From 'disrupting' traditional knowledge production to exploring expanded possibilities, architectural design research now enters a confident third phase, with capabilities to embrace new 'disruptions' to architectural knowledge production.

Disrupting design research in architecture: Speculating on the third phase of architectural design research

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Design research in architecture has significantly evolved in the last three decades. The term architectural design research refers to the process of systematic investigation in which architectural design is a central component of the research method and/or its outcomes.[1] As Murray Fraser (2021) describes, this type of research foregrounds the possibilities for media, tools, and techniques in designing and making, such as drawing, modelling, and writing – tools that are used in both the educational studio and practice – to inform the research itself.[2] This essay traces a historical lineage of architectural design research in order to speculate on its contemporary trajectories. Building on the evolution of architectural design research as a discourse,[3] this essay investigates two interrelated threads. The first thread provides an overview of significant moments in the history of architectural design research within the academic fields of the UK and Western Europe, drawing on relevant literature. The second thread focuses on the book *SMLXL* (1995) by OMA and how it coincided with the emergence of the architectural design research discourse in academia. The essay demonstrates how the medium of this book marked an important moment for design research. It is argued that *SMLXL* offered a precedent that contributed to a re-organization of architectural design knowledge and coincided with what was later defined as the early phase of systemized design research in architecture.

To explore this, the notion of hypermediation developed by media theorists Richard Grusin and Jay David Bolter, as well as Michel Serres' reading of signal and noise in *The Parasite*, will be used to re-consider how *SMLXL* systematically re-organized the three fields in which architectural knowledge is conventionally generated: practice, research, and pedagogy. The essay concludes by speculating on a similar paradigmatic turning point for

design research that we are facing today. With the emergence of A.I. image generators and their expanding impact on architectural design, through examples such as Midjourney and DALL-E, the field is confronted with a new horizon. If the birth of architectural design research was ushered in by a hypermediated format whose multiple narratives were co-constructed by the reader/viewer, new media, such as A.I. technologies, signal a phase of post-mediation that challenges the very authorship of the architect. The essay ends by speculating on the role of architectural design research at a time when the very agency of the architect is challenged by such an outside.

Design research, a very short history
Architectural design research refers to the process of making original investigations – through generative and propositional modes of producing work in which researchers interactively use and reflect upon methods associated with design and practice – for critical inquiry. This mode of research utilizes multiple media such as drawing, modelling, and other creative tools commonly used in architectural design studio and practice.[4] The use of multiple media has expanded research methodologies, offering more dynamic interpretations of Donald Schön's 'the reflective practitioner'.[5] Design research has changed the landscape of architectural knowledge by bringing 'academic' architectural research in closer proximity to design practices while considering the irreducible complexity of what constitutes architectural knowledge.[6] This shift has transformed how architectural knowledge is produced, disrupting the established systematization of academic architectural research. Through architectural design research the relations between research, practice, and pedagogy continue to be redefined.[7] To understand these intertwined relations, it is useful to outline a brief history of architectural design research.

Architecture and Early Formations of Design as a Research Discipline
The origins of architectural design research are contested. While the term 'design research' was first mentioned in Eliel Saarinen's 1943 book *The City*,[8] it wasn't until the 1990s that its application in architecture began to formalize within academia.[9] The pursuit of design as a scientific field and methodology for research gained significant momentum in the second half of the 20th century. These aspirations were reflected in the design methods movement of the 1960s, advocated by Geoffrey Broadbent, John Christopher Jones, and Christopher Alexander under the framework of 'design as science.' This movement led efforts to externalize the design process to make it controllable, systematic and rational.[10] These initiatives expanded the debate on establishing design as a distinct discipline and were accompanied by the founding of the Design Research Society (DRS) in 1970s.[11]

Although architectural design was a small branch under the bigger umbrella of design methods, there was a general push during this period to make architecture more objective and scientific. Following the RIBA's influential 1958 Oxford Conference on architectural education, masterminded by Sir Leslie Martin, architectural education became integrated into universities, establishing its legitimacy by adopting the traits of an academic discipline and developing a coherent body of architectural research rooted in the scientific tradition.[12]

The design methods movement was short-lived, facing a backlash in the 1970s against its underlying values. Architects in particular, and notably, some early pioneers of the movement like Christopher Alexander, criticized design methods for being overly reductive and incapable of addressing the complexity of real-world issues.[13] They argued that design science and organisations like the Design Research Society were too narrowly focused to be of much relevance to architectural design.[14] Meanwhile, in practice, the seeds of architectural design research began to germinate in the work of radical architect Cedric Price, who ran his office more like a research laboratory than a conventional architectural practice. Around the same time, other early examples of architectural design research emerged, including the speculative experimental practices of Archigram, Superstudio, and others.

