

Architectural Drawing: the culture of learning an unstable currency

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Abstract

This paper develops a preliminary map of the contemporary *culture of learning* drawing in UK schools of architecture using Bourdieu's related notions of *field* and *habitus*, as applied in Hodkinson, Biesta and James' 'theory of learning cultures'. In developing this proposition the paper argues that drawing has been the defining currency by which architectural production has developed cultural distinction during the twentieth century, but that information technology is destabilising architectural drawing as the established currency of this culture. Examining the teaching of drawing as a *learning culture* demonstrates that drawing is learnt within an open field of objective forces, that students define their drawing *habitus* in negotiation of these forces, many of which are extraneous to architecture as a distinct cultural practice, and that in their subsequent redefinition of drawing students also redefine something of central importance to how architecture has expressed its exchange-value over the past century.

Keywords

learning cultures, habitus, drawing

Paper

Introduction

The high art of late twentieth century architectural drawing is approaching bankruptcy. Making a parallel between the status of architectural drawing and our society's financial instruments we observe that digital media has generated new forms of financial and architectural currency that loosen the connection between physical matter and its representation and make the exchange-value of currencies increasingly unstable and subject to change. We are increasingly doubtful of what a currency might buy for us. For the student of architecture the worth of learning to draw is unclear; and for the teacher of architecture the unstable nature of architecture's drawn currency makes it increasingly difficult to know whether it is relevant to teach students to draw by hand. The central argument of this paper is that hand drawing, as the creation and interrogation of that which is essential to the intellectual organisation of a building proposition, has been the defining currency of architecture. As the central currency, this mode of drawing practice has been the instrument of order and translation of architectural ideas and also the instrument by which the system of architectural production has been controlled. However, technological change – both in the objective fields of architectural education and in the student learners' operation of that field - are undermining the privileged status of this drawn currency.

In the twentieth century the discipline of drawing was the central instrument of architectural culture and to a great extent how drawing was learnt defined what architecture was understood to be. A dominant architectural culture was prescribed by the discipline of architectural drawing as taught at the school of architecture. In the twenty-first century, digital production facilitates open-source and de-professionalised access to architectural representation, diminishing the value attached to the traditional role of the architect's drawing in the production of architecture. Twenty-first century, digitally fluent, students of architecture are central to this diminution of traditional architectural culture. It is argued here that, in their culture of learning architectural drawing, these students express and exacerbate the tensions in architectural culture that have led to the bankruptcy of its once-primary mode of expression – hand-drawing. This paper puts forward a preliminary map of this 'culture of learning'.¹ Using Pierre Bourdieu,² it theorises this learning culture as a *field* relationship between interleaved objective influences and students' subjective *habitus*. In conceptualising this culture as a field-relationship it argues that students are re-defining the central currency of architectural production - re-positioning drawing from its traditional role as an essentialising discipline, understood through architectural conventions, to become an expanded exchange enabled by a range of digital technologies.

This paper presents its argument in three sections. Firstly it discusses the ongoing technological shift in architectural design methods; from analogue media that represent, to digital methods that simulate proposals; arguing that this shift undermines the central purpose of hand-drawing and drawing conventions in high-architectural culture. It asserts by extension that this shift to simulation undermines the design traditions of high-architectural culture itself. Secondly, the paper explores the role of analogue representation, primarily in the form of hand drawing, as a principal instrument by

which architectural culture has traditionally been made and regulated. As the nature of design media has shifted one is led to ask if analogue drawing does still remain instrumental to the production of architectural culture and how students seeking to learn architecture should now value this form of drawing. The third section explores this latter question by mapping the *culture of learning* drawing students inhabit. This *learning culture* is theorised, after Bourdieu, as a relationship between *field* and *habitus*. Where a set of individual but related fields, each setting a *field* of objective relationships that govern an aspect of drawing practice; are negotiated by each student's *habitus*, the embodied set of inherited and learnt habits that might be seen to constitute an individual. The paper argues that, if we understand this learning culture to be a reflexive field, then students' culture of learning drawing is contributing to the revision of architectural culture.

From representation to simulation

This paper seeks to maintain a neutral position on the place of digital media in contemporary architectural design. It echoes Sherry Turkle's observation that computer simulation offers both 'new ways of knowing and new ways of forgetting' for the design and scientific professions.³ But in exploring the change in values affected by digital media this paper seeks to understand how digital media influences the culture of learning drawing and how the formulation of architectural ideas using digital media can be seen as the underlying cause of instability in the traditional architectural currency of drawing. The paper contends that digital production has caused a change in the role of drawing in design development. This change has shifted the function of drawing from a series of discrete acts of representation: drawing as the distillation and projection of an idea as a form of notation that can be interpreted and executed by others; to a process of modelling where the final execution of a design is rehearsed through the digital simulation of its future reality. This role of simulation is a radical shift in the operative function of drawing in the design process.

