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PART III

How do we conduct design research?

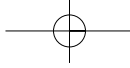
**Asking questions; data collection methods;
analysing information; ethical issues**

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The chapters in Part III are concerned with how design research is conducted and offer examples of a wide range of approaches, tools and methods used for various disciplinary, academic and commercial contexts. The methods presented here are not an exhaustive list but they offer a patina of relevant, contemporary and often very different approaches appropriate for design research. The variety of ways in which design research is conducted illustrates the plurality, depth and richness in it. We also see a blurring of design practice and design research as we begin to see many different ways that practice might feature centrally in the production of knowledge in design. A recurrent theme in Part III is the use of mixed-methods and hybrid approaches, where the formula seems to be combining or appropriating established techniques from other domains with design abilities such as visualising information (Shumack, Sadokierski and Sweetapple) and making through prototyping (Wensveen and Matthews). Another observation in the chapters of Part III is the focus on enacting change, which aligns to conventional methods such as ‘Action Research’ (Villari) and explicitly applied in von Busch’s ‘hactivism’ approach that calls for direct intervention into the artefacts of society.

Part III opens with Koskinen’s identification of four main analytic cultures in design research: statistical, inductive, explication-based and art- and design-based. He argues that several cultures co-exist in contemporary design research and that this pluralism should be present in a healthy and mature field of research. A new approach, firmly situated in Koskinen’s art and design analytic culture, is ‘hactivism’ (hacking + activism) introduced by von Busch. Hactivism is an emergent research approach that is used to deal with socio-cultural issues in participatory ways, offering design researchers a way of ‘cultural counterintelligence’, a stance currently explored in design research under the guise of ‘critical design’ or ‘adversarial design’ as it intervenes in order to challenge established orders. Similarly, Shumack’s description of a hybrid approach enables us to explore in detail how existing methods borrowed from different fields can be appropriated with more design specific approaches. Shumack introduces a hybrid research approach termed ‘creative designerly mapping’ that offers a useful and practical means by which to explore complexity across individual and collective understandings. Shumack provides three case studies that each reflect a different emphasis and approach as forms of ‘creative designerly mapping’. We continue this theme of ‘designerly’ research methods with Sadokierski and Sweetapple’s three examples of visual analytic methods which are used to help designers draw out ideas, understanding and inspiration from written texts. All three methods rely on turning

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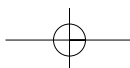
1 text into visual abstractions and representations in order to find hidden patterns of themes and
2 ideas in either a focused or an exploratory way.

3 One of the many unique characteristics of design research is the role of and focus on designed
4 things in the research process. This is highlighted in Wensveen and Matthew's chapter that
5 discusses the use of prototypes as vehicles for research 'about', 'for' and 'through' design. They
6 present a rough typology of the various ways that designed things appear in design research
7 methods in order to identify and differentiate the range of possibilities open to design researchers
8 for whom design practice is an essential component of their modes of investigation. Continuing
9 with research tools and methods that have affordances for visual thinkers, Bolton introduces his
10 'Visual Thinking Method' as a set of reflective and critical thinking tools devised specifically
11 for designers. The purpose of the 'Visual Thinking Method' is to help reduce uncertainty in
12 front-end design-driven innovation and is seen predominately as a way to help design teams
13 improve their ability to rapidly and clearly see radical innovation opportunities. Like many
14 visualisation techniques used in research, the ability to externalise data and work with visually
15 based information are crucial factors of the 'Visual Thinking Method'. Like the methods
16 introduced by Sadokierski and Sweetapple, the 'Visual Thinking Method' has been developed
17 and honed through a mixture of professional practice and design research.

18 The remaining three chapters in Part III offer examples of specific methods and approaches
19 used in various design research contexts. Woodward, in an emerging interdisciplinary field of
20 Interpretation Design, illustrates the use of Christopher Alexander's pattern language as a strategy
21 to facilitate sharing of knowledge and professional expertise between different teams. Villari
22 offers a detailed explanation and rationale on the suitability of the 'Action Research' method
23 in instances where a collaborative and participatory design approach is used to facilitate shared
24 decision-making, knowledge exchange and creative problem solving. Part III concludes with
25 Christensen and Ball's chapter on the 'in vivo' method: a 'live' research technique aimed at
26 investigating design cognition in naturalistic settings. Christensen and Ball's chapter offers a
27 fitting end to Part III as it highlights recurring themes of appropriation and mixed-methods
28 observed throughout the chapters.