The period from the 1980s to the 1990s saw significant development in design research marked by the growth of research-based journals in the design world. Notable examples include *Design Studies*, launched in 1979; *Design Issues* first published in 1984; *The Journal of Design History*, established in 1988; *Research in Engineering Design* in 1989, and *Languages of Design* in 1992.[15] During this time, Bruce Archer and Nigel Cross were pivotal figures, advocating for design as a 'third culture' of knowledge, distinct from the two established cultural fields, science and arts. Cross argued in various publications, including his seminal 1982 paper, for 'Designerly ways of knowing' as unique methods and epistemologies distinct from those of science or the arts.[16] With a stronger architectural focus, architect, academic, and psychologist Bryan Lawson conducted observational studies on how architects think, the decision-making processes in design, and the interplay between human behaviour and architectural environments.[17] Despite these contributions, such efforts did not gain significant traction within mainstream architectural academia. Instead, attempts were made to 'academicize' the architectural discipline by adopting methods from established models in other fields to legitimize itself as a latecomer to academia. During this time, established architectural knowledge depended on external validation from other disciplines to secure its place within academia. Research in architecture often relied on importing knowledge from fields such as the humanities, sciences, and social sciences. For these established academic disciplines, design practice was often regarded as a form of applied science.

Consequently, architectural researchers were expected to distance themselves from their professional backgrounds as designers in order to be accepted into the academic research community.[18]

Against this backdrop, multiple voices in the UK and Western Europe emerged in the 1990s, criticizing academic architectural research for its reliance on disciplines outside of architecture. Those critiques rekindled interest in design practices as the core of the architectural discipline and its research, leading to efforts to establish a clearer definition of design-based research in architecture. This moment marked the initial formalization of design research in architecture, signalling the beginning of its quest for legitimacy within academia.

Seeking legitimacy: The first phase of design research in architecture
The 1990s saw a series of research initiatives and events in the UK and Western Europe that documented a growing awareness among practitioners, educators, and researchers of the need for a mode of inquiry specifically tailored to architecture's modus operandi. [19] In the UK, Christopher Frayling's essay 'Research in Art and Design' marked a significant moment in the history of design research. Frayling's definition of research *through* design was foundational in shaping a new approach for the design fields in general and architecture in particular. [20]

In parallel, a series of conferences held at TU Delft and Sint-Lucas School of Architecture in the late 1990s highlighted the growing recognition of the disparity between design and architectural research. Events such as the European Association for Architect Educations (EAAE) conference on 'Doctorates in Design + Architecture' (1996) questioned the scientific status and autonomy of design research. [21] While these conferences sparked renewed interest in design-based research in architecture beyond conventional academic frameworks, they also ignited debates about the validity of this new research method. These discussions revealed the challenges of establishing clear boundaries and values specific to the discipline of architecture. Other events explored the potential for developing doctoral scholarship in architectural design and the criteria for evaluating such work. Despite acknowledging the obstacles facing architectural design research, this period fostered a positive outlook, focusing on creating opportunities and finding pathways for architectural design research to thrive within academia. Meanwhile in the UK, the first issues of newly established architectural refereed journals – the *Architectural Research Quarterly* (established in 1995) and the *Journal of Architecture* (launched by the RIBA in 1996) – were preoccupied with the status of design as research in architecture. Under the banner 'can architectural design be considered research?' these journals sparked debates about how the architectural design process and its outcomes might be classified as research. The discussions also explored the pedagogical,

bureaucratic, and practical challenges of integrating architectural design as a form of research within the academic research framework.[22]

A key catalyst for the debates around design research in architecture during this period was the establishment of the Research Assessment Exercise (RAE) in the UK (later renamed the Research Excellence Framework, or REF). This funding mechanism for British universities relied on evaluating research productivity, which significantly impacted how design research was perceived and assessed.[23] With this new mechanism, schools of architecture faced a predicament: design studios and their modes of practice, which are central to knowledge production in architectural schools, might not be considered valid forms of research for this assessment. Such research was deemed 'research with a lowercase r' due to its association with more informal and personal processes of enquiry that lacked accessibility and transferability of knowledge.[24] This kind of 'research' rarely held much currency or authority in formal academic inquiry and was therefore not considered as legitimate for the purposes of the RAE.[25] With this serious challenge to the architectural discipline, particularly research and pedagogy, design research was crucial in terms of mediating the relationality between practice, research, and pedagogy. This changed how the architectural discipline would consider design. As a mode of producing architectural knowledge that stems from practice and education, design research would gain legitimacy within academia, carving out more space as an accepted form of research.