A twentieth century formal and modernist understanding of drawing understands it as a practice that conceptualises the essence of an artwork.⁴ This is set out in Philip Rawson's well-established definition of drawing as: 'that element in a work of art which is independent of colour or actual three-dimensional space, the underlying conceptual structure which may be indicated by tone alone'.⁵ Related to this definition is the traditional understanding of drawing as an intermediary process defining relationships that will become implanted in some other art form. Here one thinks of Rudolf Arnheim's account of the drawn structure ordering Pablo Picasso's *Guernica*.⁶ It is these two characteristics of drawing, as intermediary and as conceptual structure, which have been the universal currency of modern architectural culture. Traditionally an education in this culture would be fundamentally incomplete without a thorough understanding of the history, conventions and practice of formal architectural drawing; and central to this education would be the encapsulation of a design proposition - and its underlying conceptual structure - in drawn form. One might see Clark & Pause's publication *Precedents in Architecture*, as the quintessence of this approach to the drawn organisation of architectural form. Here buildings from the high-architectural canon: Palladio, Hawksmoor, van der Rohe, Corbusier, are analysed by a system of related abstractions that, Clark & Pause argue, may

be distilled into a ‘part’ that ‘encapsulates the essential minimum of the design, without which the scheme would not exist, but from which the architecture can be generated’.⁷

This model of design proposition defined by its drawn representation is being usurped by practices of digital simulation. Simulation offers the designer the possibility of bypassing drawing’s traditional purpose. Where drawing might be understood as a reductive search for that which is intellectually essential in a design, for Rawson the independent underlying structure that may be described in ‘tone alone’; simulation approaches the conceptual structuring of architecture in a different manner. Instead the conceptual structure of a design is expressed directly as one or more simulations of a potential reality. Within this simulative process of design the representational role of traditional architectural drawing is diminished and the intermediary role of drawing – between idea and building form - collapsed.

This shift from representation to simulation raises the question of the current and future value of architectural drawing. As the following section will discuss, in the architectural profession drawing unquestionably has currency and has operated, in Pierre Bourdieu’s terms, as a form of social, cultural and economic capital.⁸ But the introduction of a digital design environment is, one might argue, changing the value of this currency. This revision in the role of drawing is perhaps most keenly felt in architecture schools - where architectural students understand their acculturation into a profession as an acquisition of forms of capital and where, this paper argues, those forms of capital have traditionally been expressed as drawn currency. However, the once dominant conception of drawing as ‘underlying conceptual order’ seems of diminishing relevance and the shifting relationship between representative and simulative drawing makes it unclear to students to what purposes they should draw by hand. If architectural space can be conjured into form using SketchUp and quickly revised and reviewed in response to new information; or, if it can be generated from parameters, why draw in order to crystallise an underlying conceptual order? In this environment the tradition of learning and teaching architectural drawing would seem to be increasingly problematic. The impetus towards digital technology undermines the centrality of hand drawing as a generator of design leaving it only as a potential indicator of social distinction. Thus, many students still wish to learn how to draw by hand *like an architect* as part of their accumulation of cultural capital associated with the profession, but they recognise this skill as an adjunct to the more central role of digital representation. In seeking to understand this learning culture of drawing we can develop a clearer sense of the character of contemporary architecture drawing as a conduit for architectural culture and what this learning culture might tell us about the continued relevance, if there is any, of teaching students to draw.

Drawing as an instrument of architectural culture

Before exploring this culture of learning we should first understand the nature of architectural drawing and its privileged place as the principal instrument by which architectural culture has traditionally been made and regulated. Here, this paper argues that drawing has performed three instrumental functions for architecture – as the creative generator of intellectual order, as the medium of translation for architectural artefacts, and as the instrument by which the cultural system of architectural production is controlled.

The traditional practice of architectural drawing, as a manual craft communicated in a language of conventional two and three-dimensional projections,⁹ incorporates a deeper definition of architectural drawing as essential to the formulation of architectural ideas. We might see Clark & Pause's distillation of canonical *partis* as reinforcing this line of thought. Sir Peter Cook follows a similar line, but with a more expansive range in the expression of ideas, in his definition of drawing as: 'the motive force of architecture'.¹⁰ Another distinguished academic of the same generation, Simon Unwin, reinforces this argument by defining architectural drawing not as the production of artefacts but as a process of:

... manual-intellectual activity. [...] the knowledge and understanding 'inhabiting' the performative interchange that is underway while a mind is engaged in drawing.¹¹

In both these quotations we can see drawing as an instrument of intellectual investigation essential for the translation of ideas into architectural form. For Cook drawing carries the motivating ideas for the project – an extension, and enrichment perhaps, of Rawson's more general definition of drawing as the conceptual representation of an artwork.¹² Unwin introduces a different notion of drawing as integral to the creative process of design, where the designer's hand and brain converse in 'performative interchange' through the mark-making activity that is central to the process of hand-drawing. Each statement also encapsulates a key aspect of professional architectural culture that drawing has valorised over the twentieth century. Cook's phrase, and the book for which it provides the title, places drawing as central to the development of twentieth century architecture as an avant-garde practice where the process of drawing makes *paper-architecture* of value in its own right. While Unwin looks to define embodied architectural knowledge, understood through the practice of drawing and expressed in drawing, as the architect's principal – and one might say somewhat magical – currency during the twentieth century. Although these distinguished teachers of architecture give drawing different kinds of value: Cook as expression of the architectural idea, Unwin as origination of the idea, in each case one can read their argument to be that, without drawing, there can be no architecture.

