
Certain Uncertainties and the Design of Design Education

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Abstract

This article is about the design of design education. After a series of reflections on the design space of design education in relation to complexity, uncertainty, and change, the article is divided into two main parts. First comes a brief history of how design seems to be evolving in response to complexity, and how this has led to a shifting balance between what we consider to be certain, and what is inherently uncertain when designing. Second, there is a discussion of what this evolution and shifting balance implies for design education. The article does not offer a general account or articulation of what design or design education is or should be like, but a series of conceptual tools, diagrams, and figures enabling us to frame and define design programs for education and research. Ultimately, this article is a reflection on what it means to think about design as an act of making things possible, and therefore as the opposite of taking things for granted.

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Introduction

In this article I will present some of the conceptual tools I have come up with to try and deal with issues of scope, complexity, uncertainty, and change in design and design education. The notions, diagrams, and ideas I would like to discuss here in one way or another all address how design evolves over time and where that leaves us now. The purpose of these reflections is not to describe what design or design education is or should be, but to better understand the design space we are working with as we create programs for education and research. Perhaps this article can be visualized as an attempt to take an imaginary walk in this space, looking at its structure, and considering what is visible from different positions and perspectives. It is a discussion of what it means to think about design as the act of making things possible.

There are certain things we can say about what designing is. But much about design is also uncertain. Part of what defines design practice is how we balance certainty and uncertainty—while we may have the ambition to look at a design issue or situation with as open eyes as possible, explicitly seeking new perspectives and knowledge as we approach it, we at the same time also put our trust in pre-established structures, processes, and methods to support us making it through.

Similar things can be said about what it is like to educate designers. On the one hand, we identify which tools, skills, methods, processes, and so on we believe a student needs to know to competently enter the design profession. On the other, there are also many things we do not know about the future of designing, such as what it will take to thrive in the design profession even as it changes and evolves. There is a difficult trade-off here between honing the skills of contemporary practice and taking the risk of developing competence in areas that may or may not become more important later on. How an institution handles this trade-off between certain and uncertain aspects of design and designing will be one of the defining characteristics of its design education. Whether we like or not, it is quite clear that one cannot simply assume things about design: to design is the opposite of taking things for granted.

The importance of not taking things for granted has, however, increased significantly in recent years. If we imagine that there is a balance between certain and uncertain things in design, between established foundations on one side and the need to revise or replace them in light of contextual and other changes on the other, the issue of sustainability is quickly shifting weight towards the need-for-change side—much of what we have come to take for granted in design cannot be sustained. Futures have never been certain, and are thus notoriously difficult to predict, and yet there is unprecedented scientific agreement about the certainty of what lies ahead should we not change. To understand what this implies for design and how we educate designers is critical, as failing to do so very likely will result in education even further reinforcing ways of living, doing, and thinking that we now know cannot be sustained. This is a significant shift in the balance between certain and uncertain aspects of design education. In other words, we cannot ignore the issue of how to *make design less certain of itself*.

In the following paragraphs I will argue that not taking “things” for granted is not a new idea coming about as a response to the seriousness of

- 1 John Chris Jones, *Design Methods*, 2nd ed. (New York: Van Nostrand Reinhold, 1992), 15–26.
- 2 *Ibid.*, 42.

our current situation, but rather something that—if we look closely—has been central to how design has been developing since its very beginning. The first part of the article is a historical overview of how design has responded to increasing complexity and uncertainty, and why a key reason design seems to be constantly expanding can be found in a constant and critical questioning of what making is and could be. Based on this, the second part of the article turns to issues in the design of design education related to the changes that have taken place over time and the challenges these might bring to our current efforts. Finally, I will outline the distinction between design as something given and as something constantly in the making, and argue that both research and theory will be awarded new roles. “Designing” is thus not something one is instructed how to do, but something one learns how to create.

Coping with Complexity

The process of design emerging out of crafts was well under way for a long time when industrial design was born. In his seminal book on design methods, John Chris Jones outlines a history of designing that was moving from traditional crafts, to design-by-drawing, and then towards new methods beyond drawing, as it lacks the perceptual span necessary for dealing with contemporary problems.¹ In many ways, his is a narrative describing what is required of design to cope with ever-increasing complexity. In comparison to how traditional craft approached improvement via gradual refinement over time, design-by-drawing offered a greater perceptual span both in terms of managing size (the scale drawing) and production (as it supports both overview and detail: work can be divided, planning and building coordinated, and so on). But Jones goes on to discuss why modern design problems are even more complicated than traditional ones, requiring new methods with even greater perceptual span, coming to the conclusion that

“The search space in which we have to look for feasible new systems, composed of radically new products and components, is too big for rational search and too unfamiliar to be penetrated and simplified by the judgments of those whose education and experience has been limited to the existing design and planning professions. Clearly, we need ‘multi-professional’ designers and planners whose intuitive leaps are informed by knowledge and experience of change at all levels from community action to component design. Equally, we need new methods that provide sufficient perceptual span at each of these levels.”²

