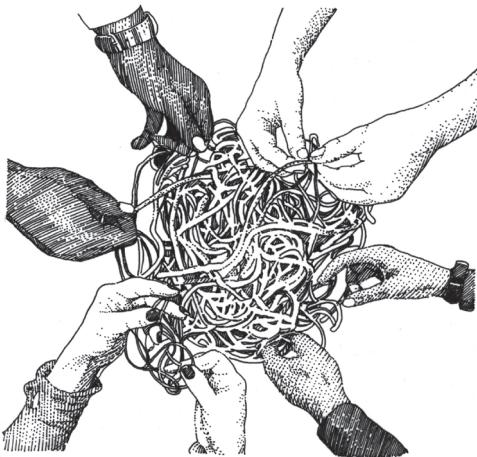


Fig 55.2: Wicked problems are easier to detangle when we involve others

## Definition of a wicked problem

About twenty or thirty years after Fermi came up with his questions, two professors – Horst Rittel and Melvin Webber – divided all important problems into two categories: Tame or Wicked. The main difference is that tame problems can be solved while wicked problems have no obvious solution.<sup>348</sup> They identified essential characteristics of wicked problems: every wicked problem is unique; they have no agreed-on definition; they have no single, correct solution; no solution is right or wrong, but only bad, good, better, best; there is no rule for knowing when to stop working on them; and, they can never be truly 'solved'.<sup>349</sup> They're also problems that are created and exacerbated by people.

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**TRY THIS**

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Apply your education and training to the challenges of society: global issues such as crime, sanitation, housing shortage, traffic, waste, migration and pollution. Extract lessons from your most recent projects that go beyond them. By offering viable, actionable suggestions – or better yet, solutions – aim to go beyond conscience-clearing good intentions and go for real world results. For example, by 2030 it is thought that five billion people, many in extreme poverty, will live in cities, and currently there isn't adequate housing. Architects can respond by coming up with affordable housing models, such as a portable housing shelter.

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**ASK THIS**

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Would it be over-reaching if we were to ask architecture to help us solve real-world issues? Can thinking like an architect help the world contend with and ultimately find solutions to tangible issues that affect everyone, such as inequality, migration and climate change? As Olivia Butcher has asked, 'is it arrogant to even ask: can architects succeed where others have struggled or even failed?'<sup>350</sup> Pritzker Prize-winning architect Alejandro Aravena believes we should encourage architecture students to apply what they learn in school to challenges facing society.<sup>351</sup> A contrarian take would be that architects over-reach when they claim physical buildings can address and solve social problems. But what about architects themselves? Can the thinking tools employed by designers of buildings be applied to solve the most intractable, wicked problems felt in the world today?<sup>352</sup>



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Fig 56.0: Collaborative thinking as a go-to tool in your toolbox

# PART III: CRITICAL COLLABORATIVE THINKING

**Architects work collaboratively.** Buildings are too complex for any one architect to know everything. Thinking collaboratively, they know which experts to go to for answers. Architects have *intellectual humility* and know they are not, nor can ever be, experts at everything. In fact, architects know that their real superpower is their curiosity; the fact that they know a little about a lot of things. It is because of this that they know who to have in the room, on Skype or on the phone, to chime in when the time comes with their expertise. Architects are expert coordinators. They think of others, and ask: who needs this information, and how does it jive with what we have heard so far? Able to see the big picture, the architect is best placed to orchestrate the whole.

# SECTION 7: CRITICAL COLLABORATIVE THINKING

## 56: Critical Collaborative Thinking

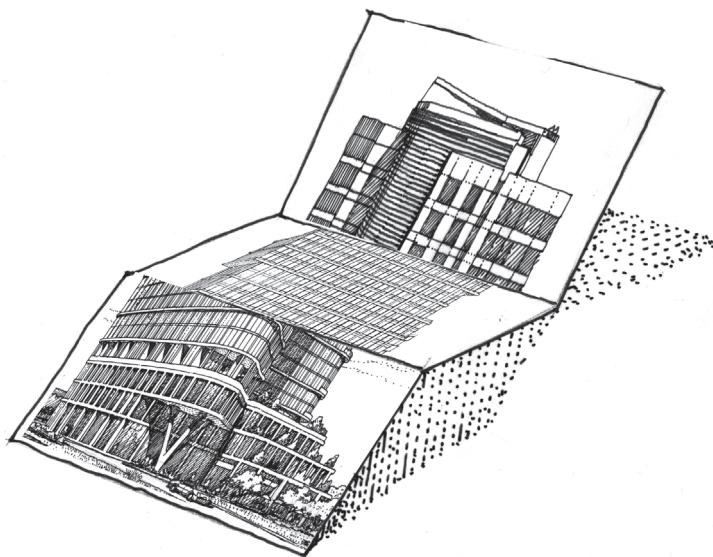


Fig 56.1: The game of exquisite corpse leads to the creation of a disjointed building in lieu of a unified synthesis. The same thing happens when we cooperate but do not collaborate

**To achieve the architects' social contract to make life better it helps to work with others.**

Why work with others? Why not just do everything yourself? When projects are large and complex, no one architect can know everything that goes into designing and realising the building. It serves as an ideal case for collaborative thinking and decision making, requiring people to make decisions together. Are decisions made together better? Are they more likely to stick? Often, yes – but, as with most things, it depends on the circumstances. Project size is one circumstance that necessitates a collaborative effort.

In addition to when problems become more complex and buildings become larger, other reasons to think collaboratively include when it helps to have a diversity of opinions, insights or inputs – for example to avoid cultural blindness, and gender or age bias; to see problems from different angles and point of view, as you strive to understand the context in which you will be building. Especially today, buildings are too complex to do alone. They require large teams made up of lots of players from many trades and backgrounds. Architects reach out into their network to identify who can best address the problems at hand.

As architecture requires the involvement of many people, it's likely that as you enter practice you will be collaborating with a wide range of professionals, and that the need for you to be able to collaborate effectively will become more important over time. The architect working on collaborative teams has implications for education. Recently, more than 80% of architects rated collaboration with stakeholders as important/critical, yet fewer than half that many, only 31.5% of interns and recently licensed architects, indicated that they had performed collaboratively prior to completion of their education programme.<sup>353</sup> With 10,000 decisions going into every building design, you can't be expected to know everything – especially with buildings becoming more complex. That's one reason why we turn to others.

I have a rule in studio: only draw what you know. Don't draw what you don't know. It will come back to bite you. It is clear that this last student didn't follow this rule. Ask questions if you don't know something – or, better yet, have a classmate look at what you are planning on presenting well before the pin-up. While most tutors want students to do their own work, in its most fundamental form, this is what collaboration can do for you: provide you with another pair of eyes.

Can collaborative thinking be abused? Sure. For example, when a student goes from tutor to tutor, student to student, asking each for their input, not stopping to evaluate their feedback – not stopping at all – just asking until they hear what they want to hear: a case where collaborating is really just looking for praise or consensus, and design becomes a numbers game.