The argument, that without drawing there can be no architecture, is set out in *Translations from Drawing to Building*, Robin Evans' seminal essay of the place of representation in architecture. Evans explains '[d]rawing's hegemony over the architectural object' where drawing is seen as creator of artistic subject matter that 'will exist after the drawing, not before it'¹³ and where, he argues, this subject matter cannot exist without the drawing. In this essay Evans also makes a distinction between art practice, where the medium of expression, be it drawn or otherwise, may be considered a creative end point and artefact in its own right; and architectural practice, where the medium of expression, drawn or otherwise, describes design intentions that are to be executed in a separate artefact, the building.¹⁴ However in the development of architecture as a professional practice that seeks cultural validation as an avant-garde art we see the medium of architectural expression gaining validation as art. We could construct a timeline, originating with the early modernist avant-garde and developing across the twentieth century, demonstrating the development of drawing as a separate activity within architectural discourse. This timeline would reveal a culture of drawing – as a professional skill and autonomous architectural aesthetic – emerging to form a drawn currency by which architecture creates cultural distinction. By the time *Translations from Drawing to Building* was published in 1986

drawing could be understood as both the central medium of architectural discourse and the subject of that discourse. Monographs published at that time on the work of Eisenman, Hejduk, Rossi and Tschumi¹⁵ make a culture of drawing central to this discourse. Each of these architects' monographs can be read as a highly sophisticated manipulation and critique of the tradition orthographic and perspectival conventions; and we might see these works and Evans' essay positioned at the culmination of this timeline, at the high point of drawing's instrumental role as the generator of architectural order and perhaps also the central artefact of architectural culture. It is also at this point in the late 1980s, at the peak in this currency's valuation, that computer-assisted design became professionally viable.¹⁶

Writing twenty-five years later, and in some respects in reaction to now ubiquitous digital design methods, Marco Frascari defends hand-drawing as instrumental to the creation of architectural meaning and perhaps, in his definition of the hand drawn '*fattura*', as a 'facture' with the auratic power to influence the making of buildings. Here he argues more explicitly that architecture and drawing are indivisible. For him: 'Architecture is not a work of art, but the art that makes the work'¹⁷ and this architectural art must be hand-drawn.

Frascari also links drawing explicitly to the formulation of the *habitus* by which architecture is practised. He understands this as a twofold definition of architecture, where a professional *habitus* is formulated by architectural practise and where also architectural practice makes drawings-as-*habitus* that control the process of architectural production. Frascari develops this position from his reading of Bourdieu's *Postface to Panofsky's Gothic Architecture and Scholasticism*,¹⁸ stressing Bourdieu's analysis of drawing in the medieval scriptorium as the development of a regulated and transposable disposition developed through practice.¹⁹ The import of this practice is intensified for Bourdieu by his reading of Gothic art, not as an expression of Godhead or zeitgeist, but as a culture monopolised by one school of teaching where a discipline of pedagogic work first trains the pupil and then, through continued pedagogic work, internalises the practices of that training so that they become a self-perpetuating teaching within this single-minded school of thought.²⁰ Drawing acts here as the medium by which a school of thought is encountered, understood and ultimately embodied. Frascari supports this process positing 'the world of architectural drawings as cosmographic', taking place '...within a Scholastic-like world subjugated by drawing *habitus*, a social making based on a set of bodily operations related to mental schemas'²¹. For Frascari this sense of architectural drawing as a distinct universe includes both the work of drawing as pedagogic but also the resultant drawing itself as a form of *habitus*. He argues that "non-trivial architectural drawings are the result of *habitus* and fall within the framework of *habitus*" and posits Bourdieu's definition of *habitus* as a definition of the architectural drawing itself:

Systems of durable, transposable dispositions, structured structures predisposed to function as structuring structures, that is, as principles which generate and organize practices and representations that can be objectively adapted to their outcomes without presupposing a conscious aiming at ends or an express mastery of the operations necessary in order to attain them.²²

One might see the traditional school of architecture and its studios as inhabiting this traditional cosmography of architectural drawing, where architecture and drawing are indivisible and where the self-perpetuating pedagogic role of learning architecture has been undertaken by drawing. More specifically - within the pre-digital cultural monopoly enjoyed by drawing's 'hegemony over the architectural object' – this role was undertaken by the teaching of hand drawing. It is one step further to position drawing as the social instrument by which the development of a student within a distinct architectural culture occurs.

The symbolic violence of architectural drawing

It is in the learning of it that drawing becomes the social instrument by which the translation into architectural culture is affected. There is nothing more mysterious within Reyner Banham's Black Box of architectural education²³ than the specialised clutch pencils and fetishised 0.05 pens with which students attempt to learn to draw. We have seen from Garry Stevens²⁴ and Helena Webster's²⁵ 'Bourdivin' analyses that the development of the architecture student is a physical embodiment of the cultures and attitudes of the architectural profession. It is clear that Unwin's 'manual-intellectual activity' of drawing must be central to this process of physical embodiment and it is also clear that acts of symbolic violence are occasionally enacted to reinforce this process. Student myths of the public burning of student drawings or the enactment by a tutor of self-induced retching when viewing a first year's first attempted drawing, serve to enforce the norms of architectural culture and demonstrate the role of drawing as the social instrument of architectural order.²⁶

Students of architecture are clearly negotiating a treacherous cultural field; doubly confusing as it is policed by a discipline - the teaching of drawing – that they are finding increasingly difficult to respect as a medium of value to them.

Architectural drawing as late twentieth century cultural currency

From the previous section we can see the central and instrumental role of drawing in the learning and teaching of architecture. Drawing has operated as the central tool for organising architectural ideas, as the mode of pedagogy by which the practice of architecture is embodied by the learner and as the arbiter of skill necessary to be accepted as an accomplished student of architecture. From this, one can understand drawing, and hand drawing in particular, as the central currency of architectural teaching and discourse internal to architecture over the last century or more. We now consider how drawing acts as a medium of exchange for contemporary architectural culture.