Looking back at design and design education, however, I think Jones’s argument can be rephrased as follows: it is not so much that modern design problems are more complex than previous ones, but rather that coping with complexity is a fundamental driver of change in design—the perceived radical increase in complexity is not only because of external change such as societal and technological development, but most importantly also due to an increasing ambition and ability *within* design to both appreciate and address such complexity. In other words, had design problems changed so much and become so much more complex over time, there would be no need or space

- 3 D. C. Christner, *The International Encyclopedia of Scientific Tailor Principles for All Kinds and Styles of Garment-Making* (Philadelphia: [S. M. Larzelere, printer], 1885), 157, available at <https://archive.org/details/internationalenc00chri.org/details/internationalenc00chri>.
- 4 "Oral History Interview with Anni Albers, 1968 July 5," Archives of American Art, Smithsonian Institution, online, accessed February 9, 2020, <https://www.aaa.si.edu/collections/interviews/oral-history-interview-anni-albers-12134>.

left for craft—but there is, and a substantial part of the design world still deals with matters of form and material. Beyond responding to needs and other external pressures, there was a significant element of choice in design wanting to engage and explore alternatives beyond its previous scope.

Before looking for possible internal motivations for engaging with ever increasing levels of complexity, however, we need to unpack the notion of complexity itself, and what Jones calls its search space. If we think of design as emerging out of traditional crafts, and take making rather than planning as its creative foundation, then the making of everyday things before designing focused on creating things with just a few functions. Most of the time something would be made with few materials, by a small group (or even just one craftsperson) and almost always intended for a particular customer and a well-known, specific context for use. The creative practices that formed in and around such circumstances could therefore afford to rely extensively on previous experience. Improvement through gradual refinement over time was not necessarily (and certainly not only) because of limitations to the perceptual span of the methods used, but because it was effective—when a context is stable enough, previous experience can serve as a useful foundation for future action.

Consider the craft of tailoring: its materials are mostly familiar, as are its tools and techniques. Many of the garments a tailor makes would be based on templates that have been refined over the years. And further, there are ways of finding out what is not known: measurements can be taken, preferences in fit noted, age and life habits accounted for (to determine how much margin to include in the waist). In an early example of design research, "The International Encyclopedia of Scientific Tailor Principles for All Kinds and Styles of Garment-Making" from 1885, D.C. Christner states the following towards the end of a section on tailor finishings:

"We have given the above, because they represent standard-methods; the principles of which, will ever remain the same; and which, cannot be effected by fashion—as they can be adjusted to every conceivable style."³

The situation designing emerged from is not just one of relatively low (perceived) complexity, it is also one where the process of making relied on existing knowledge to a significant degree, and where the new knowledge obtained during the process was primarily used to make adjustments. It is however important to remember that this is not the same as to say that an outcome is somehow determined by this, or that there is no room for experimentation or innovation. On the contrary, there is considerable freedom. For instance, a weaver might be using tools, techniques, and materials that have been used for centuries, even millennia, and yet engage in a process where the outcome is anything but completely determined.

What is discussed above as the known vs. unknown aspects of the design situation concern what we can say and know about the design space *as such* at the outset, not what we decide to do with that knowledge. Anni Albers, once a student at the Bauhaus and later head of the weaving department at Black Mountain College, provides a beautiful example of how this issue can be addressed in design education:⁴

- 5 Clive Dilnot, "The Matter of Design," *Design Philosophy Papers* 13, no. 2 (2015): 116, DOI: <https://doi.org/10.1080/14487136.2015.1133137>.

“SEVIM FESCI: What is your method of teaching? How do you...?

ANNI ALBERS: Well, maybe it’s an exaggerated term to call it ‘method’ at all. But I tried to put my students at the point of zero. I tried to have them imagine, let’s say, that they are in a desert in Peru, no clothing, no nothing, no pottery even at that time (it has been now proven that, archaeologically, textiles have come before pottery), and to imagine themselves at the beach with nothing. And what do you do? There are these fish at the Humboldt Current, marvelous fish swimming by, the best in the world in fact, because of the cold current there. And it’s hot and windy. So what do you do? You wear the skin of some kind of animal maybe to protect yourself from too much sun or maybe the wind occasionally. And you want a roof over something and so on. And how do you gradually come to realize what a textile can be? And we start at that point. And I let them use anything, grasses, and I don’t know what. And let them also imagine what they were using at that point. Did they take the skin of fish and cut it into strips possibly to make longitudinal elements out of which they could knot something together to catch the fish? And get carrying materials in that way.

SEVIM FESCI: Quite a bit of imagination there.

ANNI ALBERS: Exactly. Absolutely inventing something. And gradually then we invented looms out of sticks and so on. And the Peruvian back strap loom. And once they understand these basic elements—that the Peruvian back strap loom has embedded in it everything that a high power machine loom today has. And they understand it in a completely different sense than walking into a factory and seeing these things operate because they know what is necessary and what kind of inventions have occurred in the course of history. Well, this is a very rough way of doing it. So it goes back to imagination and invention.”

Looking back at the time when design emerged, at least three different dimensions of complexity were coming into view: which things are being made (the results and outcomes); what the design process is like, (individual, collaborative, or participatory work); and for whom and for what the design is destined (the use situation) (Figure 1).