People are social animals, and architects have what Will Alsop referred to as an architect's social contract to make life better.<sup>354</sup>

Why is collaboration important? You'll soon be entering a quickly transforming, global design practice environment, one where emerging

technologies are enabling – and a world increasingly in environmental, economic, and societal crisis that requires collaboration.<sup>355</sup>

Not everyone who says they collaborate, collaborates. Look at just about every architecture firm's website; most say they are collaborative. They can mean a lot of different things by this: think of it as a continuum with, on the far left end, corruption, conflict and conspiracy, and on the far right cooperation, collaboration and chaos, with a gradation of competition, conversation, communication, community and coordination between.

The important thing is for you to think of collaborating – the ability to work well with others, and engage in teamwork and consensus decision making – as just another tool in your toolbox. Collaborate when you need alignment; when the solution isn't straightforward and obvious; when it isn't a distraction from getting the job done.

That's not to say that collaboration doesn't have its challenges. For starters, collaboration is hard and takes time – to build relationships, to clear up misunderstandings, to listen and to get things done; it can be experienced as challenging when you are first starting out. On large teams especially, beware of 'social loafing' – the tendency to abdicate responsibility when there are others who can do the heavy lifting. It's easy to underperform on large teams, especially when roles are blurred or ill-defined and it is unclear what role you are supposed to perform.

Among the top obstacles to successful collaboration, for many collaboration means compromise, resulting in watered-down design – a product of groupthink, a race towards the lowest common denominator – and they have difficulty connecting the development of collaboration abilities with desired design outcomes, let alone design excellence and the contribution of one's design ideas in relation to the overall project.<sup>356</sup> The fear in collaborating is that we and our work will be mediocre. For a designer whose singular voice is their expression through their work, collaboration is equated with joint authorship – to some the antithesis of creative expression, muddying the message of the work, dispersing and diluting the voice and design intent of the creator. This thinking is of course mistaken, as leaders need to make clear. One only needs to compare a Beatles' tune with any of the band members' solo efforts to recognise that teams make better decisions – and importantly, achieve better results – than individuals.<sup>357</sup> Collaboration can be time-consuming and resource-intensive.

In addition to challenges, there are benefits to collaborating. Collaboration helps build consensus – by getting everyone on board – and envisions the problem from multiple points of view, and at its best it engages a diversity of problem solvers. By *not* collaborating, architects become marginalised, and not knowing how to effectively collaborate could lead to your irrelevance.

There's one way in which being a relative newcomer to the field can be seen as an advantage: with little or no past experience you also don't have a lot

of the mental baggage that can hold teams back, and one of the barriers to collaboration remains organisational silos.

There's an alchemy to working with others. Where – as with the Beatles' lead songwriters – two are better than one. Where 'the alchemy of collaboration does not merge the two authors into a single voice but rather proliferates them to create the chorus of a multitude'.<sup>358</sup> To collaborate you have to be more focused on the outcome than on who gets credit for what. In the best collaborations it's hard to tell who did what: that is why the songwriting credit is shared for most Beatles' compositions, reading Lennon–McCartney.

### TRY THIS

At some point when you are presenting your work in your portfolio, the prospective employer wants to hear you use we more than *I*.

### TRY THIS

The image of the individual architect working independently is largely a myth. That said, architects tend to be independent types – to a fault. During the global economic downturn of 2008, 30% of architects in the US lost their jobs. Adding insult to injury, most architects didn't help each other during this trying time: instead, it was mostly every person for themselves. Therefore, be the architecture student or emerging professional who looks out for others.

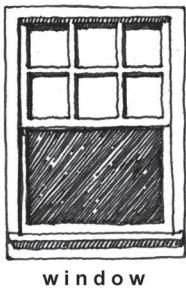
### TRY THIS

Become acquainted with the disciplines related to the architect: landscape architects; structural engineers; mechanical, electrical and plumbing (MEP) engineers; civil engineers; conveyancing solicitors; estate agents – the list goes on. Introduce yourself to people in these related professions, tell them where you are in your academic or professional career, and request an informational interview over coffee or lunch. Most will be more than willing to help out a fledgling architect at the beginning of their career.

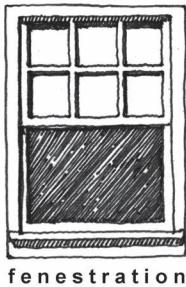
### READ THIS

*Idea Work* by the Scandinavian architecture firm Snøhetta about activities concerned with generating, selecting, realising, nurturing, sharing, materialising, pitching and communicating ideas in organisations. The book features ten patterns or qualities identified as being present in extraordinary idea work.<sup>359</sup>

## 57: Communicating with Non-Architects



window



fenestration

Fig 57.1: Calling a window a window requires architects to consider their audience

**Life experiences  
prior to becoming an  
architect should be  
used and considered  
a strength.**

Architecture students and architects too split their lives into two phases: before architecture school and after, where the experience prior is discounted or altogether ignored. There is value in the experience of students prior to entering architecture school. Architects design for non-architects, so since architecture students are still non-architects themselves, they will never be able to relate to a project's users more than they do now.

In other words, you are not a blank slate. You bring with you your life experiences, and these should be considered a strength, as opposed to seeing yourself as a *tabula rasa* with no beliefs or prejudices except those that must be wiped clean before real learning can begin.

Communication is a social act. Learning to communicate with non-architects goes beyond saying 'window' when you think *fenestration*. To communicate with others requires a sincere interest in others. Communicating well requires empathising with those you are trying to reach: actively listening and speaking in terms of their interests and concerns.

And even when we do communicate, how can we be sure what we said has been heard? True communication has four steps. You haven't communicated until you've spoken, they've heard and said what you said back to you in their own words, and you've heard them. Anything short of that is just talking to – or worse, at – each other. It isn't communicating if they aren't listening, if they or you are multitasking, if they aren't figuratively or literally looking into your eyes when you talk.

How do you talk to your client when your client is your tutor? To get buy-in from your tutor, go over what you spoke about last time. It is your idea – not theirs – but you still need to sell them on it. Here's how: *I looked at the suggestion you made. I didn't like it* (it didn't achieve x, y and z).

Be prepared. Anticipate questions and reasonable objections. You don't have to be a know-it-all. (I knew you were going to say that!) Just behave as *if*. As if they will respond a certain way (based on past behaviour and what you know about them). Don't worry about pleasing them – your tutor is your biggest champion. They will write recommendation letters on your behalf. They will nominate you for awards. They will stand up for your design.<sup>360</sup>

### TRY THIS

When presenting your idea, represent both sides. People will be more convinced of your idea if you mention that you thought of the negative consequences or thought of alternative approaches.