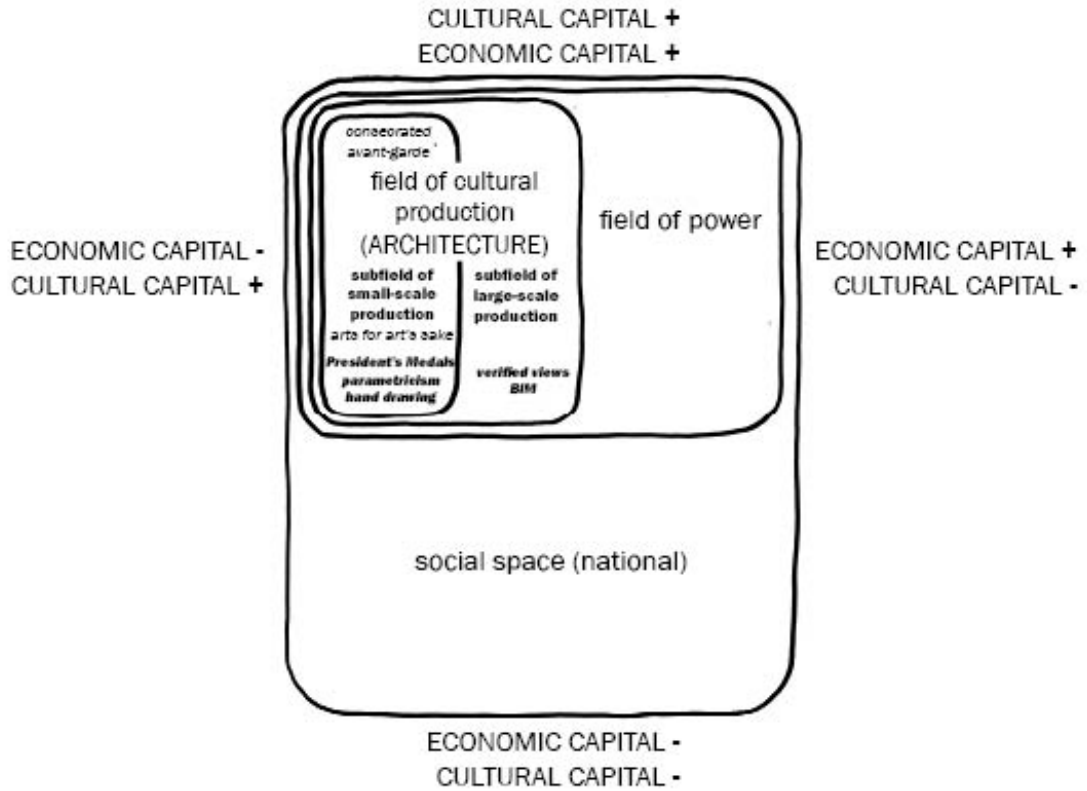


Figure 1. Currencies of architectural drawing located within Pierre Bourdieu's *Field of Cultural Production* (Drawn by the author using Webster, (2011))

Applying Bourdieu's mapping of the 'field of cultural production' in *The Rules of Art*,²⁷ Helena Webster²⁸ makes clear the position of architecture as a contemporary cultural system, in which the architectural profession has developed an autonomous field of cultural power that substantiates itself with its own internal market for symbolic goods. Figure 1 above illustrates how this cultural system includes smaller fractional groups of *distinction* that coalesce around poles of economic and cultural capital.²⁹ This Figure also proposes forms of drawn currency as central to the expression of these groupings³⁰. The RIBA President's Medals, for example, can be seen as a fractional field of small-scale restricted production that awards the shortlisted students an immediate resource of high cultural capital but little in terms of economic capital. Within the cultural system of architecture it is "art for art's sake" or production for producers.³¹ Students whose projects are awarded this high symbolic value often achieve a level of digital expertise that promises financial rewards in a fractional field that values wholly different forms of capital. This is the fractional field of large-scale architectural production that meets the immediate needs of the external market with products of high short-term profit, but where symbolic value is less necessary (here one might think of the computer-generated view verifiable for purposes of planning submission).

These fractions of the field of architectural culture are expressed in distinct approaches to drawing and one can argue that the ongoing revolution in computer-aided design amplifies the distinction between these different practices within architectural culture. At both the small and large scale, digital production expands the speed and range of expression available to the image-maker and encourages

practises of high *art for art's sake* and *art for market* to engage in competitions of techno-digital virtuosity. Each becomes a more separately distinct mode of architectural image production where the connection to a physical reality of building is reduced or removed; so that, in the fractional field occupied by the RIBA President's Medals, a digital animation *is* architecture and in the fractional field of large-scale architectural production the developer's image *is* architecture, produced prior to design development as places are 'commodified through pre-emptive imagery'.³²

The expression of distinction through approach to computer-aided design can be paralleled by Bourdieu's study of the social impact of the popular consumption of technological advances in photography in the mid-1960s. Bourdieu's social study of French camera clubs³³ - experimenting with a newly accessible film and printing technology - showed how 'photographic practices were a 'register' of social position'.³⁴ In this development of distinction those with more cultural, economic and social capital play the game of pure aesthetics, while those with less symbolic capital pursue a resource-bound aesthetic.³⁵ The middle class seeks social distinction in prints of artfully composed photographs, the working class in the resolution of technical problems of film and print. If digital design replaces the camera technology we can make a parallel with contemporary architectural practice, and, we can see architectural clubs forming in relation to similar aesthetic polarities. The elite celebrate the aesthetics of parametricism as pure expression of social distinction whilst the workaday professionals discuss how technology can facilitate everyday pragmatics of Building Information Management.