The events and research initiatives of the 1990s provided platforms for architectural researchers and educators to explore opportunities for knowledge production at the intersections of academic research, pedagogy, and practice. This period marked the beginning of a 'formalized' disruption to the traditional modes of systematic knowledge production in architectural academia, signalling the first phase of design research in the field.

Proto forms of architectural design research
Before the formalization of design research in architecture, the production of architectural knowledge relied on rigid distinctions between practice and research. In contrast, the architectural book served as a common platform that interconnected practice, research, and pedagogy. As Jonathan Hale states, '[architectural design research] is within a tradition that has been intrinsic to what architects have done for five hundred years [...] through the architectural book'.[26] Retrospectively, various forms of early 'architectural design research' can be recognized in the work of renowned figures from architectural history, whose knowledge creation was deeply rooted in their architectural projects and design practices, often manifesting through a particular medium: the architectural book. Considering, for example, Jean-Nicolas-Louis Durand, Eugène Viollet-le-Duc, Le Corbusier, or Zaha Hadid.[27]

While the architectural book did not directly inform the systematization of an architectural design research discourse, certain moments, such as the paradigmatic shift in the architectural book by OMA in *Delirious New York* (1978) and *SMLXL* (1995), helped jumpstart architectural design research.[28] The latter, specifically, coincided with the formation of the first phase of systematized design research in architecture.

SMLXL, hyper-mediation and noise

The architectural book is a loosely defined medium due to its diversity in terms of historicity, content, and the relations between image and text. Here we would like to approach the architecture book as a mediator between design projects and writing. As Murray Fraser states, 'a particular concern is the implications for the potential methodology of design research in its task of interweaving projects (design) with texts or books (writing).'[29] The period that coincides with the first phase of design research is the early to mid-1990s. What defines the architectural book during this early phase of design research? OMA's seminal *SMLXL* (1995) serves as the exemplary case study to address this question. *SMLXL* has been widely discussed for its impact on architectural practice, pedagogy and research. Upon its publication, the graphic imagery of the book, co-designed by OMA and Bruce Mau, made a significant visual impact within the field. It is argued that the medium of the architectural book – in this case, *SMLXL* – systematically organized knowledge in an unprecedented way, revealing a change in how architectural design is produced and disseminated. Fraser is critical of *SMLXL* because, for him, it lacks the critical import of Rem Koolhaas's *Delirious New York* (1978). According to Fraser, 'poststructuralism worked well as the basis of critical opposition in the 1970s, but it was inadequate for when an architect started to deal with the realities of architectural production within the capitalist system.'[30] He considered the book a disappointment because 'instead of offering a new model for design research, thereby updating and transcending *Delirious New York*, it came across as a practice brochure fattening up and hiding itself behind Bruce Mau's dazzling graphics.'[31] Reducing the design of the book to 'dazzling graphics' and a 'practice brochure,' or considering it merely as a reflection of Koolhaas's ego, misses the point. The 'message' of the book must be closely examined through its medium. In other words, as Marshall McLuhan would proclaim, 'the medium is the message,'[32] not the content. To 'dazzle' is more than a straightforward aesthetic choice.

Before going further, the architectural book needs to be considered in relation to the book format, and the written word, in general. As McLuhan states, 'Western values, built on the written word, have already been considerably affected by the electric media of telephone, radio, and TV.'[33] The first part of McLuhan's statement is instructive. If Western values inform the written word, to what extent does the format of the architectural book deviate

from that of a non-architectural book? The architectural book – due to its reliance on images – disrupts the technology of the phonetic alphabet and its ensuing impact on culture. In this respect, architecture is similar to illustrated books or graphic novels. Through drawing, photography, and other visual media, the architectural book disrupts the linear format of the written word and creates new associations between text and image. For example, Le Corbusier's cataloguing of photographs of industrial products in *Towards a New Architecture* (1923) provided a lens into the direction that architecture, according to him, should follow. As articulated by Beatriz Colomina in *Privacy and Publicity* (1994), the medium of photographic cataloguing in *Towards a New Architecture* not only runs parallel to the text but also supplants the linearity of the written word.