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TRY THIS

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Practise adaptability. Practise resilience. Learn how to take feedback. It's not personal. It's business. Even in school! Stay on topic. It's not you against them. Work with them. You are defending your design – not yourself. Communicate to others how they have arrived at their solution. Criticism isn't a personal attack. They are looking out for your best interests. Act as though this were true. There's a place for poetry. For the ineffable. Avoid tangents. Stay focused. Be completely present. As Pritzker Prize-winning architect Alejandro Aravena advises, 'architects need to understand people and places and be able to read between the lines. Communication is only 90 per cent verbal – we need to be face to face to fully communicate. We have access to sophisticated technology but it's completely mismatched to the primitive emotions humans have been dealing with for millennia; fear, desire, love and envy.'<sup>361</sup>

## 58: Diverse Points of View

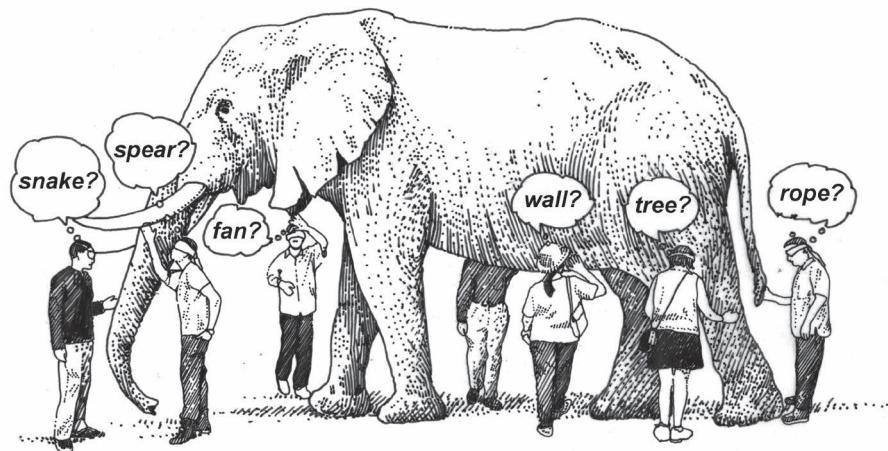


Fig 58.1: People think differently from one another, and architects benefit when they collaborate by filling in blind spots and overcoming weaknesses

**Architects design  
with others in mind.**

The architect draws a building facade – an image turning the object over (in their mind, or on their work surface) to see what it would look like from another angle or on a different side of the building. This requires spatial intelligence – something architects possess. Architects will turn their drawings upside down to see from another perspective or another point of view (POV), to shake up their complacency, to not be so attached to one POV, because they know that their POV is only half of the equation. Architecture students in particular develop a critical consciousness for design when they extend their POV even larger by considering historical, economic, social, cultural or political contexts for their designs.<sup>362</sup>

Architects design with others in mind, and this mindset extends to *the way* they design. The importance of inviting different voices to work on diverse teams – and not being on teams made up of people just like yourself, where each brings something of value to the team and the project stems from the need to consider other sides and diversity in every dimension: race, gender, nationality, company size, industry and role. People think differently from one another, and we benefit when we collaborate with them by filling in our blind spots and overcoming weaknesses.

So where to start? While the architecture profession itself is famously undiversified, those who make up most architecture school student bodies are often quite diverse, as students come from different parts of the world and some from non-architectural backgrounds.

#### TRY THIS

While nobody likes to have their design criticised, in the spirit of science, ask for feedback. You want to know if your idea is any good, and the sooner the better.

#### TRY THIS

To start a collaboration, look for mutual interests. Consider meeting to discuss a book or film you all enjoy, or start a reading group to learn more about a topic you mutually care about. Pay attention to how you benefit from a diverse set of sources of information, insight and inspiration relative to each other's backgrounds.

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**ASK THIS**

Are there students on your course previously from different subjects? What insights do they bring? Can you suggest an interdisciplinary exchange, where students or tutors from other courses critique your work, and vice versa? Come to appreciate why studio culture – working together in studio, keeping your headphones off so you can engage with and share ideas, spontaneously explaining your project to others when they ask, receiving impromptu feedback – is so valuable for your academic, professional and personal growth. Consider how you might benefit from reaching out and getting to know and understand each other.

59:

## Solving Wicked Problems With Collaboration

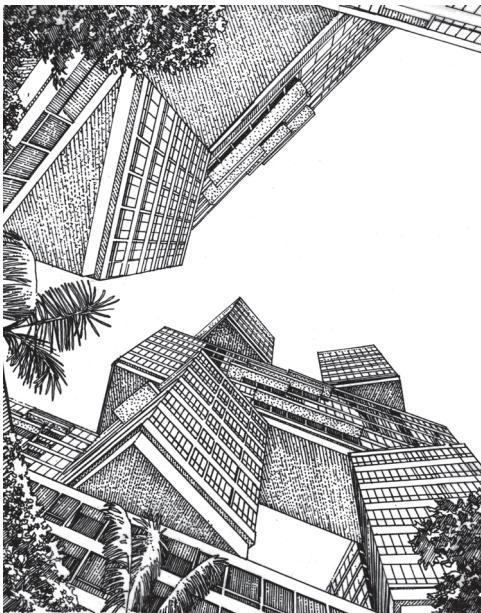


Fig 59.1: Wicked problems are found whenever people try to make the world better

**Because they are comfortable with ambiguity and uncertainty, architects are ideally suited to solving wicked problems with others.**

As discussed in the introduction and the last section, wicked problems (problems that have no single, definitive solution) and tame problems (which, well, do) are two types of problems that architects address. If the problem is tame then the architect can DIY and consider it done. If the problem is wicked – if the building is unique or complex, or the issues associated with it difficult to solve, for example due to climate change or lack of affordable housing – then the architect will need to bring others in to help solve it via a transdisciplinary team.

Even interior design projects face intractable, hard-to-solve problems. Open office plans are intended to encourage spontaneous collaboration, but most evidence suggests they accomplish the exact opposite: they are noisy, distracting and lead to lower productivity. Now, with the pandemic, they may increase the possible spread of the virus.

In other words, wicked problems are found whenever people engage with the world and try to make it better, for example by asking: How to address inevitable density in cities without resorting to high-rises? How to design high-rises so that they are people-friendly? How to address millions displaced by immigration and crises? How to design for rising sea levels due to climate change? How to convince others that climate change is real and worth paying to ameliorate?

How, in other words, to approach deep and complex problems not simplistically, but in deep and complex ways? And applying rational thought and technology or working harder and longer won't solve them: only working smarter. And one way for the architect to work smarter is by engaging with others, which brings to the design process new viewpoints, skills, insights – increasing the odds that the problem will be solved. What will solve wicked problems in the future is arming a critical mass of people with the ability to think like an architect.

There has been talk of bringing back the Renaissance idea of the architect as the master builder. But with buildings becoming more complex, the possibility that any single individual can tackle wicked problems has passed. Other options include master builder teams,<sup>363</sup> allowing machines themselves to be master builders, and collaborating with technology. At one time the best chess *player* in the world was a couple of teenagers and a laptop – people working side by side with machines. It's best to prepare for a world where technology is complementing rather than substituting people.

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**TRY THIS**

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Start by identifying tame and wicked problems. In architectural education, your tutors could help by, instead of offering increasingly complex projects throughout the course, offering a continuum of projects from tame to wicked. Architects like Ole Scheeren purposely choose larger wicked problems to tackle rather than only addressing and solving the client's assignment or needs. This is because architects try to progress with each project, to improve on what came before, but also to address those not represented at the table: the public at large, the users, the neighbours and future generations. It's not that architects need to take tame projects and make them wicked, or that architects need to turn every project into a wicked problem. It's that architects, because of their social contract to make the world better, look for opportunities to make something more than the narrow assignment they have been given. Because they are comfortable with ambiguity and uncertainty – a transferable skill – architects are ideally suited to address and attempt to solve wicked problems with others.