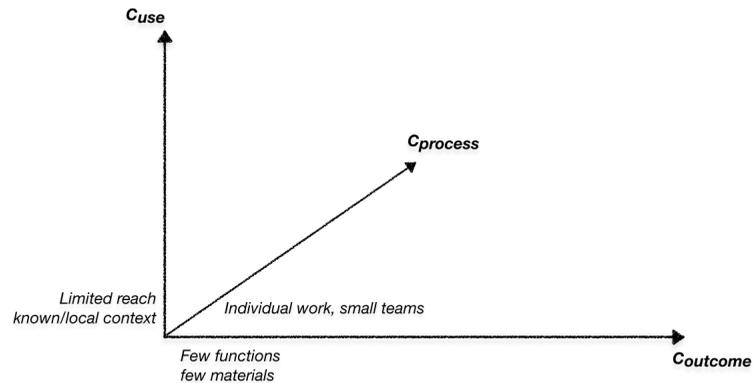
Design seems to be constantly expanding its scope and reach. Traditional crafts did not evolve in this way. What makes designing so different? There are several potential explanations to consider. One option is in line with the characteristics of industrial capitalism—to quote Clive Dilnot

“...as a professional activity design does not occur, does not happen, only or even largely through its own volition. Rather, design—modern design, professional design—is called into being by industrialization and is so in order to do a specific job.”⁵

Industrial design came about for many reasons, but one cannot escape the fact that had there not been industry, with its drives, needs, and an inherent orientation towards growth, there would not have been industrial design. A second potential explanation might be found by searching for colonialist traits and tendencies. Though rarely explicitly colonial in its intention, something still happens when the notion of “making something for someone” is transformed by the capacity to make things not for a few people, but for hundreds or thousands of people elsewhere in the world—a transformation even further accelerated by using or exploiting people’s needs and desires in

Figure 1

Three aspects of complexity in design: the complexity of the things we aim to create (the outcome); the complexity of the design process, including the design situation, methods, etc. (the process); and the complexity of the intended use situation, including how far it reaches beyond the designers' own context (the use). © 2020 by Johan Redström.



- 6 Walter Gropius, "Principles of Bauhaus Production: Dessau," in *Programs and Manifestoes on 20th-Century Architecture*, ed. Ulrich Conrad (1926; Cambridge, MA: MIT Press, 1970), 95–97.

various ways. Strictly speaking, design might not be in the business of telling people how to live their lives, or what to appreciate and value, but the actual outcome is sometimes remarkably close to such ambitions.

Contemporary challenges, such as sustainability (in the wider sense), will require us to contend with many historical factors. However, there is also hope to be found in reflecting on this process of constant expansion, and as we look for other perspectives on what fundamental reasons for change there might be. And so let us take another look.

Making Design

Design emerged out of a fundamental rupture in making: a deep split that occurred as people began to use machines to make, or rather to produce things. In traditional crafts, there is a unity to the work, and making also entails the producing of the actual thing. As machines took over, and the unity of making and production was lost, much of what was previously taken for granted with respect to the ethics and aesthetics of making could not be sustained. But, this also meant that making was now free from production: the ultimate purpose of making was no longer tied to producing that thing in the end, but could become something else. Indeed, this could be seen as either loss or liberation (or indeed both)—making *had* to become something else. And the new idea about making that was planted, nourished, and cultivated in places such as the Bauhaus was that making could be about finding things out.

At first, to not take things for granted but instead find things out meant precisely that: to actually find the things that would be suitable and worthy of mass replication. Consider the following excerpts from Walter Gropius's "Principles for Bauhaus Production: Dessau" in 1926:⁶

"This research into the nature of objects leads to the conclusion that by resolute consideration of modern production methods, constructions, and

materials, forms will evolve that are often unusual and surprising, since they deviate from the conventional (consider, for example, the changes in the design of heating and lighting fixtures).

“It is only through constant contact with newly evolving techniques, with the discovery of new materials, and with new ways of putting things together, that the creative individual can learn to bring the design of objects into a living relationship with tradition and from that point to develop a new attitude toward design....

“The Bauhaus workshops are essentially laboratories in which prototypes of products suitable for mass production and typical of our time are carefully developed and constantly improved.

“In these laboratories the Bauhaus wants to train a new kind of collaborator for industry and the crafts, who has an equal command of both technology and form....

“The Bauhaus represents the opinion that the contrast between industry and the crafts is much less marked by the difference in the tools they use than by the division of labor in industry and the unity of the work in the crafts. But the two are constantly getting closer to each other. The crafts of the past have changed, and future crafts will be merged in a new productive unity in which they will carry out the experimental work for industrial production. Speculative experiments in laboratory workshops will yield models and prototypes for productive implementation in factories.”