With *SMLXL* the architectural book takes on a much more radical scope. The book contains multiple media formats. It 'spills over with graphs, charts, poems, scripts, revisions, essays, metaphors, panic, chronologies, plans, cartoons, Beckett, events, big men, big type, models, diaries, competitions, notebooks, disasters, artworks, manifestos, drawings, rants, lectures, cities, speculation, invention and tragedies'.[34] Using multiple formats, the book makes no effort to provide a coherent, linear, or overarching structure *[1]*. The bricolage-like structure of the book anticipates the media environments of Internet websites, which Jay David Bolter and Richard Grusin define as 'hypermediation'. For Bolter and Grusin, 'the logic of hypermediacy acknowledges multiple acts of representation and makes them visible'.[35] It is important to emphasize the shift that occurs with the very medium of the architectural book. Hypermediation, according to Bolter and Grusin, is contrasted with immediacy, the latter of which assumes that the medium itself becomes effaced. For example, the architectural book of modernism sought immediacy, aiming to use the medium to communicate the message clearly without drawing attention to the medium itself. With hypermediation, the multiplicity and heterogeneity of multiple media call attention to their fragmented nature. The viewer becomes an active contributor who must navigate the hyper-mediated formats. Thus, while Le Corbusier's *Towards a New Architecture* is a book of *immediacy*, *SMLXL* by OMA offers a hypermediated architectural book. The 'dazzling' array has had a profound impact on the discipline and cannot be reduced to a mere brochure. In contrast to Fraser's position, which argues that *SMLXL* 'acted to sever the necessary continuities of design research between text and project,'[36] the book contributed to a rethinking of these relations.
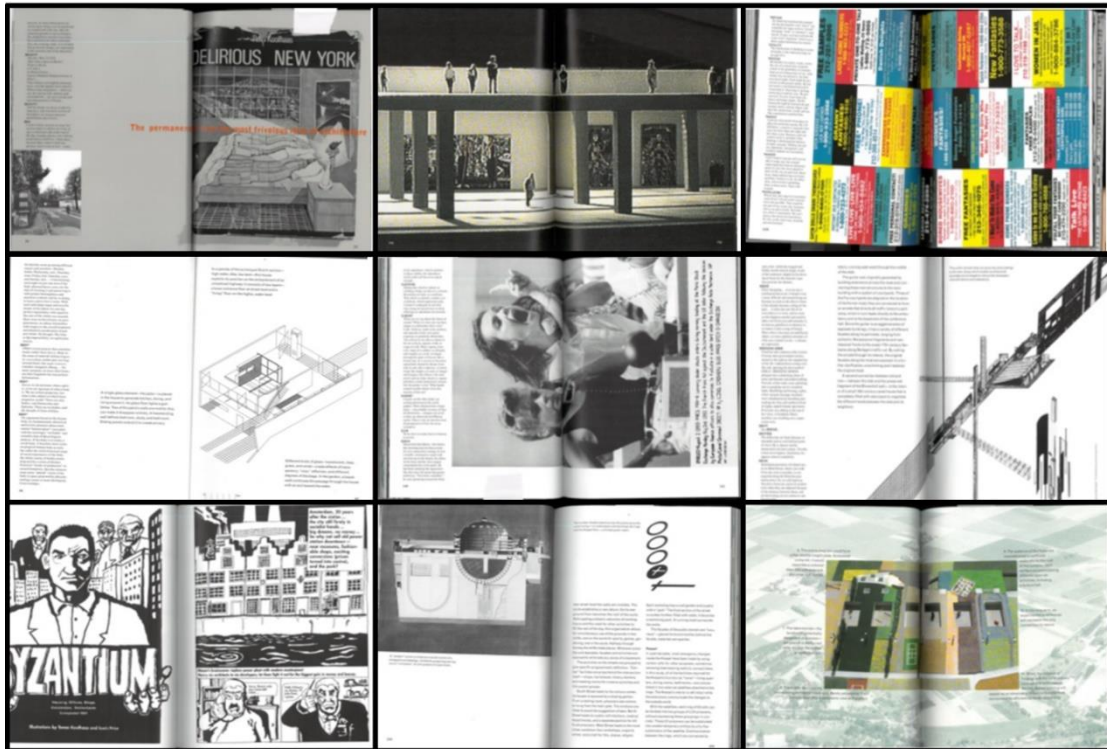
1 The hypermediated space of the SMLXL architecture book