60:

## Intuition and Collaboration



Fig 60.1: Snøhetta MAX IV Laboratory in Lund, Sweden

**Architects rely on their intuition to make design decisions; it turns out, so do the best teams.**

It could have been a wall. The MAX IV Laboratory in Lund, Sweden was built near a highway which created unwanted ground vibrations that had a negative impact on lab experiments. Snøhetta were hired, and instead of a wall they came up with several solutions, settling on a landscape in the form of a wave field. Maya Lin had created a sculptural wave field in North America, but the one Snøhetta proposed was different. Using computational design tools, their wave field was designed to model the effects of the vibrations. But that's not all: their wave field absorbs vibrations while creating public space, a constructed meadowland that also captures stormwater. And best of all, to build this landscape Snøhetta uploaded the 3D model directly into the GPS system that then guided bulldozers to carve out the shapes.

Architects rely a great deal on their intuition to make design decisions. But what role, if any, does intuition have on teams?

First, it is important to recognise that intuition is private, so its role in collaborative efforts is put into question. It doesn't help if, when working on a collaborative team, your gut tells you to go in a certain design direction. You need to articulate your intuitive feeling in terms others can understand and be persuaded by.

What about collaborative teams? Could a team be said to possess intuition? Some teams who have worked for many years together – teams who have shared experiences and access to information – might answer in the affirmative. You only have to look as far as the name of Snøhetta's most recent monograph, *Collective Intuition*.

An architect who works everything out in their head, who considers drawing a waste of time and resources – as opposed to communicating their thoughts in words and sketches – would have to consider a more social means of working when working on a team. Working in one's head precludes a collaborative process, rendering it opaque.

When collaborating, architectural thoughts can be personal, but not isolating. To think like an architect on a team means, as in the case of Snøhetta, to think collectively; where creativity isn't the province of the few but the purview of the many, and where working collaboratively isn't a sometimes thing but daily habit.<sup>364</sup> Where intuition has a place, not in the privileged but in the collective.

# SECTION 8: THINKING WITH OTHERS

## 61: Thinking Like Others

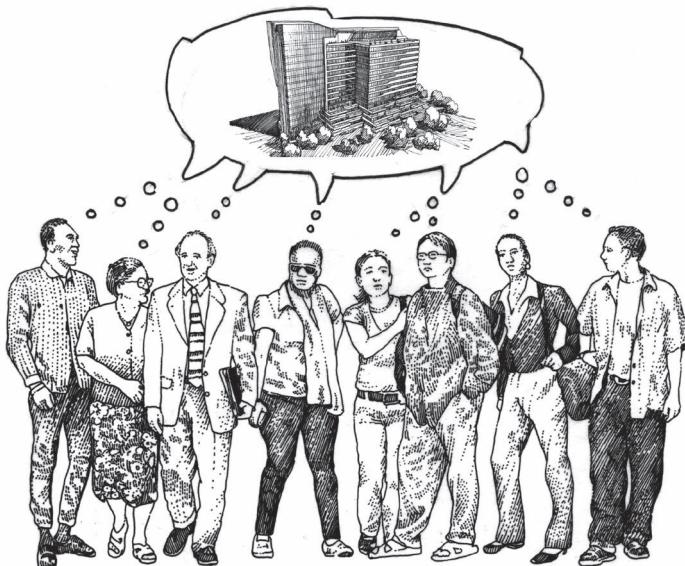


Fig 61.1: It is unlikely that everyone is thinking what you're thinking

**Architects think like others to be more observant while avoiding the pitfalls of drawing faulty conclusions.**

As important as it is to think like an architect, it is equally important for the architect to think like others: to speak in terms they can understand; to understand how your idea applies to them; to empathise with their situation and circumstances. To think like others means to be more observant while avoiding the pitfalls of drawing faulty conclusions.

To put yourself in others' shoes, you have to feel empathy, and consider how people will experience and use the spaces you design or propose.

How can you know for certain what people want? You can ask or interview them. Some say that focus groups and user interviews don't work for innovation. Ford Motor Company founder Henry Ford famously said, 'If I had asked people what they wanted, they would have said faster horses.' That said, there is always something to be gained by listening.

For the same reasons you want to think like an architect, you want to think like others. To prepare for an exam it helps to think like the tutor, right? What advantages would this give you?

This is one reason why taking non-architectural courses is so important: in addition to what you learn and are exposed to, these courses help you think like others outside the industry. This also applies to joining organisations outside your field. Thinking like others helps you to develop what is referred to as an outward orientation or mindset<sup>365</sup> that will serve you well in both your career and your personal life.

Architects can lead collaborative teams by thinking like other team members, anticipating their concerns and questions before they arise. Architects see through others' eyes; they empathise with and understand what is important to others. In trying to predict the consequences of any course of action, the architect needs to anticipate the responses of each of the integrated team members. To do this, an architect must know enough about each discipline to negotiate and synthesise competing demands. Architects don't need to be plumbing or electrical contractors, but they ought to be aware of what these entities do and the services they provide.

### TRY THIS

You have the ability to think like others. Ask yourself: What will my tutor think? What will the structural engineer think? The MEP consultant? How would someone who does maintenance feel about my creating an all-glass facade? Anticipate what others will think, including their objections. You could ask them – but if you have imagination and empathy you can imagine their responses – and adjust your message accordingly.

**TRY THIS**

To think like others, get your hands on every *Think Like a \_\_\_\_\_* book. There are hundreds: some general – *Think Like an Artist*, *Think Like a Fish* – while others are more specific – *Think like a Graphic Artist*, *Think Like a Bass*. There are books that will teach you how to think like a game designer or to how to think like a venture capitalist or a horse. I read these types of books early in my career (OK, not the ones about fish or horses) because I wanted to understand how others thought so I might understand how I thought. So I could communicate better with others – speak in terms they understood – and to see if maybe there was some insight I might glean that could help me become a better architect.

**TRY THIS**

To better understand why some people think differently from you, deliberately read an essay, interview or book by someone with ideas or viewpoints diametrically opposed to your own. As futurist David Zach suggests, think into other boxes without abandoning your own (which you probably invested a lot of time and money in to build).

## 62: Collective Intelligence

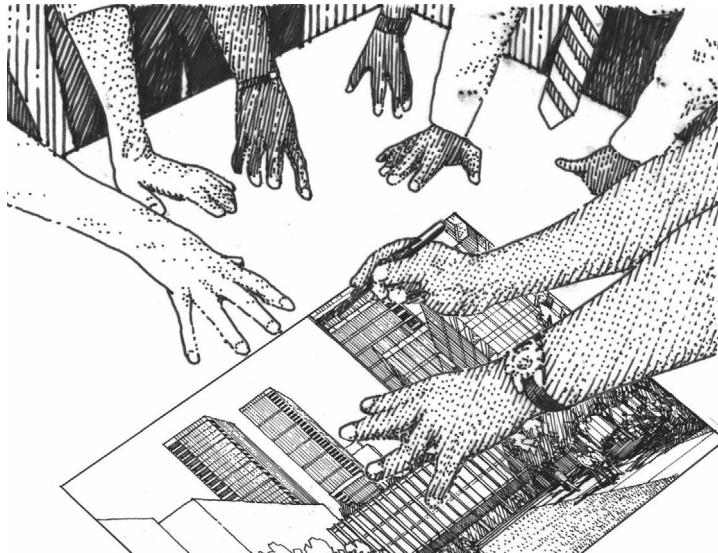


Fig 62.1: No single individual can fully grasp all that goes into a building project

**Project teams possess  
a collective intelligence  
above and beyond  
the intelligence of the  
individual architect.**

It has been suggested that an ant colony possesses memories that its individual members don't have, where memory itself is considered the result of collective action.<sup>366</sup> Buildings are becoming increasingly complex with more people involved, more demanding construction systems, budgets and schedules, and stricter performance goals. We have reached a point where no single individual can fully grasp all that goes into a building project. Window walls, roofing and other building parts have become areas of specialisation requiring the input of consultants. Buildings of any but the smallest size or scope today require the collective intelligence of the many.