Drawing remains the central currency of architectural production. Digital technology has made the expressions of this currency more different and extreme. The architectural drawing as artefact can be seen as an expression of social distinction within the contemporary cultural field of architecture and practices of drawing are driven by the forms of capital accumulated within this field. The realisation of this brings a further set of pressures to bear on the architectural student. The value, in the professional market place, of their drawn currency demands increasingly distinct manipulations of computer drawing software that separate from and privilege the value of image-making above the design of buildings. This process is supported by drawing's traditional role in architecture as generator of intellectual order but it is also contradictory to it. The role of drawing as creator of an underlying conceptual form seems increasingly separated from the contemporary architectural culture's requirements of drawing as a speculative, and Spectacularised, image-making process.³⁶

The culture of learning drawing

The third section of this paper seeks to understand how students conceive architectural drawing. Here we understand drawing to be something created by students within a field of objective pressures and subjective actions that come together in their learning of it. The contention here is that this field is contradictory and unclear on the exchange value that drawing now has for the learner of architecture.

Using Bourdieu, educationalists Hodkinson, Biesta and James have theorised a learning culture as a space formed at the inter-leaving of a number of related *fields*, where boundaries of the learning culture do not encompass the boundaries of its constituent cultural *fields* and where the *fields*

themselves are changeable over time, both by their very nature and due to the possibility of external intervention.³⁷ Transferring this to the learning culture of architectural drawing, we can identify these inter-leaved objective *fields* as the institutional/professional field and the institutional/academic – these two playing out issues of symbolic value discussed earlier. To this we might add a financially driven field of professional practice, itself influenced by separate globalizing and governmental fields – all of which are operating within a fast-changing technological field. These objective fields are drawn together by the problem of learning to draw and interconnect creating a complex set of pressures and influences within which this learning takes place. These various objective pressures might be understood as a force field, which Bourdieu has described as magnetic fields or systems of power lines which in their opposition or combination determine the specific structure of a cultural field at a given moment in time.³⁸ As in a force field the actors within this relational matrix affect its constitution. Thus the students add a further layer, firstly in their individual subjective agency; and secondly the secondary learned habitus of what they should *be* in order to study architecture.³⁹ Thus the culture of learning drawing is formulated as shifting interplay of objective and social conditions. The student of architectural drawing is an active agent in this culture of learning. Their *habitus* is formed by the social system of architectural culture, forms the culture and is the viewpoint from which the future cultural meaning of architecture is proposed. If then, as argued above, architectural drawing can be seen as indivisible from architectural culture, yet architectural drawing is now an increasingly unstable currency changed by digital simulation; what then does the culture of learning drawing tell us about the contemporary field of architectural culture?

The student *habitus* is negotiating a professional/institutional field that is fractioned into an employment market valuing CAD, and soon Building Information Management [BIM] practices, as a means of enhancing economic value; and a professional body torn between the protection of its cultural capital and the fulfilment of practice's requirements that architectural schools train CAD/BIM literate prospective employees. We can find insights into this *field* of practice within which a graduating student is expected to operate. Nigel Davis' website 'Eat your CAD' offers web-logs on the state of the industry and the graduates' increasingly subservient role in the production of buildings:

Here's how you place a line (click, click), here's how you delete (click) and here's how you print (click, click, click, click, click, click). Now off you go and earn us some cash. This is all well and good, and I'm sure the drawings are being delivered, but long-term we have created an army of the living dead.⁴⁰

As an Information Technology Manager, Davis has also bemoaned the lack of training for new employees and the inefficiencies this ignorance leads to. In an earlier blog post he noted that '[a]rchitectural drawings are produced by architects; the role of the architectural technician has, on the whole, diminished gradually to where they are now a rarity' but notes that the 'cost effective' graduate expected to do this job, has neither the 'technical expertise' nor the training in 'drawing presentation basic' to produce these drawings.⁴¹ Although this post is a decade old and perhaps historical in its description of graduate expertise, categorisation of the trainee/graduate student as a low-cost, technically enabled operator would seem to remain pertinent. Here one might characterise architectural practice as a *field* that is operating an ever-narrowing definition of the cultural capital it deems worthy of financial reward and as a *field* dissatisfied by the lack of economic value it perceives

it is offered by new graduates recruited from architectural school. Yet this dissatisfaction itself finds two contradictory problems with contemporary architectural training – that students are not trained to operate computers and also not trained to think through the act of drawing in traditional way architecture has previously expected.⁴²

Meanwhile in academia Evan's hegemony of the drawing has fragmented. A survey of literature associated with the place of CAD in the *field* of architecture as an academic discipline shows two inter-linked areas of discussion. The first category of thinking considers how CAD, as a design practice, might affect more traditional practices of design. This could be considered to be a debate internal to architectural culture and sees academics assessing the effects CAD practice may have on architecture's cultural capital. The second category sees academics looking outside the institution to assess CAD's impact on the field of architectural practice and how teaching will be changed by this new influence.

In her essay 'Subverting the Silicon' Deanna Petherbridge outlines the problematic relationship between CAD and traditional hand-drawing practice.⁴³ She notes an essential difference between a hand drawing – quick, fixed and complete at the moment it is committed to paper and needing a secondary interrogatory process of design in order to creatively progress – and the computer-drawn sketch that is 'seamlessly usurped into the system, even as it is generated'.⁴⁴ The hand-drawn sketch is a 'mind-diagram' which is both an open-ended stimulus to further creative thinking and which can also encompass the comprehensive statement of an idea; whereas the computer drawing is always both incremental and single-minded in its attitude. As Petherbridge observes:

To assert the importance of hand drawing in relation to the computer-as-tool is to demystify the computer and to reassert the importance of critical creativity.⁴⁵