We can clearly see a shift in focus from final product to prototype, and how that shift supported a reorientation of the making process from production towards speculative experimentation. It implied that questions of actual production could be bracketed and, at least to some extent, dealt with in principle. Further, it meant that this emerging practice we now call design was no longer limited by the scale and reach of its own making-production, as traditional crafts were, but able to gradually distance itself from the limitations of any particular kind of making. By leaving the question of actual production open, design could begin to explore making in a much more experimental sense, speculating about change at different scales, and even begin to approach systemic issues. The ingenuity of this reorientation is that design could still be conceived as a matter of making things, and many of the processes could still be very close to prevalent practices in the arts and crafts (in some respects, the distance between Walter Gropius and William Morris is not that great). Nevertheless, this shift towards prototyping opened up for transcending most, if not all, practical and not least conceptual limitations associated with any *particular* act of making.

At its core, that transcendence initiated a transformation of making by means of a reorientation from production to knowledge creation—in other words, a transformation from *making things* to *making things possible*. And it is precisely here that I think we find hope: design does not rest on an idea that we already know how to do things, but rather on doubt, unstable ground, and a profound willingness to question what making things is all about. In many ways, early industrial design was still largely an applied art. The processes used were still very much grounded in individual artistic practice—but there is a fundamental shift taking place as the unity of the work was lost and the very purpose of making redefined.

7 Tomás Maldonado, "New Developments in Industry and the Training of the Designer," *ULM Bulletin 2* (Ulm: HfG Ulm, 1958), 25–44.

8 *Ibid.*, 26.

9 *Ibid.*, 27.

10 *Ibid.*, 34.

From Why, and How, to Who

This shift in the purpose of making—the idea that we primarily make to make things possible—first came to expression as a shift in focus from final thing to prototype, and thus from final outcome to which designs must be explored to get there. Indeed, as design evolved and began to explore new territories in the design space—which includes engaging in more complex issues—the limitations inherent in an individual artistic process became increasingly salient. And then, at some point, designing was ready to fundamentally question and investigate another aspect of making that had previously been taken for granted: *how* we go about designing.

As an illustration of this critical shift, let us consider another highly influential school in the context of European design education, *Hochschule für Gestaltung Ulm* (HfG Ulm). In the late 1950s the HfG Ulm began to transform design from a primarily individual practice to a collaborative effort. In the second issue of the *Ulm Bulletin*, published in 1958, there is a piece by Tomás Maldonado entitled "New Developments in Industry and the Training of the Designer."⁷ Part of it reads

"Today, not only has the true importance of design training been recognized, but the dissemination as well as the discussion of the theme has been fully fostered.... This ... would lead one to imagine that the schools of industrial design have already reached their maturity in every country, and all in the same way; in other words, that the question is one of institutions whose goals and methods are finally established."⁸

"However ... these very same [institutions] ... show on the other hand a symptomatic state of disorientation regarding what industrial design is and ought to be...."⁹

"In each of these periods, the producer-consumer relationship differs, for in each one the product functions in a different way. As a result, the design cannot always have the same function or the same significance. In the first of the periods I have just recalled, the designer was the constructor, the inventor, the planner. Henry Ford himself was a great designer of this period. In the second period, the designer was the artist; it matters little whether his aesthetic was popular or purist. In the third period, he will be the coordinator. His responsibility will be to coordinate, in close collaboration with a large number of specialists, the most varied requirements of product fabrication and usage; his will be the final responsibility of maximum productivity in fabrication, and for maximum material and cultural consumer-satisfaction."¹⁰

If the prototype is a typical example of what came out of design's reorientation with respect to why we make, then inherent in for instance this critique by Maldonado was a new idea about design methods and processes. There is much to be said about design methods, but what is most important here is that discerning methods and methodology became a way of thinking about the design process itself as something separate from the designer, as something we can design—and therefore as something that can be designed in many different ways. In retrospect, and because of the rhetoric at the time, it is tempting to think of this as a matter of making design certain—or more precisely, to do what one can to increase the chances of design resulting in

- 11 Jones, *Design Methods*, 45.
- 12 John Christopher Jones, "How My Thoughts about Design Methods have Changed During the Years," in *Developments in Design Methodology*, ed. Nigel Cross (New York: John Wiley and Sons, 1984), 332.
- 13 It is probably no coincidence that while the first conference associated with the emerging Design Research Society was held around the theme of design methods (1962), the one that revived the effort to establish the society a decade later (1971) was about design participation. For more on this, see <https://www.designresearchsociety.org/cpages/history>.
- 14 For example, see Finn Kensing and Joan Greenbaum, "Heritage: Having a Say," in *Routledge International Handbook of Participatory Design*, ed. Jesper Simonsen and Toni Robertson (New York: Routledge, 2012), 21–36; and Pelle Ehn, *Work-Oriented Design of Computer Artifacts* (Stockholm: Arbetslivscentrum, 1988).

a certain result. But more fundamentally, this was about questioning *how* we make, finding ways to make design processes visible and open for review and revision. In other words, it was about opening up yet another aspect of making to alternatives.

An illustration can be taken from the design methods movement in the UK in the 1960s. Consider the following remark by John Chris Jones from *Design Methods*:¹¹

"The first question to be answered is 'What do the new methods have in common?' The most obvious answer has already been given: it is that all the methods are attempts to make public the hitherto private thinking of designers; to externalize the design process.... Clearly, the underlying aim is to make designing more manageable, particularly at the systems level. A major advantage of bringing design thinking into the open is that other people, such as users, can see what is going on and contribute to it information and insights that are outside the designer's knowledge and experience."