This kind of collective thinking is what a firm like Snøhetta – a firm where thinking, intelligence, and knowledge are social – does especially well; not on selective projects, but daily, in everything they do.<sup>367</sup> One wonders whether an organisation such as Snøhetta, which works as a collective, could – like the ants – be said to possess memories that its individual firm members don't have? Or project teams whose collective intelligence can be thought of as being above and beyond the intelligence of each individual team member.

Architect Daniel Libeskind describes his creative process in similar terms – where he starts by immersing himself into the project site, picking up or internalising on an intuitive level the history of the place and what he refers to as *invisible wavelengths*. The resulting concept for Libeskind isn't something that can at first be put into words, but emerges from his immersion and can only be realised in form.<sup>368</sup> But how can such a personal and intuitive approach involve other people? At what point does Libeskind bring other people into the process? He brings others into the design process once the nascent design – not yet a building – starts to take shape. Other architects have the core team present before so much as starting the design process.

We live, work and go to school in a culture that celebrates individual talent over that of collaborative teams. Few architects have been the focus of laudatory media coverage over the past decade more than Jeanne Gang of Studio Gang Architects – yet she is the first person who will point out the team effort required on complex projects. For Chicago's Vista Tower, Gang and her firm have what she refers to as a symbiotic relationship with bKL Architecture, working together throughout to make the building design a reality. While these firms are mentioned the most frequently in the media, literally hundreds of teams – including thirty consultants – from various industries have been involved in the project: a true collective.

### TRY THIS

Make your next project a group project instead of a solo assignment. If you carefully pair yourself with another student so that you symbiotically learn from each other, you'll end up learning not only about design, but how individuals work together, while developing necessary interpersonal skills.

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**TRY THIS**

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A rookie mistake is to have a DIY mindset. You work on a team begrudgingly, you give lip-service to input from others, and you go to others when you need something – but you don't add to the gestalt or overall work or project. Instead, think of collaboration as supplementing your weaknesses. You are expected to have weaknesses, as you are still only starting out. Why not make use of the input of those around you? Think of collaboration – whether collaborating with people or machines – as bigger thinking. This bigger mind has the potential to solve increasingly complex design assignments. Work on developing a collaboration mindset. It's different from you working among others; on truly collaborative teams, the dynamic changes; the roles and titles blur.

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**TRY THIS**

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You are responsible for your own creative output. Your tutor on the other hand is trying to manage the creative output of others – you and your classmates – which is even more difficult. Your tutor has had to master the transition from maker to manager, with a goal of managing consistent, systematised output from an unpredictable design process. No one knows for certain what will result from a design studio assignment: not you, not your tutor. The secret? Leading by influence, not by direct control. Some have likened managing architects to herding cats or even tigers.<sup>369</sup>

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**ASK THIS**

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The single most important issue confronting architecture, engineering and construction (AEC) leadership is, as MIT research fellow and author Michael Schrage asked, how to pose problems and opportunities in forms that will elicit and inspire a collaborative response. Consider reframing questions so that they lead to responses that engage the intelligence of the collective.

## 63: Impact of Culture



Fig 63.1: Given the complex issues architects will face in the years ahead, you want to attend a school, take classes and work in firms that encourage collaboration when appropriate

**Architects strive  
to build, learn and  
work in cultures that  
support collaborative  
problem solving.**

Architecture is of course part of a culture and a particular time and place, and the individuals who participate in its design and making contribute to its culture. Used slightly differently, the culture of a place – a school, an architecture firm – is sometimes referred to as the way we do things around here, and it can have an outsize impact on whether and how well people collaborate.

If you attend a school or work at a firm that places greater importance on competition, and on individual rather than team performance, it can be an uphill battle to get the support and encouragement you need to develop cooperatively at a team member, and to find opportunities to work together while building your interpersonal skills. Given the complex issues architects will face in the years ahead, you want to attend a school, take classes and work in firms that encourage collaboration when appropriate.

Asking relevant questions, from an attitude of respect and curiosity, requires critical collaborative thinking, and is the basis for building trusting relationships. Trust facilitates better task-related communication, thereby ensuring collaboration not only to complete the assignment but also to make sure all constituents and stakeholders are represented. Question asking is especially important for complex problems like those that architects face, that cannot be solved by solitary designers.

### TRY THIS

There is a stigma attached to students and emerging professionals who ask questions. Does asking a question imply that they are ignorant and don't know? Some say they're fed up with mansplainers (or we may be afraid we unwittingly act like one ourselves), but being assertive as opposed to tell assertive can put pressure on us to become one.<sup>370</sup> Instead of giving orders, see if you can find a way to get people to do what needs to be done by putting your request in the form of a question. An impatient, task-oriented culture discourages us from building community. As Edgar Schein explains in *Humble Inquiry*, if you 'don't care about communicating or building a relationship with the other person, then telling is fine. But if part of the goal of the conversation is to improve communication and build a relationship, then telling is more risky than asking.'<sup>371</sup>

**ASK THIS**

Look at how you were raised. Were you rewarded for individual contributions or when you helped others out? Does your school culture now make it safe to speak up? If you work or are educated in a culture that doesn't encourage question asking or collaboration, what are other ways you can gain this experience (for example by joining organisations)? A culture that rewards the DIYers is a culture that is more about just get it done rather than honest enquiry and research.

## 64: Being a Master Generalist

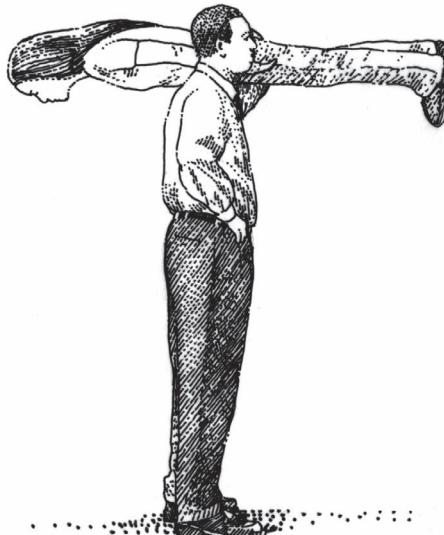


Fig 64.1: To become effective collaborators, architects should strive to become master generalists, polymaths and T-shaped people

**Architects,  
by definition, are  
multidisciplinary  
generalists.**

Architects are multidisciplinary generalists<sup>372</sup> who, since the time of Vitruvius and then Alberti, have been encouraged to familiarise themselves with various branches of knowledge. It makes sense, given that architecture is both an art and science, while being not entirely one or the other. Martha Thorne has said that architecture is not just art, or just science, but – as it draws on psychology, sociology, economics, politics and more – is more than either of these.<sup>373</sup> As generalists, architects thrive in environments where wicked problems prevail.