Thus, the hypermediated format of *SMLXL* anticipated ways to consider what Ruth Blacksell and Stephen Walker term the 'Spaces of Information' (2016). In the article 'Architecture and the Spaces of Information' (2016), Blacksell and Walker outline the issue of *Architecture and Culture* that explores architecture in relation to editorial design, and art practice. The authors explore the changes that come with emergent digitally mediated environments (online platforms for example) and how they formulate new relations between architecture and editorial design. They emphasize a 'different way of engaging the spectator as a participant who no longer has to be physically positioned in proximity to the work.'[37] Instead, the 'reader' or 'contributor', rather than 'viewer' within this expanded conception of the exhibition space,' provides another understanding of how the medium moves from 'the physical (and static) to the virtual (and dynamic).'[38] The authors mention how McLuhan's writing on media is crucial. They state that, 'these new forms of practice have required the understanding and appropriation of an entire mediating context and structure.'[39] Thus, it becomes possible to trace how the hypermediated format of *SMLXL* offered a precursor to the digital publishing platforms we are witnessing today. However, the notion of hypermediated interactivity offered by emerging platforms is not the same as in the more innocent age of the early Internet. The digital interactive environments of today do no not simply offer 'new opportunities for interactive manipulation.'[40] They also 'position the user inside an imaginary universe whose structure is fixed by the author.'[41]

But beyond the notion of control, it is important to posit here that, as McLuhan suggests, with electronic media there is a drastic change from the book that is based on Gutenberg technology. *SMLXL* is crucial because – to a certain extent – it spatially anticipated the hypermediated multimodal temporality of the web, and the open temporality suggested by Blacksell and Walker in emerging information spaces, but it did so through the medium of the typographic book. Architectural historian Mario Carpo also explores how current technologies diverge from the Gutenberg print in terms of the standardized typographic process.[42]

Within the hypermediated space of the *SMLXL* architecture book, there are threads of linear narratives, such as project drawings, essays, a graphic novel strip, advertisements, film stills, a dictionary, etc. The various vectors in the book, however, are organized in a way that disrupts any over-arching linear sequence. This is why it is argued that the book offers an unprecedented organization of architectural knowledge: it is the first architecture book to present information in not just a non-linear organization, but a hypermediated spatial format. This kind of space is not only meant to represent actual or speculative projects but also becomes a space in and of itself. Coincidentally, it was released around the same time the World Wide Web began radically changing global communications. It reflected the emerging digital spaces of the early Internet and their complex relations with actual spaces. The hypermediation thus opened up new ways to synthesize architecture's various visual and textual representational formats and connect different forms of speculative and realized practice with theoretical and practice-focused research. In this sense, the hypermediated format introduces an element of 'noise' into the established ways of architectural knowledge production and communication at the time.

According to Serres, 'communication theory is in charge of the system; it can break it down or let it function, depending on the signal.'[43] In Serres's notion of a system, noise attains primary value. 'Noise, through its presence and absence, the intermittence of the signal, produces the new system.'[44] Cary Wolfe explains the importance of noise and its relation to the signal in Serres's theorization, showing how noise is 'always already part of the signal,' as 'blindness inescapably accompanies vision.'[45] Wolfe states that 'noise' (for the English reader) forms the third and unsuspected meaning of the French word *parasite*: 1. Biological parasite; 2. Social parasite; 3. Static or interference.'[46] Serres focuses on this third meaning. The parasite as interference problematizes the straightforward biological and social connotations of the term. What needs to be emphasized here is that the disruption of the system and the emergent possibilities are not determined – at least initially – by human intentionality.[47]

Similarly, the architectural book *SMLXL* and its hypermediated format acted as a parasite—a 'noise' to the established modes of knowledge

production and communication in the architectural field. While *SMLXL* was not identified as design research per se, it nonetheless acted as a reference for further developments in design research inquiry, supporting the first phase in which design research sought credibility and legitimacy from within academia.