This perceived schism between the essential qualities of the sketch and the computer drawing is explored and reinforced by others researching CAD and the nature of design. In their consideration of the computability of design Kalay, Swerdloff and Majkowski take care to stress the 'inherent distinctions between design and computation' noting the 'ill-defined practices such as creativity, judgement and intuition' used in design.⁴⁶ More recent works by Kalay continue this distinction noting that, while Information Technology will infuse the construction industry, the need for an architect's creative vision' will remain.⁴⁷ Brian Edwards' interviews with ten leading UK-based architects also support the view that creative leadership – as expressed through the development of a design idea – is somehow separate from CAD practice.⁴⁸ As an academic study of the attitude to drawing amongst some of the UK's most revered contemporary practitioners this study provides insight into the intersection between the practice and teaching of architecture. Edwards takes from this analysis and understanding that drawing and designing are intimately linked, citing Lawson and Schon.^{49 50} He then makes clear a distinction between design activity and CAD stating that for '[a]ll the architects interviewed [... . . .] CAD remains, in spite of considerable software development, a drawing and testing tool rather than a design aid'.⁵¹ He also notes that one large Edinburgh practice 'preferred to recruit new staff from Europe because they were still trained to think through traditional drawing'.⁵² Suwa and Tversky give a similar preference to thinking and hand-drawing in their psychological 'protocol analysis' of the connection between freehand sketching and the formulation of

the design idea in architects' and students' sketches.⁵³ They find that the sketches formed a 'perceptual interface' through which designers discover underlying non-visual relationships and go on to suggest that a CAD sketching tool would need to enrich perception in a similar fashion.⁵⁴ Work contemporary with this by Lawson and Loke and an earlier study by Negroponte follow a similar line of thinking and take the supposedly illogical nature of design as their starting point for a possible computer-assisted tool modelled to support this complex mode of thinking.^{55 56} Writing at the infancy of CAD development, Negroponte identifies a need for CAD sketch tools to develop a memory fuzziness 'consonant with design development, gaining crispness over time, developing consistently and analogous to the passage from a 6B to a 6H pencil'.⁵⁷ While Lawson and Loke reject the place for computer-aided drawing in the design stage of a project:

... there remains virtually no evidence of the widespread use of computer graphics to enhance creativity in three-dimensional design. Today most designers have a computer, and many use them for producing drawings, but not for designing.⁵⁸

Thus we find a literature exploring the relationship between CAD and the tradition of design that continues to privilege the tradition of the hand-sketches creative act over the CAD execution of a project. We look now at how literature more directly concerned with the teaching of CAD relates to this schism between sketch and computer.

One strand of discussion argues the need for the teaching of critical reflection on communication media so that the learner is equipped with tools for the qualitative assessment of computer-generated work. Sylvester and Tripp see this as teaching the authenticity of drawn communication. '[A] thorough generalist course of eye training and drawing if [architects] are to use any technique'⁵⁹, which is taught by hand-drawing from "direct observation and experience'.⁶⁰ Less didactic is Mark Gross' proposal for a three-part framework for computer teaching that includes 'tool using, tool building and theory, methods and computation'.⁶¹ The latter part intends 'to promote a sense of scepticism and doubt' so that students think critically about the role of the computer in their work.⁶²

One is tempted to categorise the literature around this topic as a chronological reaction to the increasing prevalence of CAD. In the literature surveyed academic papers coalesce at different positions on CAD education: a group in the early-to-mid 1990s (as just discussed) investigating the introduction of CAD to schools of architecture; and a post millennium grouping that questions the qualitative effects CAD has on design teaching. We also find, within the earlier cycle, papers that discuss CAD as an integral element in an explicit architectural pedagogy. Cigolle and Coleman use the potential for transformative geometries that CAD offers to generate student projects that merge precedents from architectural history into new hybrid buildings.⁶³ While Madrazo reports on the ETH Zürich course introducing CAD to new undergraduates, beginning in 1990, which introduces computing in parallel with the teaching of a grammar for the development of building-form.⁶⁴ Lewis and Knight report from the Welsh School and the Liverpool schools of Architecture respectively on IT development in a UK-context.^{65 66} All these reports convey a pioneering spirit in the instigation of a new curriculum and are not positioned to reflect on the impact of CAD on design teaching. More recent academic literature has the benefit of hindsight and uses this to reflect on the impact of CAD on

learning and teaching. In two papers, Basa and Senyapili study attitudes to CAD drawing amongst teachers and learners at Bilkent University.⁶⁷ They find, in the Turkish learning context, that both instructors and students ‘seem to acknowledge the assets of the meticulous computerised presentations while preserving their choice for the artistic warmth of the hand’.⁶⁸ Conversely, in a Scottish learning context, Hanna and Barber⁶⁹ find a positive response amongst students to the use of CAD as a design tool. They find that students can proceed in acts of design without sketching by modifying their design approach – a relatively rare positive linkage between CAD and creative design thinking.

Thus we find a learning and teaching field seeking to teach CAD with an element of critical reflection and to incorporate CAD into the tradition field of the architect’s cultural capital. To achieve this, teaching models are developed that either include CAD as part of a theoretical architectural position from within which CAD can be theoretically placed,⁷⁰ or ensure the teaching includes an element of qualitative evaluation of computer practice that takes it’s framework of values, again, from within the traditional field of the architect’s cultural capital.⁷¹ Thus students learn to draw within an academic institutional field set between conflicting cultural charges – one polarity re-asserting the ‘critical creativity’ of the hand-drawn and the continued need for hand drawing in practice,⁷² another polarity asserting the digital tectonic.⁷³