And given the complexity of buildings and the number and kinds of people involved in any building project, it is important for architects to be familiar with a lot of things. David Gilmore, president and CEO of DesignIntelligence, calls on architects to become *master generalists* and polymaths<sup>374</sup> who, by definition, know a whole lot about a whole lot. But as important as knowledge is, it is equally important that architects feel comfortable engaging with others who may hold specialised knowledge and insights that can move the project forward. This combination of deep smarts and wide social wingspan is sometimes referred to as being a T-shaped individual.

To relate well with others, it is important to think like them and to empathise with them. But there is no substitute for actually switching roles with them on project teams. Snøhetta use a concept they call *transpositioning*<sup>375</sup> – where firm members are invited to break from their professional role and actually switch perspectives with others on the team. Earlier in my career, when designing transportation stations, the public transportation client would have their employees one month serve as project managers, then as conductors, or as safety engineers. The thinking goes that by exposing ourselves to others' roles for a short period of time we release ourselves from disciplinary conventions, which can – as Snøhetta have learned – foster a greater sense of what is possible, freeing teammates from conventional domain-specific thinking, and yes, build empathy for others you may work with in the process. Snøhetta liken doing this to how some orchestras encourage their musicians to rehearse on each other's instruments to better appreciate the challenges and possibilities of other musical parts, and better communicate across cultures and disciplines. On returning to your own instrument, what you learned can elevate the collective quality of the performance.

### TRY THIS

Make it your aim to know how others think, and know what others do in the process, so you know who to go to when you need information you don't possess or have access to. As a generalist, specialise in people. Zoom out to better see connections and join the dots. Appreciate specialists, but be the one who actively seeks to get them out of their silos to solve holistic, common sense solutions. Know just enough to be able to communicate the overall contours of the assignment, your ideas and the problem you are trying to solve – then strive to get others involved in helping you solve it.

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**TRY THIS**

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Increase your use of metaphor, so you can explain new things in terms others can relate to. Make it your goal to be relatable, to use language others can relate to, and that doesn't exclude others. Have something you are known for (you're more likely to work on important projects), but also develop diverse interests and consider what it is beyond specific skillsets that you bring to projects and teams.

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**READ THIS**

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*Range: Why Generalists Triumph in a Specialized World*  
by David Epstein

## 65: Agility



Fig 65.1: With the blurring of roles and responsibilities, you want to aim to be agile enough to adapt to different demands and situations

**Architects design  
for resilience and are  
themselves resilient,  
remaining agile not  
fragile throughout  
their careers.**

As 10,000 decisions go into the design and making of a building, architects have to think of many things.

What's important for the architect is to remain agile, not getting caught up or stuck on any one question, issue or point; maintaining an open mind when others are speaking; zooming in and out to look at decisions at different scales; and remaining flexible in their thinking.

With the blurring of roles and responsibilities, working remotely and together earlier, and increasing complexity and speed of projects, you want to aim to be agile enough to adapt to different demands and situations. Some problems or assignments will be similar to ones that you have encountered before – and then it's more expedient for you to do it yourself. Doing it yourself makes sense when the schedule or budget won't support a team effort, or when the simplicity or lack of complexity of the assignment calls for a more direct route to a solution. In addition to everything else, architecture is a business, and problems often have to be solved quickly. There isn't the luxury of dwelling on them endlessly – sometimes the more expedient decision is made for the sake of time. DIY is when your boss unforgivingly promises something to a client by the end of the day and you are the go-to person to get it done. It doesn't make sense collaborating in these situations. Remaining agile throughout your career will help you to pivot between working collaboratively and independently, depending on the circumstances, and be seen as someone who is flexible and easy to work with.

Few right out of school are given DIY assignments, because emerging professionals tend to work on a team from the start. While it may seem that technical ability – building technology and digital or design technology – is more important at the start of your career, in part because you are given fewer opportunities to engage with clients and consultants, people skills are still important when you first graduate, and increasingly so as you continue in your career.

Architects can famously maintain two simultaneous lines of thought: their own and their client's; their client's and that of the public-at-large; the paying client and the non-paying client; the 99% and the 1%; the circumstantial and the ideal; science and art; reason and intuition; evidence and the ineffable; HSW and aesthetics; practical and dreamer. Doing this takes agility.

**TRY THIS**

While you don't always need to be the expert, the question of memorisation – how important is it, can't you just google it? – comes up when collaborating. Some memorisation is useful and important. You will be of more use to others in real time if you keep some information in your head. You want to work around others in studio – to be in the room where things are happening. You may be more comfortable wandering off doing things in your own place and time. But you can miss important messages and information. More importantly, when you are off on your own you don't learn from other students – or only from those you hang out with. Some architects find that they do the most learning when eavesdropping on nearby conversations. (Some people speak loudly – what can you do?)

**ASK THIS**

In response to the increasing wicked problems where outcomes are unknown, instead of focusing exclusively on disciplinary fidelity and skill building, today's schools really ought to focus on developing resilient, adaptive and agile multidisciplinary thinkers. Short of this goal, what can you be doing in your academic and professional career to remain as agile as possible, adaptive to a variety of roles and situations?

**ASK THIS**

If the best results tend to be achieved when computers and humans work collaboratively – allocating tasks to each other's strengths, rather than working in competition – what can you be doing today to increase your responsiveness to working with technology? Can you take a course or watch tutorials to help you learn to code? Can you take software home and open the bonnet, so to speak, finding ways to customise the tools you and others use to be more accessible and user-friendly? What other things could you try to build a bridge between you and the tools that will help you get ahead in your academic and/or professional career?

# SECTION 9: PERSUASION

## 66: Rationalisation and Persuasion

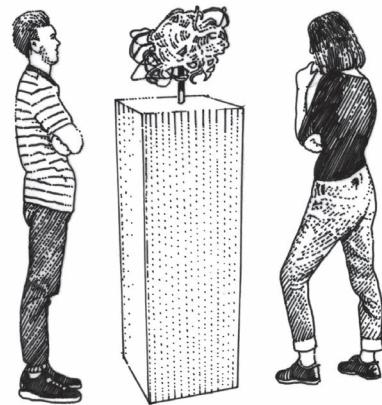


Fig 66.1: People will be swayed by information that is made rational, i.e. translated into something relevant, understandable and usable

**As with building facades, architects rationalise their subjective ideas by translating them into something relevant, understandable and usable.**

As we saw in the first section on critical thinking, like many people, architects like to rationalise.

But architects also take part in another form of rationalisation – when they rationalise building facades, which they usually do computationally.

Often associated with facade design, rationalisation is used where complex geometries made up of unique components need to be translated into understandable and buildable form. This type of rationalisation is how an architect like Frank Gehry has been able to build his complex ideas. Complex shapes that are becoming easier to design still raise the question of how they can be built feasibly and affordably.<sup>376</sup> Gehry first works with physical models, then creates a computer model by scanning the physical model. It doesn't make sense for him to do more conventional elevations of his buildings, as contractors won't build from them – they'll build from the model. However, municipalities require elevations to issue a building permit, so his firm provides them.