The second phase of design research: Systemized hypermediation
The first phase of design research in architecture 'disrupted' the systematic production of architectural academic knowledge and focused on legitimizing itself within the broader academic context. With the advent of the new millennium, a new phase of design research in architecture began to emerge in British and West European universities during the 2000s.

The second phase was defined by moving beyond the cautious question 'can architectural design be considered research?' to exploring the possibilities offered by design research, its medium and message.[48] In the next two decades, design research would gain more traction in the architectural academic field. This was evident in the increasing number of research events[49] and literature on architectural design research that emerged during this time.[50] The period saw the publication of different volumes exploring the definitions and applications of design research in architecture, which included the volume *Mapping Design Research: Positions and Perspectives* (2012), edited by design theorists Simon Grand and Wolfgang Jonas.[51] This volume scoped out the territories of design research and its emerging vocabularies in the early to mid-2010s, spanning from speculative design studio projects to realized practice-based and led research. Other volumes that emerged during this period include Michael Hensel's *Design Innovation for the Built Environment: Research by Design and the Renovation of Practice* (2012),[52] which showcased design research approaches of many advanced architectural programs from around the world. Central to these volumes is the often-cited book *Design Research in Architecture: An Overview* (first published in 2013) by architectural historian Murray Fraser, which aimed to bring together different understandings of design research in architecture.[53] The optimism for design research in architecture was also evident in publications such as *Perspectives on Architectural Design Research: What Matters – Who Cares – How* (2015). The book featured a collection of short essays and projects demonstrating how design research in architecture can catalyse architectural knowledge production in academia and practice.[54] Meanwhile, the Bartlett Design Research Folios served as an important platform for presenting educational and experimental works that informed both education and broader research in architecture.[55] Another important publication from this period is *Demystifying Architectural Research* (2015) by Anne Dye and Flora Samuel. The book focused on linking research in both academia and practice.[56] Similarly, Michael Hensel and Fredrick Nelson's *The Changing Shape of Practice* (2016)

and *The Changing Shape of Architecture* (2019) explored the evolving relationship between research and design within architectural practice. The book reflected on how architectural practice is increasingly incorporating research methodologies, leading to a more informed and reflective design process. It emphasized the dual role of the architect as both designer and researcher, which involves not just the creation of buildings, but also generating knowledge through design, contributing to both the academic and professional fields of architecture.[57]

During this period, multiple conferences and symposia showcasing architectural design research projects were held in the UK and Europe. These included the 'Ph.D. by Design' conference series at Goldsmiths University, showcased in the *Instant* Journal (2014 - 2017), and the AHRA (Architectural Humanities Research Association) PhD student symposia, which provided platforms to disseminate design research alongside other more conventional academic formats. Not coincidentally, the AHRA journal *Architecture and Culture* (Routledge), launched in 2013, became one of the first journals to support the publication of design research. In Europe, there was a similar appetite for design research, as made evident by events such as the TU Delft ARENA Architectural Research Network Meeting in 2013 and the Lisbon Conference on Architectural Research by Design (ARbD'14). The design research events of this period expanded modes of architectural knowledge production and led to an increase in design research doctorate programs within architectural schools, whereby doctoral students integrated their own creative practice into their dissertation projects.[58] Still, during this period, although by-design PhD programs became more common, architectural design research – at least within UK schools of architecture – remained a relatively niche and insular activity.[59] It was still under pressure to prove itself as an equivalent to long-established research in architectural academe—a status that generally mirrored the atmosphere of the second phase of the development of architectural design research.

As in – and possibly inspired by – *SMLXL*, the notion of hypermediation defined the second phase of design research in architecture. During this period, a new generation of researchers used an expanding array of media to investigate architectural design research – including drawing, model-making, photography, film, digital media, installations, material explorations, prototyping, and construction, methods commonly employed in design studios within architectural schools. The use of multiple media also opened up new relations with written textual formats. This expanded toolkit defined the second phase of design research in architecture, revealing a broad spectrum of spatial research investigations. Design research was recognized as a methodology capable of re-framing and re-organising other fields in the humanities and science. While the first phase of architectural design research focused on establishing credibility, the second phase was characterized by

experimentation with the possibilities that this mode of research could uncover.