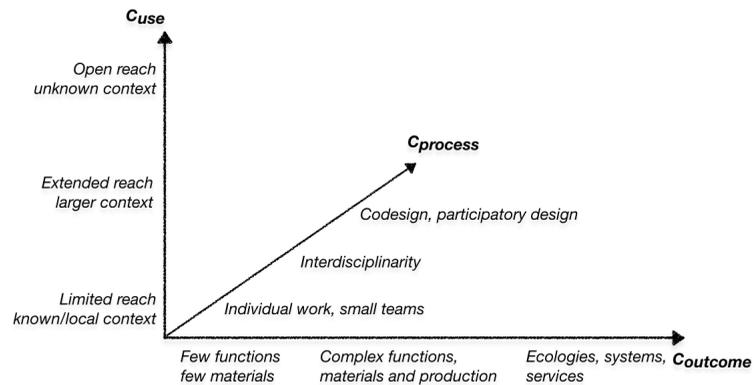
That the intention was not to make design more predictable or more certain is quite evident from Jones's later remarks on what he felt became an area of study that misunderstood its basic premise:¹²

"Where is the essence of the subject?
For me the word in the index with the most sub-entries to it
Is 'Instability of Design Problems'
Which has about ten entries
The whole problem becomes more unstable as you widen it
As you take more and more of life to be part of the problem you
don't get a more stable problem you get a less stable problem.
And this I think is not what the rationalists like.
I think that people who approach this subject because it seems
rational are those who like certainty in life.
If you wish for certainty you might as well leave this subject alone
Because design is to do with uncertainty
As far as I can see
But a lot of people who do wish for certainty do dabble in it
And I fear they're wrecking the subject"

Indeed, the most important result of opening up the question of how we design was not that it made design more predictable, but rather the opposite: it made the design process something we do not take for granted, but something we actively design.

If we follow designing into the space of possibilities revealed when we replace an individual process with an externalized process we actively design, we will soon run into the issue of *who* should then be part of such forms of collaboration.¹³ Ideas about participation came into design for a number of different reasons, ranging from the needs of industry to coordinate across expertise in larger projects, to political ambitions of making democratic principles present in development processes leading to significant changes in the workplace (the latter becoming a central starting point for participatory design in Scandinavia).¹⁴

Figure 2
The design space has expanded over time as a result of exploring new aspects of and possibilities for addressing complexity.
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15 Jones, *Design Methods*, xxxiii.

Again, there is an inherent, critical orientation in this transformation of making, something asking us to be less certain about what making must be like. Jones again:

“Designer. Inventor. Architect. Genius. Leonardo da Vinci. Our new tradition, in the West, has been to believe that creativeness is a matter for gifted individuals and that an ‘ordinary person,’ or a group, cannot do anything new. I think this is a myth, but a difficult one to disprove. Looking back now, at this book, and at what has become of design methods, I think that this is the crux of the matter: the new methods permit collaborative designing whereas the old methods do not. They change the nature of designing, or can if one lets them.”¹⁵

Given this very brief outline of how design has been evolving, I would argue that a central reason the scope of design has been expanding is a result of how the interest in coping with complexity has led to critical and constant questioning of what making things can be like. This emerging design space is illustrated in [Figure 2](#).

We can see the traces of each of these once radical transformations in how we work today. We see them in the ever expanding repertoire of prototyping, and how we still constantly come up with new ways of manifesting ideas, concepts, and use situations depending on what objectives, contexts, materials, and technologies we engage with. We can see it in how we continuously change and invent new design methods and processes as we understand more about the expanding design space and how to work with it. And we can see it in the many different ways to include people in a design process, ranging from design teams, field studies, and participatory processes, and in how the boundaries between ‘designing’ and ‘using’ undergo constant change, not to say gradual dissolution. One could say that the transformation of making from actually making things to making things possible built an inherent instability into design that ensures designing will never be quite what it used to be.

- 16 Maria Göransdotter and Johan Redström, "Design Methods and Critical Historiography: An Example from Swedish User-Centered Design," *Design Issues* 34, no. 2 (2018): 20–30, DOI: https://doi.org/10.1162/DESI_a_00483.

I believe it is crucial to keep in mind that the reason design has access to an expanding design space is not only be found in what new technologies and new design problems (and so on) we have engaged in, but also in our constant and critical questioning of making, and a commitment to not take designing for granted. These transformations of designing came out of a need to change rather than make things more stable. It is certainly convenient to think of the design process as having a fixed structure, of design methods as a pick and mix toolbox, but that is to radically reduce design's potential when it comes to dealing with complexity. Further, we risk disregarding the context in which these transformations emerged, somehow ending up with a perspective where ways of prototyping and methods or formats for participation and so on seem to exist in a void, as if they are timeless and neutral tools to be used at the pleasure of the designer.¹⁶ On the contrary, design has always evolved in relation to its context. As with any form of life, what is sustainable in one context might turn out to be an invasive species in another.