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FOUR CULTURES OF ANALYSIS IN DESIGN RESEARCH

Ilpo Koskinen

Analytic practices in design research

Design research has gone through several phases over the last 60 years. The first serious attempts to lay design on scientific foundations took place in HfG Ulm, and slightly later in architectural programmes in the United States and at the Royal College of Art in London. Most key figures involved in these efforts had, however, given up hope of turning design into a science by the early 1970s. Tomas Maldonado called them immature; J. C. Jones told designers to turn to art; Christopher Alexander famously told designers to “*forget the whole thing*” (Maldonado 1984; Alexander 1971; Jones 1984). The disappointment to post-war optimistic dreams of building a rational society was part of the *Zeitgeist* of the late 1960s, and design could not escape it.

What we were left with were a few research departments in design schools, lukewarm enthusiasm among practitioners, and few significant academic contributions. With the exceptions of ergonomics and foundational work in how designers solve problems, design research was dominated by art history and with the wake of postmodernism, cultural studies (for example, Dreyfuss 1967; Lawson 1980; Cross 2007). Useful as they were in teaching, they tended to widen the gap between design and research.

Fresh interest in design research came from several corners in the 1980s and the 1990s. The 1980s saw the first steps of design management, but a broader renewed interest in research had to wait until the 1990s, when design first turned digital, and slightly later, when communications technologies began to change the technological base of design. These technologies, however, had no obvious form – what is the ‘shape’ of software? As the problem designers faced was what to design, not how to design, designers turned to user research. In slightly over ten years, design had got several new research communities, like usability and user experience researchers, ethnographers, sociologists, even some natural scientists, management scholars, computer scientists and engineers of many persuasions, and ‘practice-based’ research communities that bring art into design research. Much of this development took place under the wings of semiotics, philosophy, management, usability engineering, psychology, and sociology.

As a result, design as a set of disciplines has at its disposal an immensely richer set of methods and techniques than 20 years ago. The picture of design research today is hard to compile because of the proliferation of research communities. As new research communities have developed, they have usually learned their research practices and worldviews from disciplines

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1 with longer historical roots. By implication, keywords like ‘analysis’, the topic of this chapter,
2 have become difficult to understand.

3 One source in understanding how the design profession understands analysis is the research
4 class design schools organise for MA and PhD students. They tend to tell a picture of an
5 occupation borrowing its methods from other fields of learning, be these sciences or social
6 sciences. For instance, at The Hong Kong Polytechnic University doctoral classes divide
7 methods into qualitative, quantitative methods, and historical methods. Many design research
8 disciplines do fine with this palette – for example, in design management research tends to be
9 statistical or it builds on case studies that build on linear models (Heskett 1989; Kicherer 1990).

10 If we turn from education to design research, the picture gets more nuances. For example,
11 critical design builds on design tradition, architecture, and contemporary art in search of
12 methods. Art provides references and models also to ‘practice-based’ research (Mäkelä and
13 Routarinne 2007). As the case of cultural probes, some of these initiatives speak the language
14 of design, and are more attractive to design students than, say, statistics or case study analysis
15 (Presence Project 2001). Also, some recent work has started to unravel empirically how designers
16 and architects of the calibre of Santiago Calatrava analyse problems and turn them into design
17 programmes (Dorst 2012).

18 As this brief account suggests, design research has several cultures of analysis, not just one or
19 two. There is no such thing as ‘the analysis’; rather, there are several ways to analyse. The
20 variation is not endless, though, and can be broken into a few main categories. The unit of
21 analysis of this chapter is analytic culture – those deeply ingrained habits and techniques through
22 which design researchers examine the structure of their data before proceeding to conclusions.
23 Terminology used to describe this step varies, and practice adds to confusion: design firms like
24 eLab and IDEO have talked about storytelling, concept design, or predesign rather than analysis.