What this has to do with persuasion is that people will be swayed by information that is made rational – i.e. translated into something relevant, understandable and usable. Just as metaphor is one way to take something new and make it understandable to others, rationalising intuitive or subjective information is a way to verify it logically. Unlike post-rationalisation, where the architect comes up with reasons after the fact, rationalisation is a way to size up and measure what you are being told.

An architect like Steven Holl starts his design process with watercolor sketches that result further along in built form that is subjected to all of the regulations, constraints and forces of other built works. In the process his abstract intuitive ideas are rationalised so they can be realised.

### TRY THIS

While playing Devil's advocate is not always an effective way to advance your ideas, to persuade others it helps to represent both sides. People will be more convinced of your idea if you mention that you thought of the negative consequences or thought of alternative approaches. This communicates that you are not so irrationally obsessed with an idea that you have failed to see it in context, from another's perspective.

## 67: The Role of Emotion

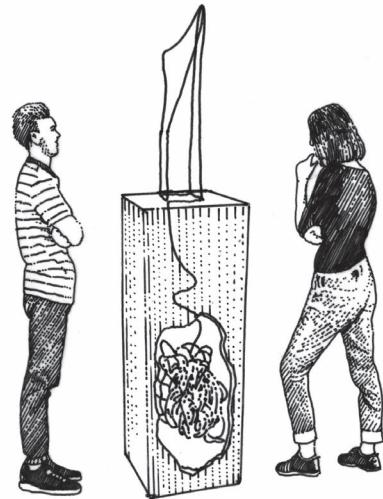


Fig 67.1: Arguing using not only reason but passion and emotion can make all the difference to a project others will stand behind and defend

**Architects learn when and how to use emotion when presenting their design ideas.**

During his Ground Zero interview, Libeskind allowed himself to express emotion – thus making a strong connection with the design jury, while differentiating himself from teams that took a different approach or established a different tone in their interview presentation. From the emphasis that Daniel Libeskind placed on emotion in architecture, one could be led to believe it was Libeskind's expression of emotion during his presentation that led to his being selected to oversee the rebuilding of the World Trade Center.

Using facts and figures – appealing to the rational and logical, while critically important to arrive at a decision and move a project forward, is seldom enough.

For this reason, it is important to appeal to the emotions to take decision makers to the final step.

Arguing using not only reason but passion and emotion can make all the difference between a project that is understood but doesn't build excitement, and a project that builds consensus others will stand behind and defend.

Architects have to learn when and how to use emotion when presenting their design ideas. Emotion communicates that you care – that you have conviction in what you are presenting – and relates to the rhetorical tool of pathos, the quality that stirs up emotions in the listener.

Buildings, likewise, make emotional connections, perhaps none so prevalent as what is known as the 'wow effect'. Architects provide the wow effect, that sense of awe when we are standing before something manmade, masterful and inexplicably beautiful or grand. This is the gift architects give to the world: creating places that inspire, where people live out and realise their dreams and destinies. Architects aim to wow.

This bit of wisdom is here in the collaboration section because while it is always a good idea to keep your emotions in check, you don't need to manage emotions as much when by yourself. Emotions primarily have to do with the presence of, and potential impact on, others.

### TRY THIS

Learn how to manage emotions – not to be overcome by feelings when having a bad day. Easier said than done, but always try to keep the long game in mind and have faith that things will come through for you in time, just perhaps not exactly when you'd hoped. Keep your eyes on the prize and you will prevail over short-term setbacks.

## 68: Beware the Cookie



Fig 68.1: Beware of the product sales representative who tries to win you over to their product via your stomach, not your head

**Architects think independently and can't be manipulated or swayed by extrinsic enticements.**

A product manufacturer's sales representative makes the following claim:  
Wood is stronger than steel!

Pound for pound, they say, wood is stronger than steel. Is it? How can you know?

Once out of school and working in a firm you will be invited to attend lunches arranged by your firm and hosted by product manufacturers.

These events can be hit or miss in terms of learning opportunities. The best cover general content about a topic for the first two-thirds of the time and only in the final third is the product itself specifically mentioned as an example.

One thing to be on the lookout for is that the product sales representative will try to win you over to their product via your stomach, not your head.

They want your firm to specify their product – and that explains the free lunch.

Economics in nine words: *There is no such thing as a free lunch.*

Don't be swayed by the cookie! Look under the product's bonnet, take a sample for a spin. But don't be pressured into using someone's product, nor buy into the hype. A professional is someone who is not swayed by either self-interest or commercial interests. Architects think independently. It is essential that architects are not manipulated or swayed by enticements and remain neutral – that they seek out and hear from both sides of an argument.

Architects must make an effort to see beyond the free lunch and the cookie to create their own continuing education, for as one architect has said, 'once the Part III certificate is filed away all too many of us rest on our laurels, skimming an online journal or listening to a product rep murder building physics in pursuit of product sales'.<sup>377</sup>

### ASK THIS

You want to scrutinise what others are saying. If they are speaking for an hour, is the first forty minutes general information about the category and industry knowledge, with the final twenty minutes about their product, plus Q&A? Is it a marketing person or an engineer who is presenting? An engineer will often be able to respond to questions more thoroughly – based on experience in the field.

## Epilogue

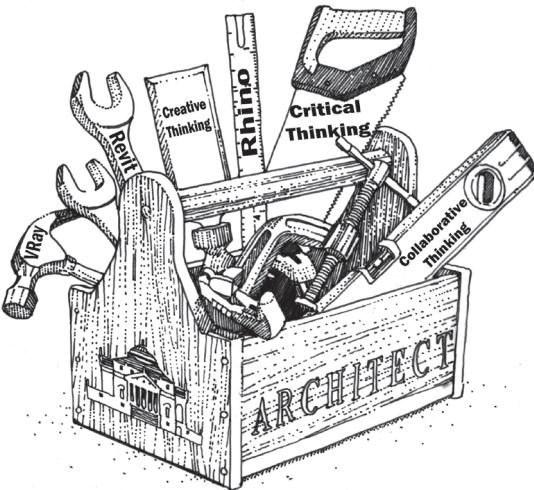


Fig 69.1: Use critical, creative and collaborative thinking to help you get what you want

# A conclusion is simply the place where you got tired of thinking.

– Fortune cookie, New Year's Eve 2019

How do we decide to end? When is a building complete?

Was the Hunters Point Library *complete*? Who decided it was so?

The purpose of this book isn't to ensure that there will be more thinking, just better thinking. If we need to think, I cannot think of a much better way to do so than the way an architect thinks.

The thinking that goes into the design and delivery of buildings all but assures their longevity and impact, and the positive impression they will have on their communities.

A friend decided to work on her Michigan beach house renovation without an architect, explaining that it wasn't rocket science, that she could handle it. I recently asked her how that's going; what, if anything, is missing? Someone who sees the big picture, she said. How everything pieces together. Someone who understands the minute details and the larger overall view; who thinks beyond the immediate situation and keeps others in mind.

Your goal isn't to think. Your goal is to get your building design liked, approved or esteemed. Or to get someone to throw money – and lots of it – or prizes at it. Or to make places where people can afford to live well. Or thrive in their schools or workplaces. To feel at home wherever they are.

Your goal isn't thinking. Thinking, though, is how you get there (that, and some hard work). It's what will help you arrive at your longed-for, long-sought-after goals. To arrive at your goals, you'll have to do some thinking, and there is no better way than to think like an architect.