Designing Design Education

With these historical trajectories in mind, let us turn to the question of design education. As mentioned briefly at the outset, there is no such thing as a general education in design. To ask a question like "What competencies and skills should a designer have?" is not that different from asking "What shape, material and color should a chair have?" The answer in both cases would have to be that it depends on who it's for, what it will be used for, where it will be made, and so on and so forth. To answer such questions, we need to engage in design—we need to actively start choosing between which options we have, based on what we aim for. And we need to negotiate a number of conflicting needs in order to come up with a meaningful whole that is something more than the sum of its parts. Precisely how do we conceptualize an educational program as a meaningful whole? Here follows three figures exploring how to conceptualize design education based on what was found in the stories told in the previous section.

Positions/Trajectories

Imagine we were to plot out the elements of a design curriculum onto the three-dimensional illustration of complexity introduced earlier (see [Figure 2](#)). The design processes and methods taught and the forms of prototyping involved could be correlated to points on or near the three axes, and the final contours of the form that emerges would give us an understanding, or image, of how the program curriculum is "shaped," including how it relates to use, potential users, other stakeholders, and so on ([Figure 3](#)).

Now, there are at least two ways of constructing a curriculum after plotting a program onto a map like this. The first way is to decide where in this conceptual space of coping with complexity we want to situate the program's center of gravity—for instance, we could base this decision on what kind of outcome we aim for (as in product design, service design), or what kind of material we aim to concentrate on (as in textile design), or

Figure 3

A model of the curriculum in which the center and contours lie somewhere within the axes of its design focus (use, process, outcome). ©2020 by Johan Redström.

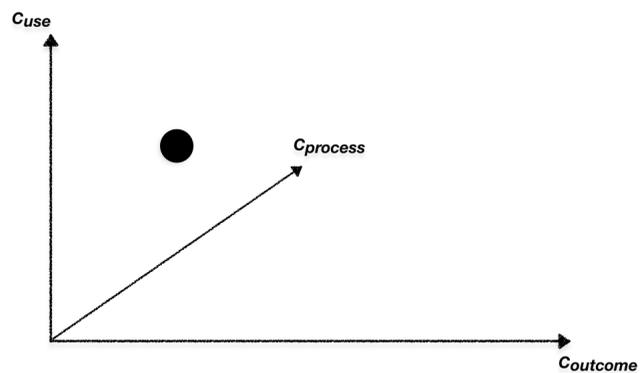
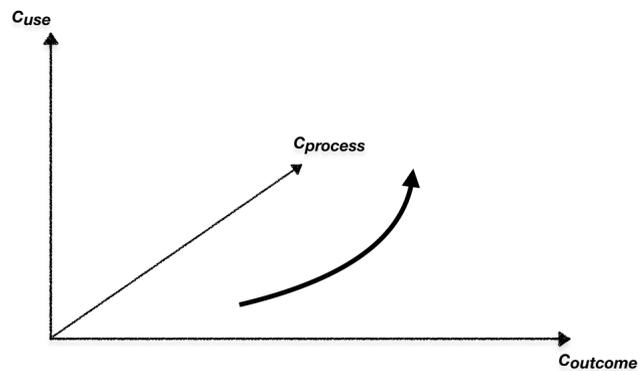


Figure 4

A curriculum conceived as a trajectory; the resulting shape is similar to a situated line, but with no special center of gravity. ©2020 by Johan Redström.

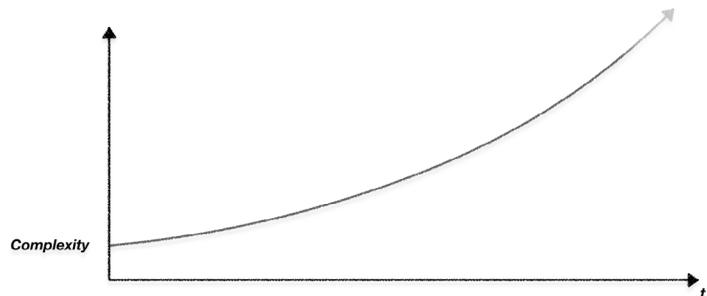


what forms of collaboration to start from (as in codesign). All of these are perfectly valid and quite common ways of framing an educational program. Because such programs are based upon a stable core, it also makes sense to name them accordingly (as in “product design” or “codesign”). Historically, this seems to be the most common way to construct a curriculum: assume a position in this space (and maintain it).

The other way is to think of an educational program as a trajectory in this space. To the best of my knowledge, there are few programs explicitly conceived as trajectories rather than as having a center of gravity (Figure 4). Looking closely, however, there are often tendencies towards introducing increasing complexity over time within some curricula, and if there is a possibility for elective direction within the program, these can be seen as a kind of trajectories that will allow the students to move into different parts of this space. Further, many design students seem to have an (intuitive) understanding of this and create something of a trajectory for themselves by choosing different (kinds of) programs, often at different schools, to complete their undergraduate and post-graduate studies.