25 Not for distribution 26 Designers as statisticians

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28 Interaction designers in leading engineering schools like Delft, Eindhoven, and KAIST usually
29 take their research methods from the sciences and theories from psychology (see discussion on
30 statistics below). In practice this means that research becomes a theory-driven, experimental
31 enterprise in which analysis is statistical. A researcher interested in, say, a new form of interaction,
32 reads existing literature and formulates a hypothesis, an explanation based on theory. After
33 creating a design, he conducts experiments. These experiments produce measurements that he
34 analyses with statistical methods. The final phase of research is discussion, in which the researcher
35 evaluates the merits of his hypothesis against competing explanations, assesses possible threats
36 to validity, and describes his vision of the implications of the study for the future (see Stappers
37 2007 for a good account).

38 Usually statistical methods are used in conjunction with experiments and surveys. They are
39 also routinely used in non-experimental sciences, however, like geology and bird migration
40 studies, as well as in some mathematical fields of the social sciences, most notably econometrics.
41 Statistical methods are typically divided first in descriptive and decision-making statistics, and
42 second in linear models and multi-variate methods. A specialised field is statistical inference and
43 sampling. There are numerous statistical software packages, most notably SAS and SPSS.

44 Typically, a study that uses statistical methods has its beginnings in some theoretical issue.
45 For example, when working in Delft, Stephan Wensveen built an alarm clock that was supposed
46 to read emotions in the evening, and adjust its wake-up call accordingly (Wensveen 2004). His
47 design was a large spherical disc with slide buttons around the disc. The idea behind the design
48 was that when tired or angry in the evening, people almost hit the clock; when in a good mood,



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they carefully adjust and almost caress it. Sensors in the clock read these patterns, and then the clock decides how to wake the user up. For instance, if the user went to bed angry, he got a gentle alarm; if in a good mood, the alarm could be more abrupt. His study used sophisticated trigonometric models to model the positions of the switches, and subjects in his study came from the technical university community at Delft (for pictures of the clock, see for example www.acm.org/uist/archive/adjunct/2002/pdf/demos/p55-wensveen.pdf).

In very broad terms, statistical methods are the first choice in engineering schools, in engineering research communities, in ergonomics, in psychologically oriented fields of design research, and among the more senior factions of human-computer interaction. The anomalies are significant as well. Most researchers in art schools and traditional design occupations (including industrial design) avoid statistical methods, as do most researchers in Europe and North America. Also, in design firms and in design units in major corporations, ethnographic methods tend to find a more receptive audience than statistics.

It is important to keep in mind that a good deal of research that at the outset has little to do with statistics or experiments shares a basis with them. The most important design research area in which researchers often – not always – share background assumptions with the sciences is design management, with many researchers trained either in economics or engineering. The methods of choice in design management are questionnaires and case studies, and a good deal of case study research follows Robert Yin’s well-known book with the same name (Yin 2003). The best case studies are typically about firms like Philips and Olivetti (Heskett 1989; Kicherer 1990), and though qualitative and historical, they are usually treated by other researchers as observations in statistics. The practice is similar to case studies in business schools and the Human Relations Area File in anthropology.

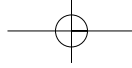
The problem of meaning: design and qualitative social science

User-centred design became popular in design in the 1990s. User-centred methods of analysis usually come from interpretive social sciences, most notably from sociology and anthropology, but there are philosophical reasons too. People think and talk, and can always change their ways, however habitual and mechanical they may look. As the philosopher Peter Winch noted in the 1950s, the apple that fell on Newton’s head could not choose not to do what it did. When the President declares the state of war, he is not only making a choice, but also is deeply aware of the consequences of his words. As Winch notes, this means that in studying humans as if they were bacteria or atoms misses the crucial point that move humans: meanings (Winch 2008: 119). A related problem is ‘context’: those times, places, and practices in which people make sense of design and put it to use. This context is practically always socially shaped and heavy with meaning: cities are shaped by someone’s visions, and elaborated by others’; interiors are designed by someone, decorated by others; our fellows listen to us and build on what we say, and come to shape the way in which we can act. People make some things relevant from this environment, edit others into the background, and that way make some definitions real.