A different polarity is also emerging at the confluence between the academic-institutional field, the technological field of information technology and the commercial field of construction. This polarity requires the teaching of BIM in UK schools of architecture, as directed by central government strategy.⁷⁴ In her survey of *BIM in Academia*, Peggy Deamer notes architectural education as ‘the “elephant in the room”’ that remains undiscussed in the debate over a new ethos for the education of built environment professionals.⁷⁵ This influence raises questions critical of other aspects of the culture of learning drawing. It implies a need for shared literacy in software, a collaborative distribution of drawing authorship and a re-evaluation of the teacher’s role as facilitator that challenge the signatory role of drawing in design.⁷⁶

Influencing all these fields is the globalising effect of the Network Society where generic geographically specific labour is replaced by highly-skilled self-programmable labour non-specific to place. As Brown and Lauder have shown this places a further objective pressure on this field as students realise they compete for specialised work within a global market.⁷⁷

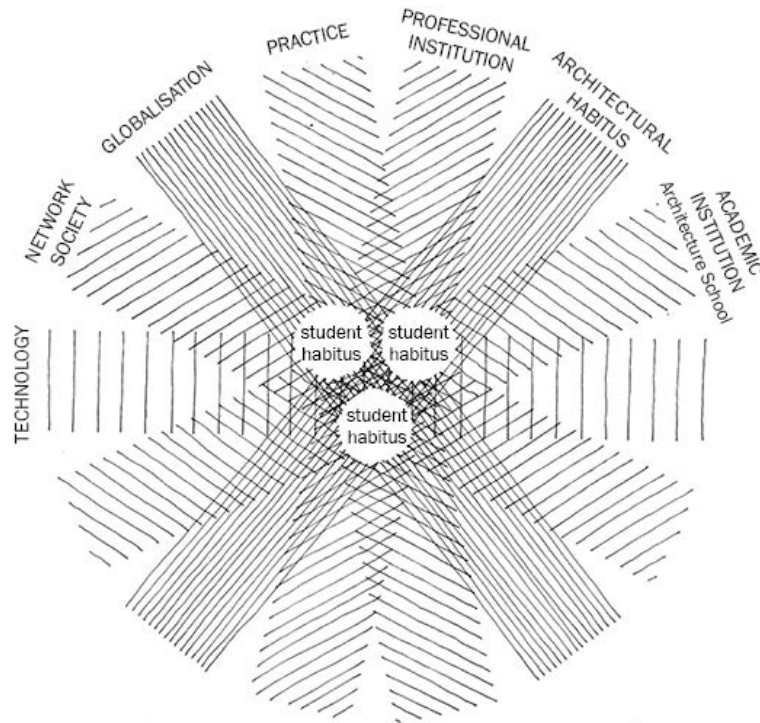


Figure 2. A preliminary map of the culture of learning architectural drawing (Drawn by the author)

In Figure 2 above we see the student *habitus* set within the interleaved objective fields we have mapped out above. For Bourdieu, this field of relationships is objectified in the production of symbolic capital, which can be economic, social and cultural in nature, but which will ultimately shape an economic consequence.⁷⁸ Hodkinson, Biesta and James liken this conception of a *field* to a ‘market’ or ‘game’ where there is ‘inequality but also mutual dependency’⁷⁹ and where customers use their purchasing power – be it ‘economic capital, [...] social capital (for example, who you know and who knows you) or cultural capital (for example, knowing the deeper and often less obvious ways in which the field works)’⁸⁰ – to maintain and increase their social value. All three forms of symbolic capital can be valorised within the field although, for Bourdieu, this is a ‘misrecognition’ of the economic value as the cultural value – for ultimately the value of all societal relations are measured as economic capacity. In illustration of this, Grenfell and James offer the example of the misrecognition of the social and cultural capital of good schooling as individual talent;⁸¹ as an alternative we might try a CAD-related analogy:

The successful architect’s son seeks advice from his father’s office on the most appropriate rendering package for his student-work and a new ‘MacBook Pro’ is bought through the Practice’s books ready for the boy’s next university assignment.

In this, this author’s, fictitious example, social and economic symbolic capital has been employed on the architectural field of play and is misrecognised as cultural capital. Or, to put it crudely - *the boy*

with the biggest machine and the social wherewithal to exploit it gets the best degree – and the job that financially rewards this accumulation of symbolic capital. The gendering of this analogy is intended. FutureLab’s extended research into teenager’s attitudes to and use of digital technologies⁸² has shown that gender roles are also embodied in the developing secondary *habitus*. As part of this initiative, Facer, Sutherland, Furlong and Furlong have found that computer expertise becomes a gendered issue as children enter adolescence. Here digital technologies are appropriated and used within an already existing framework of social and cultural beliefs.⁸³ Computer expertise amongst boys, predominantly developed in ‘games play as performance’, acts as the mediator for the construction of friendship and development of a Bourdieusian ‘distinction’ in the boys’ understanding and conversation about technology - a mode of operation downplayed by girls.⁸⁴

Thus we see learners bringing a primary accumulation of cultural, economic and social (including gender-related) capital to their first engagement with the culture of learning architectural drawing. Also, as they first engage with this learning culture, they also engage with the secondary habitus of architectural student-hood, which Garry Stevens describes as not only, the development of ‘institutionalised cultural capital’ of the architectural diploma but equally, the development of the architecture student as ‘*embodied capital*’ – that is, the physical embodiment of the culture and attitudes of the architectural profession.⁸⁵ Using Bourdieu, Stevens sees the architectural profession as a social class that compensates for its limited economic power by accumulating cultural capital both in terms of consumption and by teaching students to *be* architects. He identifies the Design Studio as architectural pedagogy’s traditional site for this ritual embodiment of cultural capital and describes the traits of the resultant *architectural habitus* as ‘“genius” [...] and a “cultivated” disposition’.⁸⁶ As the mechanism by which the *architectural habitus* is formed, Stevens sees ‘the studio system [acting] as a particularly effective social filter, ensuring that only students with the right sort of social being pass through the system to graduate’.⁸⁷ One might also see the preferred books of the student-Studio as central to this formulation of *habitus* and here it is interesting to note the recent Studio *livre du jour* Juhani Pallasmaa’s *The Thinking Hand: existential and embodied wisdom in architecture*.⁸⁸ The title suffix of which seemingly acknowledges a search for a traditional form cultural capital protected from the destabilised currencies that architects now deal in.