I believe that curricula based on trajectories rather than positions will become more common as design evolves, not only because the ways

Figure 5
How (perceived) complexity in design seems to have increased over time. ©2020 by Johan Redström.



individual choice is becoming more prominent in higher education, but because this could be a way of responding to emerging needs in design. To offer a curriculum based on the idea of a trajectory rather than a position implies that the educational structure would embody a constant transformation of making. This can be used to counteract tendencies to stabilize the notion that “*this* is design and *this* is how you do it,” and instead build the notion that design is actually inherently unstable into a program’s movement through courses and projects.

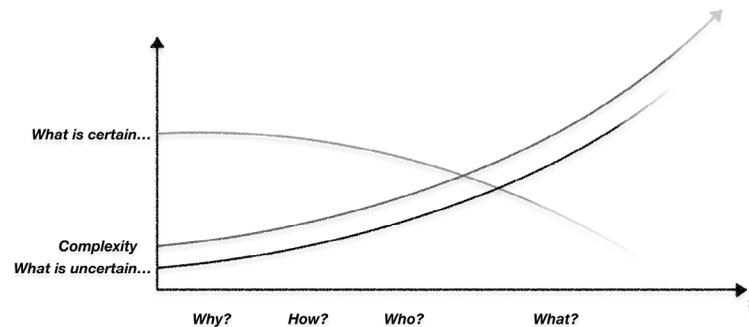
Certainties/Uncertainties

If we collapse the three-dimensional illustration of complexity used earlier in this text (see [Figures 1](#) and [2](#)) into just one dimension, and then plot any (perceived) increase in complexity over time, we might get something like the diagram in [Figure 5](#).

Now, let us add two more lines to the graph based on the history of designing described earlier in this article. I have argued that there has been a constant opening up of new aspects of designing, and that less and less is taken for granted as starting points when designing. We can draw this as two lines, one representing the decreasing proportion of how much we take for granted and another one representing the increasing proportion of aspects of designing that we actively create and elaborate. The resulting visualization ([Figure 6](#)) illustrates that we take less and less for granted, and that more and more aspects of making are opened up as we move through transformations of why we make, how we make, and with whom. In reality, the lines are a mess and not at all this smooth and continuous, but for our present discussion this simplification serves the purpose of showing how the balance between what is already given at the outset and what we actively go about changing, revising, finding out, and so on as part of designing has shifted.

Figure 6

How design has addressed increasing complexity by taking less and less about design for granted. ©2020 by Johan Redström



- 17 See Johan Redström, *Making Design Theory* (Cambridge, MA: MIT Press, 2017), 55.
- 18 See Johan Redström, "On Technology as Material in Design," *Design Philosophy Papers* 3, no. 2 (2005): 39–54, DOI: <https://doi.org/10.2752/144871305X13966254124275>.
- 19 See Johan Redström, "RE:Definitions of Use," *Design Studies* 29, no. 4 (2008): 410–23, DOI: <https://doi.org/10.1016/j.destud.2008.05.001>; Redström, *Making Design Theory*, 71.
- 20 See Johan Redström and Heather Wiltse, *Changing Things: The Future of Objects in a Digital World* (London: Bloomsbury, 2018), 9.

Now, when we consider how design has developed in the past, there are indications we have come to a point where complexity is again moving beyond what contemporary ways of designing can cope with. There is a need to address yet another fundamental aspect of making: the central task for us now is how to open up the question of *what* we make. This is a most difficult question, as it tends to hide in plain sight. It is so easy to think this is exactly where we started, and that it is the question the entire design process revolves around: what is it that we're making, what should be the outcome? True, deciding what to make is perhaps the most central question we ask. But when we look at *how* we ask that question, how we set ourselves up to answer it, to a significant degree we take our conceptual space—the categories we work with and within; the concepts we use to describe, communicate, and even understand what we're doing, etcetera—for granted. And every time we take a concept for granted, we will reproduce the implications it has for how we conceive of an issue, what possibilities we see, how we frame what constitutes a preferable outcome, and so on. We come to assume we know what form is,¹⁷ what constitutes a material,¹⁸ what (or who) a user is,¹⁹ what a thing actually is,²⁰ what value means, and so on and so forth. Not to mention how we almost desperately try to fit new things within already established categories—"This is not just any phone, it's a *mobile* phone; it's not just a mobile phone, it's a *smart* phone"—even though we realize that this brand new thing brings radical change to the ways we use and relate to the technology it offers.

Critical inquiries into concepts of design have been part of research and critical practice since the beginnings of designing, and designing would not have evolved as it has without them. Still, it appears that much of this work happens outside the context of everyday practice—at least in comparison to the extent to which different methods, prototyping and forms of collaboration are being explored as part of almost any design process. Indeed, design practices that engage extensively with the more conceptual realm we

21 Redström, *Making Design Theory*, 35.

typically call out as something slightly different, for instance as critical practice, speculative or conceptual design, or as design research. What we have made an integral part of designing with respect to *why* we make, *how* we make, and *who* is doing the making, we have never quite done with respect to the conceptual spaces we work with and in. (Rather, what sometimes seems to be happening is quite the opposite—a notion is spreading that there are *certain* ways that designers think that can be extracted, exported, and put to work in other disciplines.)