To make sense of meanings and context, design researchers have sought useful techniques from anthropology and sociology. While literature has centred on contextual design and, in human-computer interaction (HCI) on participatory design, several recent books have begun to expand the picture (Squires and Byrne, 2002; Cefkin, 2010; Clarke, 2011). The first pushes to ethnography took place in Chicago and slightly later in Silicon Valley (Beyer and Holtzblatt 1998). Ethnographic research has many proponents in industry and in many university departments design research has come to mean short ethnographic studies akin to site visits in architecture.

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Suri 2011: 1–2). She tells how IDEO was hired to extend the brand of Havaianas, the Brazilian brand known for swimwear. The project leader, Miguel Cabra, first took his team to Brazil. The team came back with hundreds of photos and a wealth of observations. The problem, however, was that everything seemed exotic to European team members. When the team then went to India, it realised that many themes – colours, patterns, ways of carrying things – they had seen as ‘typically Brazilian’ were in fact common to both countries. They came up with a bag that could carry more than its capacity. Their observations about the meanings of things were based on their design sensitivities, not on anthropological theory.

Explication: design researchers as scholars

When browsing through some of the most prominent design conferences and journals outside industrial and interaction design, we can easily see papers based on yet another culture of analysis. This is the case in the humanities – including design history – aesthetics, and philosophy, but also sometimes in constructive research and in interpretive research in design management. There are exceptions, as historians who work with quantitative methods, but the mainstay is not statistics or fieldwork but what can be called ‘explication’: a detailed examination of meaning. Explication can be theoretically informed, as is often the case in product semantics, which uses linguistic and semiotic theories in deciphering meanings in design.

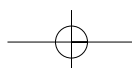
Though not codified in the manner of statistics or analytic induction, explication has a structure, however. The structure is fairly similar to analytic induction in that explication is a bottom-up activity. There is first an examination phase in which a piece of design is examined and evaluated in detail before decisions about where to go next are taken.

Usually, these kinds of procedures are described as a circle or spiral. When discussed in philosophical terms, the most common reference is to hermeneutics, and in particular to Hans-Georg Gadamer’s seminal *Wahrheit und Methode (Truth and Method)* (1975), which described explication as a hermeneutic circle in which new facts force the researcher to change his interpretation until all the facts can be explained. The roots of Gadamer’s work are in text-critical biblical studies that go back to the end of the eighteenth Century. Yet, it is important to keep in mind that the title of Gadamer’s *magnum opus* is ironic. He does not propose that the way to knowledge is having a method, but the contrary: his book is a warning that no method is failsafe. The only way to truth is relentless, careful questioning.

Processes of explication may be difficult to describe, but they work, as the history of humanities amply shows. In design research, their stronghold is in studies building on the humanities. If a researcher wants to understand Frank Lloyd Wright’s, Ettore Sottsass’s, or Hans Gugelot’s career, she has to go to several archives; talk to their family, friends, and contemporaries; study design culture and its dynamics of their era; and situate their work into a framework more complex than typical heroic narratives of creativity. This is even more evident if she wants to write the history of Swiss graphic design. It is impossible to work through 50 years of history mechanically. The only viable method is to rely on the historian’s mind and turn it into a research instrument.

What kind of scholarship does explication lead to? The sociologist Pertti Alasuutari has made a useful distinction between factist and sample perspectives (Alasuutari 1995). In factist perspectives, data are treated as facts about something outside data. For example, letters tell about the writer’s emotions. From this assumption follow others: most importantly, the question of whether data is correct or not. In sample perspectives, in contrast, a piece of data is treated as an object of interest in itself. The question of whether it is true or false is meaningless, and research concentrates in explicating its structure.

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1 When explication lies in the heart of analysis, contribution and novelty lies in constructing
2 better explanations, not in discovering new facts or conducting better experiments as stated the
3 doyen of American anthropology Clifford Geertz in 1973:

4
5 Knowledge [in cultural anthropology] . . . grows: in spurts. Rather than following a
6 rising curve of cumulative findings, cultural analysis breaks up into a disconnected yet
7 coherent sequence of bolder and bolder sorts. Studies do build on other studies . . . in
8 the sense that, better informed and better conceptualized, they plunge more deeply into
9 the same things . . . the movement is not from already proven theorems to newly proven
10 ones . . . a study is an advance if it is more incisive – whatever that may mean – than
11 those that preceded it; but it less stands on their shoulders than . . . runs by their side.