The goal isn't thinking for the sake of thinking. Or to turn you into a logician or philosopher. The goal is to use thinking to help you get what you want.

Your goal is to be whomever and whatever is needed in the situation you find yourself in.

Sometimes what is needed is someone to take tracing paper out and start sketching while others are talking, describing what needs to happen, or what their preferences are.

Sometimes what is needed is someone who listens, taking in what is said, then reframing it in clear, actionable terms, eliciting a response along the lines of *yes, that's what we meant*.

Sometimes what is needed is someone to walk a client away from doing something potentially catastrophic for the neighbourhood/context/situation/environment.

It's not about what software you use – it's about your personal operating system (OS): your brain hardware and mind software.

No matter what technology or wicked problem comes your way, you will have the wherewithal and intestinal fortitude to respond using the new tools you've acquired.

There is no better OS than one that encourages and enables you to think like an architect.

Aim to be an augmented architect. In this book we've discussed what it means to be able to think critically, creatively and collaboratively.

Time spent improving these mindsets and skillsets will pay dividends throughout your career.

As you make your way through school then practice, return to these often; make them the air you breathe, and the water you swim in.

Wear them like an exoskeleton as you go about your life.

**TRY THIS**

Australian architect and emeritus professor Alec Tzannes uses three pencils. They are all in black casings but they have black, red and blue lead. When he draws freehand to scale, black initiates ideas, blue discusses ideas and red audits. So, use black for creative thinking and initiating ideas, use red for critical thinking and evaluating ideas, and use blue for collaboration, to discuss ideas – who else to work with to communicate your thought process with the office and beyond.

**ASK THIS**

Size up the situation you are entering. What is needed? A helping hand, resource, catalyst for change, provocateur, voice of reason, or clearing-house? Can you provide what is needed here?

**READ THIS**

Read this book over again. This time return to chapters that resonated most with you. Identify what you want to work on next, and how you will go about doing so. Consider this book a career companion you can return to again and again, until you are no longer emerging but a full-fledged design professional.



## 68 Ways To Think Like An Architect

### Critical Thinking

1. Architects need to think of everything.
2. Architects are expected to think both deliberately and intuitively.
3. Architects serve as role models for how to think.
4. If architects were *only* deliberate thinkers, they'd be unemployed, and their buildings would be uninspiring.
5. The benefits of thinking critically like an architect are unlimited.
6. Architects think deliberately about how inhabitants experience their buildings.
7. Critical thinking is a go-to tool.
8. Architects argue effectively by appealing to reason, the emotions and ethics.
9. Buildings can't argue, but their architects can and must.
10. Architects don't wait to evaluate – it happens throughout the design process.
11. Architects use metaphor to provide order and meaning to the built environment.
12. Architects only need to justify their decisions when challenged, but a good critical thinker prepares for this inevitability.

### Facts, Fallacies and Photoshop

13. Architects are like investigative reporters who scrupulously explore details to verify facts.
14. Architects trust, but verify.
15. It is down to the architect to present evidence in support of their design decisions.
16. Architects move from not knowing towards knowing by gathering information.
17. An architect is someone who makes sense of the 10,000 things that go into the making of a building.
18. Architects familiarise themselves with fallacies in thinking so they can catch themselves and others who resort to them.
19. Architects let what they are already familiar with inform what is new and unfamiliar.
20. Architects turn their biases from compulsions to preferences and choices.
21. Instead of over-promising and not delivering, architects under-promise and over-perform.
22. Architects are critical thinkers and avoid attributing outcomes to magical thinking.

## Decision Making

23. Architects have to make or facilitate a series of decisions based on trade-offs.
24. At the start of every project architects ask what is actual, necessary, desirable in order to discover what is possible.
25. Architects improve their design judgement by building their experience, knowledge and intuition.
26. Architects have an unspoken social contract to make life better.
27. Architects understand that their actions have consequences and work to imagine and anticipate what they are.
28. Architects self-edit by focusing not only on the content but on the negative or white space.
29. Architects strive to manage an increasing set of variables and alternatives in their head.
30. Architects strive to be independent thinkers while engaging others in decision making.

## Critical Creative Thinking

31. Architects rely on critical creative thinking to draw on both sides of the brain.
32. Architects don't let everyday problems distract them from addressing major, wicked problems with non-obvious solutions.
33. Architects use their comfort with ambiguity and uncertainty to their and others' advantage.
34. Architects are asked to do impossible things they know nothing about.
35. Architects consider design thinking less a process than a mindset, one that may lead to intangible results.
36. Architects think in a way that is worth studying, preserving and applying to problems large and small.
37. The architect's design process moves a project forward from concept to a piece of architecture.
38. Architects have the confidence to take their project apart if it means improving it as they put it back together.
39. Architects alternate between focused attention and a relaxed state in order to recognise patterns.
40. Architects develop their hunches and intuition at the same time as their rational thinking.
41. Architects think through making, where the two are not separate acts but seen as correlated.
42. Architects see design as a reconciliation of the ideal with real and are influenced by both abstract and practical ideas.

## Curiosity

43. Architects are naturally curious and make an effort to continue to be so throughout their careers.
44. Being open to feedback, change and growth is critical to one's development as an architect.
45. Architects deliberately put themselves into a state of creative ignorance so they can approach problems with an open mind.
46. Architects make a special effort every day to be observant, mindful and alert.
47. Architects care about the quality and character of their questions to ensure their relevance and applicability.
48. Architects ask *What if ...?* to lead to new directions in research and future development.

## Problem Solving

49. Architects are not only creative problem solvers but problem definers and identifiers.
50. Architects see the creative process not linearly or as a circle, but gradually moving forward as an iterative spiral.
51. To remain open to experimentation and discovery architects try not to be attached to a specific outcome.
52. Architects are synthesisers of social, functional, economic, environmental, technical and aesthetic factors.
53. Architects require patience, resilience, perspective and above all perseverance for architecture to happen.
54. Architects think critically and creatively without technology and should be able to do so even more assuredly and quickly with it.
55. Architects should apply their unique way of thinking not only to buildings but to challenges facing society such as poverty, inequality and segregation.

## Critical Collaborative Thinking

56. To achieve the architects' social contract to make life better it helps to work with others.
57. Life experiences prior to becoming an architect should be used and considered a strength.
58. Architects design with others in mind.
59. Because they are comfortable with ambiguity and uncertainty architects are ideally suited to solving wicked problems with others.
60. Architects rely on their intuition to make design decisions; it turns out, so do the best teams.

## Thinking With Others

61. Architects think like others to be more observant while avoiding the pitfalls of drawing faulty conclusions.
62. Project teams possess a collective intelligence above and beyond the intelligence of the individual architect.
63. Architects strive to build, learn and work in cultures that support collaborative problem solving.
64. Architects, by definition, are multidisciplinary generalists.
65. Architects design for resilience and are themselves resilient, remaining agile not fragile throughout their careers.

## Persuasion

66. As with building facades, architects rationalise their subjective ideas by translating them into something relevant, understandable and usable.
67. Architects learn when and how to use emotion when presenting their design ideas.
68. Architects think independently and can't be manipulated or swayed by extrinsic enticements.



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Figure 48.1  
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