Unstable currency

In a unitary cultural field – such as *Architecture* in this investigation – Bourdieu sees the role of the creative project as an exercise in the conservation of symbolic capital:

The school is required to perpetuate and transmit the capital of consecrated signs, that is, the culture handed down to it by the intellectual creators of the past, and to mould to a practice in accordance with the models of that culture a public assailed by conflicting, schismatic or heretical messages – for example, in our society, modern communication media. Further it is obliged to establish and define systematically the sphere of orthodox culture and the sphere of heretical culture. Simultaneously it defends consecrated culture against the continual challenge

offered by the existence of new creators (or by deliberate provocation on their part) who can arouse in the public (and particularly in the intellectual classes) new demands and rebellious doubts).⁸⁹

Here Bourdieu describes what happens in a unitary cultural field, perhaps the monopole school of Gothic scholasticism we encountered earlier, where a cultural project perpetuates itself through the delivery of its consecrated pedagogy. This paper has described the position of architectural drawing as just such a system of ‘consecrated signs’ that has performed an instrumental role as generator of intellectual order, medium of translation, and tool for pedagogic discipline for the creative project of high architectural culture. But it is argued here that the *culture of learning* architectural drawing that students of architecture experience and contribute to challenges what was once a monovalent and consecrated currency. The sketch presented here shows the contemporary culture of learning drawing to be an open *field* of inter-connected forces, many of these driven by technological change, that introduce ‘conflicting, schismatic and heretical’ approaches to drawing; and the paper posits a student *habitus* that encounters architectural drawing equipped with digital technology and able to comprehend variegated economic, cultural and social capital assigned to different drawing mediums. We have seen how architecture adopts aspects of this technological change in order to further the *distinction* of high architectural culture. To this end digital specialisms create fractional fields within architectural culture that emphasise economic or symbolic value; and which, in their pursuit of digital distinction amplify the separation between architecture as the manufacture of image and architecture as a drawn projection of an underlying conceptual order.

A monovalent architectural culture has been dismantled by postmodern plurality, globalisation and digital technology and there is no longer one school at work in the production of architectural culture. Indeed there is a proliferation of schools of teaching, often expressed in a specific approach to drawing. The digital generation of architectural students accesses this proliferation of drawing pedagogies as an aspect of the *culture of learning* drawing they operate within. Perhaps, as she negotiates this learning culture, the teacher of architecture senses the unstable value of traditional architectural drawing more acutely than the student. Sherry Turkle has argued that all professions have a ‘sacred space’ and that drawing is one such zone for the architect.⁹⁰ Arguably, a teacher has a responsibility to lead students into an understanding of that which has been absolutely central to the operation of an intellectual field. But how does one lead students into a critical understanding of a (de)consecrated space? Understanding contemporary architectural drawing as a ‘culture of learning’ may help us do this by placing the tradition of architectural drawing within an expanded field of drawing currencies students encounter and value. Conceiving a ‘culture of learning’ drawing also challenges us to re-evaluate students’ contribution to architectural knowledge and, particularly when drawing has been the essential and consecrated a system within architectural culture, recognise students’ learning of drawing as a valid critique of architectural knowledge. If, following Bourdieu, we understand learning as a reflexive construction affected both by the interplay of objective forces and the *habitus*’ negotiation of those forces then we should acknowledge students’ social construction of architectural drawing as a culture that both learner and teacher now actively participate in.

An epilogue for architects' hand drawing

More often than not, when presenting and discussing this topic with colleagues and practitioners the conversation takes a frustrated and melancholic turn. There is a frustration that young people these days 'do not know how to draw' and that something innate in their understanding of the craft of architecture is missing. Sometimes this *thing* that is perceived to be missing is discussed as a version of Unwin's 'performative interchange' between brain and paper, or the concern is that without a somatic sense of it a design cannot be fully understood.⁹¹ Alternatively the thing missing is seen as a rigorous ordering of form that can only be instilled in a project by the iterative interrogation of a design using orthographic conventions. Often the discussion leads to a shared architects' melancholia for this *thing that is lost*, perhaps even regret that, without drawing, architecture itself is lost. Aggravating this mawkish humour architects look to retain hand drawing as an aspect of discourse internal to their profession. A secret currency only they may use to communicate with other architects. Framing architectural drawing as a *learning culture* changes the terms of this discussion.

The students' drawing *habitus* suggests that the teacher of traditional architectural drawing is now teaching a system of communication that is stripped of its once universal value. (Given the symbolic violence students have encountered in their learning of this system this devaluation might not be wholly negative). Instead the tradition of hand drawing is repositioned as one of a range of drawn digital and analogue currencies students encounter within a learning culture that may be understood as an interplay between open field of objective forces and students' negotiation of these forces. This suggests a shift in the pedagogy of teaching drawing from an approach that employs drawing as the principal instrument by which architectural culture is made and regulated to an approach where drawing is introduced as the tool with which aspects of architectural pedagogy are explored – always mindful that, in architecture, drawing has been much more than that.

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