12 *Geertz 1973: 25*

13
14 There is something akin to growth of knowledge indeed but it is not like in the sciences in
15 which facts accumulate. In Geertz's vision, a contribution is typically an improved understand-
16 ing. Earlier explications are contestable and debatable, and treated as arguments in on-going
17 conversation rather than as indisputable facts. Many fields of learning function like this. Goethe
18 does not write anymore; still, Goethe scholarship improves over time. Many design disciplines
19 also function like this. The world is full of chairs, but occasionally, better chairs show up.
20 Contemporary designers build on their knowledge of other chairs, but somehow manage to go
21 deeper than the giants from the past. Making a piece of furniture better than Eames, Ponti, or
22 Kukkapuro is very difficult, but not impossible.

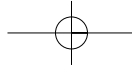
23 **Art and design as analysis: learning from contemporary art**

24
25 While the three cultures above build on research world practices, the fourth culture builds on
26 contemporary art and design. For practising designers, this may be obvious, but for researchers,
27 the step can be radical. In fact, many who take the step explicitly distance themselves from
28 science. The best-known example is probably *Design Noir*, in which we can read that through
29 research it is “definitely not scientific” (Dunne and Raby 2001: 75).

30
31 Perhaps the main difference between this and other cultures is that in other cultures,
32 researchers want to make sure other design researchers can understand the way in which some
33 study has taken shape. Without transparency, others can neither repeat the study nor inspect its
34 reliability and validity. In art and design, there is more tolerance to idiosyncrasies and vague
35 analysis; in fact, ambiguity may even be encouraged, if it leads to interesting designs (see Presence
36 Project 2001).

37 A good recent example from the borderline of design and research comes from a new
38 catalogue about Alessandro Mendini's work (Mendini, Weiss and Nollert 2012). The catalogue
39 describes how some of his designs saw daylight as games and collages of everyday objects and
40 colours and forms from Czech Cubism. In treating ordinary objects as ready-mades but by
41 colouring them with a completely different palette, he built extensively on several art-world
42 practices. For instance, by contemporising things and values with Cubist aesthetics, he created
43 collages of the banal and the refined and the stylish with the kitsch. In more traditional language
44 of research, he created a multidimensional space by juxtaposing extremes. The results were
45 objects like *Poltrona di Proust*, a collage of an old chair with pointillism.

46 This kind of work begins with browsing, organising, reading, and getting familiar with
47 materials that have been collected. These materials are placed on moodboards for visual
48 inspection and turned into collages for critique, which identifies themes for design. Sometimes



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the aim is analysis; sometimes it focuses on seeking discordances and pathways out from conventional design solutions. 1 2

As recent literature argues, several well-known design cases have been based on these techniques. For example, when Alessi renewed its thinking about kitchens and went from stainless steel and other metals to plastics, its designers started to redesign spoons, eggcups, and bottle openers as if they were toys (Verganti 2009). It goes without saying that many avant-garde designs of the likes of a Jerszy Seymour owe a lot to performance art, actionism, and installations (see Seymour 2011). How would Jackson Pollock have designed interiors? 3 4 5 6 7 8

Kees Dorst, who has developed a design methodology for unsolvable problems, has made a related observation in a forthcoming study of how people like Santiago Calatrava work (Dorst 2012). The creative step in his methodology consists of identifying themes and framing them in ways that solve several problems simultaneously. One of his examples has been the King's Cross area in Sydney. Having a high concentration of bars and nightclubs, combined with Australian heavy drinking habits, this area is seen as a public problem with nightly fights, petty theft, and occasional alcohol poisonings. The City had tried every traditional method of social work and policing to calm the area. Dorst's group took another tack. Instead of thinking about King's Cross in public policy terms (for instance, community policing), they saw it as a public event, and sought methods from rock festivals and other massive public events that gather tens of thousands of young adults to celebrate, but have very few, if any, of the problems typical to bar streets. With this frame in mind, designers went on to find ways to distribute water on the streets, add knowledge of existing toilets, and design signs that could lead people away from late-night taxi queues to trains. 9 10 11 12 13 14 15 16 17 18 19 20 21 22