The current moment: The third phase of design research in architecture
The traditional methods of producing architectural knowledge through academic research are increasingly being eclipsed by architectural design research. The relationality between research, practice, and pedagogy is also shifting due to the expanded role of architectural design research. With its inherent agility, design research mediates these relations effectively. Recent volumes on design research illustrate the broad range and potential of creative practice inquiry in architecture that emerged in this second phase. These include volumes like *Visual Research Methods in Architecture* (2021), edited by Igea Troiani and Suzanne Ewing and *Creative Practice Inquiry in Architecture* (2022), edited by Ashley Mason and Adam Sharr.[60] These volumes emphasize the importance of creative practice and emerging critical visual methodologies to chart connections between the different processes and outcomes that paved the way for narrative, temporal and affective design-based research to become foregrounded. They consolidate a broad interpretation of architectural practice, including practice-led design, material and place-based practices, multi-disciplinary studios, and educational studio practices. These contextualize the setting for a new phase of design research in architecture.

What determines the new phase of design research that is proposed in this essay? Architectural knowledge will inevitably continue to be re-structured according to the expanded possibilities offered by design research. In the 1990s the embryonic phase of design research entered the scene by disrupting the systematic knowledge production of architectural academic research. This moment, as seen with the *SMLXL* book format, occurred at a pivotal point that coincided with the explosion of the Internet and an unprecedented change in global communication systems and knowledge production in general. The hypermediated spatial organization of knowledge disrupted the established modes of architecture's communication, introducing an element of noise into the established architectural 'system'. Hypermediation echoed the digital space of the web. The nonhuman element of noise played a crucial role in shaping not only the architectural book *SMLXL*, but also Internet sites and their impact on urban and architectural imaginaries.[61]

Today, we find ourselves on the precipice of a new disruption to the system. With the recent emergence of A.I. image generator software, such as Midjourney, architecture faces an unforeseen challenge. In the Guardian article 'AI is putting our jobs as architects unquestionably at risk' (Feb. 2023), Neil Leach reveals how AI poses an existential threat to the practice of architecture.[62] It is argued that the period defined as hypermediation is now

being eclipsed by a 'postmediation'. Postmediation assumes that the human agency of architectural knowledge production is becoming disrupted by a nonhuman agency: AI. With the emergence of this *noise*, architectural knowledge production is once again being challenged.

In *Architecture in the Age of Artificial Intelligence* (2022), Leach draws from posthuman thinkers such as Katherine N. Hayles to show how we can consider AI in its relation to architecture. Leach states that, 'we can explore the full potential of AI as being not an end in itself, but a prosthetic device that can enhance the natural intelligence of the human being'.[63] In this reading, Leach wants to emphasize the 'potential synergy' between AI and human intelligence. However, in the conclusion of the book, Leach poses an important question for architectural design research. He asks, what if we 'start to design using voice commands and hand gestures, instead of drawing?'[64] Will AI be able to generate customized designs completely autonomously? According to Leach, this is expected to happen by the end of the decade.

AI is here to stay and will be a paradigm-changing technology for the architectural discipline. This will elevate the importance of design research. Knowledge that consolidates multiple media, including AI, and addresses how architectural design relates to other disciplines, will make design research even more invaluable in the coming decades. The role of architectural design research becomes even more relevant as it is best placed to confront ways in which AI might impact how architecture will be produced. Architectural design research allows us to explore how AI can be integrated into research. In other words, AI will need to be utilized as an extension of human intelligence. The role of design research will be critical in allowing architecture to address this emerging challenge to its modes of production.

Notes

1. *Design Research in Architecture: An Overview,* ed. by Murray Fraser (London: Routledge, 2021 [2013]), p. 2.

2. Murray Fraser, 'Design Research in Architecture, Revisited' in *Artistic Research: Charting a Field in Expansion,* eds. by Paulo De Assis and Lucia D'Errico (Washington: Rowman & Littlefield Publishers, 2019), pp. 128-145 (p.129).

3. The term discourse here is taken from Michel Foucault in *The Archaeology of Knowledge* (1969), where he writes: 'the term discourse can be defined as the group of statements that belong to a single system of formation; thus I shall be able to speak of clinical discourse, economic discourse, the discourse of natural history, psychiatric discourse.' It is argued here that architectural design research is evolving into its own discourse, due to its engagement with facets of architectural knowledge: practice, research, and pedagogy. Whilst these formations have their own histories and dynamics that intersect, and change with time, the essay focuses on how they coalesce to form the discourse of

architectural design research. See: Michel Foucault, *The Archaeology of Knowledge*, trans. by A.M. Sheridan Smith (New York: Vintage Books, 2012), p. 121.

4. Yasser Megahed, 'On Research by Design', *arq: Architectural Research Quarterly*, 21.4 (2017), 338–43 (p. 339).

5. Ashley Mason and Adam Sharr, 'Introduction: Creative practice inquiry in architecture', in *Creative Practice Inquiry in Architecture*, eds. by Ashley Mason and Adam Sharr (London: Routledge, 2022), p. 4; Donald Schön, *The Reflective Practitioner: How Professionals Think in Action* (London: Routledge, 2017 [1983]).

6. Christopher Frayling, 'Research in Art and Design', *Royal College of Art Research Papers*, 1(1) (London: Royal College of Art, 1993), p. 4.

7. *Visual Research Methods in Architecture*, eds. by Igea Troiani and Suzanne Ewing (Bristol: Intellect Books, 2021), p. 28.

8. Eliel Saarinen, *The City: Its Growth, Its Decay, Its Future* (New York: Reinhold Publishing, 1943) as cited in Fraser, *Design Research in Architecture*, p. 240.

9. Fraser, *Design Research in Architecture*, pp. 4-5.

10. *Design Methods in Architecture*, ed. by Geoffrey Broadbent and Anthony Ward (Wittenborn: Lund Humphries Publishers Ltd, 1969).

11. Paul Rodgers, Francesco Mazzarella, and Loura Conerney 'The Evolving Landscape of Design Research in the UK' in *International Association of Societies of Design Research Conference IASDR* (Manchester: Manchester Metropolitan University, 2019).

12. Dean Hawkes, 'The Architect and the Academy', *arq: Architectural Research Quarterly*, 4, no. 1 (2000), 35-39. Before this conference, British architecture students took various paths into the profession, each with its own standards and definitions of education and training. To elevate these standards and unify qualification criteria, the conference decisively separated architectural education from its vocational roots, redefining it as an academic pursuit. This led to the establishment of frameworks for professionalization, pedagogical methods, and research that influenced the field for decades. For more details, see Raymond Verrall, 'Situational Perhapsing' in *Creative Practice Inquiry in Architecture*, eds. by Ashley Mason and Adam Sharr (London: Routledge, 2022), pp. 28–39, (p. 29).

13. Nigan Bayazit, 'Investigating Design: A Review of Forty Years of Design Research', *Design Issues*, 20, no. 1 (2004), 16-29, p. 20; Nigel Cross, 'From a Design Science to a Design Discipline: Understanding Designerly Ways of Knowing and Thinking', in *Design Research Now*, ed. by Ralf Michel (Birkhäuser Basel, 2007), pp. 41-54, p. 42. Alexander was one of the founders of the Design Methods approach and promoted it in 1960s. Later in the 1970s, Alexander rethought the whole idea and joined the criticism of the idea of controllable design processes at the time.

14. Fraser, *Design Research in Architecture*, pp. 4-5.

15. Nigel Cross, 'Design Research: A Disciplined Conversation', *Design Issues*, 15, no. 2 (1999), 5-10, p. 5.

16. Nigel Cross, 'Designerly Ways of Knowing', *Design Studies*, 3, no. 4 (1982), pp. 221-227.

17. Bryan Lawson, *How Designers Think* (London: Routledge, 2006).

18. Halina Dunin-Woyseth and Fredrik Nilsson, 'Design Education, Practice, and Research: On Building a Field of Inquiry', *Studies in Material Thinking*, Vol. 11 (2014), 1-17, p. 7.

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50. Important figures from this period include Jonathan Hill and Jane Rendell from the UCL Bartlett School, and Teddy Cruz from the University of California at San Diego. Other important figures of this phase include Halina Dunin-Woyseth, Fredrik Nilsson, Flora Samuel then at the School of Architecture, University of Sheffield, Johan Verbeke – Aarhus School of Architecture and Faculty of Architecture Sint-Lucas.

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George Themistokleous' critical spatial research investigates the role of the body within media assemblages in contested territories, particularly borderland spaces. Using custom-made interactive installations, he explores blurred hybrids of electronic and actual selves to challenge identity constructs. George's installations and writings have been presented and exhibited internationally. He currently teaches design-studio and theory at Norwich University of the Arts and is the founder of *Para-sight* (www.para-sight.net).

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