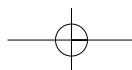
Seeing some analytic processes in design research though art gives insights into how many designers and design researchers work. It also helps to understand better some of the creative steps they take. The main danger in this kind of thinking is glorifying creative work and neglecting research. As Otl Aicher, one of the leading figures in HfG Ulm, has noted, design schools have had a habit of encouraging designs that build on form rather than functionality, technology, and aesthetics. As he writes, Rietveld's constructivist chairs are Mondrians for sitting rather than serious design in the manner of Charles Eames, for whom materials, technology, and aesthetics came before form (Aicher 2009). Design needs its artistic end, but if this end defines good design, this choice runs against the professional ethic of bodies like ICSID that tell designers to serve ordinary people. The creative step is only one step in a much longer design process, not its essence. 23 24 25 26 27 28 29 30 31 32 33

Discussion

Design research has developed fast over the last two decades, and in the process it has learned from many kinds of research and artistic practices. This chapter has been looking at analysis, a crucially important step in any research, but also a step that has not received as much attention in literature as it merits. It has been looking at analytic cultures instead of what the individual studies, and described four main cultures: statistical, inductive, explication-based, and art and design-based. 34 35 36 37 38 39 40 41 42

As this chapter shows, several cultures co-exist in contemporary design research. This is how things should be. This is how things are in many other fields of learning, and design cannot be different. Just like methods for data gathering, analytic methods need to fit the purpose. Designers have learned from the sciences, the social sciences, the humanities, and art, but this does not turn them into scientists, sociologists, philosophers, or artists – after all, using statistics does not turn economists or biologists into statisticians. Refusing to borrow analytic methods 43 44 45 46 47 48

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1 from other fields of learning would be preposterous. For design education, however, this chapter
2 poses a challenge: how to bring this diversity into curriculum currently dominated by loans
3 from the sciences and the social sciences.

4 When design researchers aim to construct something, analysis proceeds in two steps. At first,
5 there is analysis in the sense described in this chapter: it is an effort to make sense of data, be
6 these secondary data of some sort, ethnographic data, probe returns, or some kind of scrapbook
7 or collage. Then researchers decide what kinds of implications this analysis has for design.
8 Though not always, these are usually separate steps. Research and analysis ‘inspires’ detail design
9 rather than structures it. Analysis is followed by design workshops that take research findings as
10 a starting point for creative solutions.

11 This chapter has touched upon theory in a few places. The way in which theory works in
12 research depends in part on analytic culture. In statistical research, theory gets a way more
13 pronounced role than in other cultures. Researchers rely on theory in formulating research
14 questions, planning data gathering, analysing data, and, in case they construct something, in
15 prototyping. In interpretive and explication cultures, theory works as a source of precedents
16 but also as a sensitising framework that brings imagination and process to analysis. In addition,
17 it gives tools for following how people understand prototypes in everyday life. In art and design-
18 based work, research builds on referents rather than theory; however, there is often a lot of
19 theoretical and philosophical depth behind the surface. For instance, in recent work in critical
20 design, these references go from Situationism to Marx’s theory of commodity fetishism, to
21 mention a few (Presence Project 2001; Debord 2002; Jappe 1999).

22 The contribution of this chapter is in its way of posing the question of analysis. My belief is
23 that the best way to understand analysis in design research is to look at it from an abstract
24 perspective. In this chapter, the device of abstraction was the concept of analytic culture, which
25 gave the chapter a powerful narrative that covers most analytic practices in design research. Can
26 there be more cultures? Possibly, but unlikely; the cultures explicated in this chapter are
27 dominant in the sciences, the social sciences, many fields of the humanities, and contemporary
28 art. It is difficult to be creative against the full weight of these traditions. The main gaps in
29 knowledge are no doubt in art and design-based analytic methods. Despite recent advances,
30 more research is needed to understand these crucially important practices better.

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