This push towards having to open up the basic what of design accelerates as we move to a place where the balance between certainty and uncertainty shifts even more towards the latter. If we look at contemporary challenges such as sustainability, a solution might not even be visible until our perspective has changed enough to allow another world to come into view. To gain access to possible ways for us to cope with complexity, we need to more actively start designing the conceptual spaces we depend on as we design, and we need to be at least as experimental, speculative, uncertain, and willing to let go of things taken for granted as the ones who initiated similar transformations in design before us. Indeed, design education might become much more theoretical than it has been in the past. But it will not be theory as we know it from other disciplines, because it will not be framed by a desire to find out *what is*, but driven by a need to find out *what could become*.

Naturally, one can decide to position an educational program anywhere on the spectrum between how much is considered certain and how much is not. There is nothing stopping us from simply deciding or defining (whether based on our own opinion, a study of current job market needs, or something else) that *this* is what design is and *this* is how you do it—and then teaching our students everything they need to know to *practice* precisely that. But that would be to disregard the critical shifts that design emerged from, and therefore to try to capture something that was never meant to be caught.

A Design/Designing

Besides theory, another contemporary issue in design education concerns the relationship between basic education and research. As the outline of design's history above suggests, research did not get incorporated into design as the field evolved, or because the academy values knowledge and expertise based on where and how it is produced. Research is part of what made design emerge in the first place. This is research not necessarily in the sense of “producing knowledge as an end in itself,” but as “an integral part of making (new) things possible.” Indeed, I have argued that the most important shift making design possible was the substitution of actual production for learning and generating new knowledge. What we now call research through design, or research by design, or any other similar notion, is not really new—it is a more articulated cultivation of something that has been a central part of design ever since it first came about. Still, something important is happening and I believe it has to do with the issue of how to further open up design to being designed. To explain this, I will need another illustration.

Elsewhere, I have explored the idea that central dichotomies in design can be seen as continuous spectra.²¹ There I argued that while some

Figure 7

The dichotomy between particular and general in design, instead depicted as a continuous spectrum ranging from what a design is to what designing is. Adopted from Redström, *Making Design Theory*, 39. © 2017 by Johan Redström.

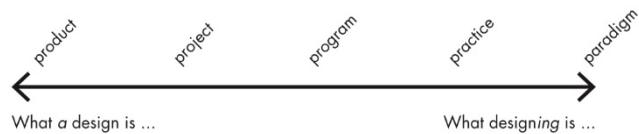
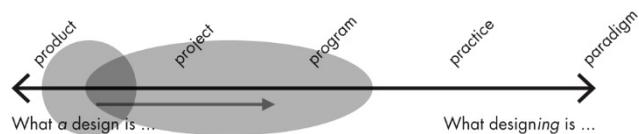


Figure 8

Using design research not to determine which designs might be best, but rather what kinds of *designing* are possible. © 2017 and 2020 by Johan Redström.



22 Gropius, "Principles for Bauhaus Production," 95.

23 Italics mine.

24 For example, see Harold G. Nelson and Erik Stolterman, *The Design Way: Intentional Change in an Unpredictable World*, 2nd ed. (Cambridge, MA: MIT Press, 2012), 27.

concepts might not be very easy to define on their own, they receive a precise, yet fluid, meaning in relation to each other. One such spectrum extends between the particular and the general, and I suggested that this can be used to understand a range of concepts spanning from what a design is to what designing is about (Figure 7).

If we look at research done in design, it is often quite close to the particular "what a design is" end of this spectrum. And this might be because this is where it all started, as we saw earlier in the words of Gropius²²

"In the conviction that household appliances and furnishings must be rationally related to each other, the Bauhaus is seeking—by systematic practical and theoretical research into formal, technical, and economic fields—to derive *the design of an object from its natural functions and relationships.*"²³

Today, we see traces of this idea in projects that might have a research phase, early on, during which designers aim to find out more about an outcome's use, potential users, contexts, technologies, and so on—knowledge that will support the creation of an appropriate right design. But if we are to open up the what of design, and make designing something we actively design, then this kind of research will not help us much, because it still revolves around a particular outcome and not the practice(s) that produce it.

As illustrated in Figure 8, we need design research that pushes the focus more towards the middle, where questions about what designing is are much more present. Some of the work happening in research through design can be interpreted as making such a shift away from the end of the (ultimate) particular²⁴—from making a design towards creating an alternative

25 Redström, *Making Design Theory*, 83.

example of what designing could be. Any resulting designs are not the only outcomes, they are also examples or illustrations that express something about what the act of designing could be. Such research opens up a perspective on designing itself as a central aspect of what is being explored—elsewhere, I have termed these “programmatically experiments.” These offer hypothetical worldviews that illustrate something about what kind of designing they might support.²⁵

This could potentially lead design research in very different direction compared with more traditional notions of practice-based research. There is a considerable difference between seeing practice as a foundation for carrying out research, and seeing practice itself as something to be prototyped through speculative experiments (to paraphrase the quote from Gropius above). In any case, this is a kind of practice research I think we will see much more of in design education: research that allows students to critically explore the idea that *designing* is not something you are taught how to do, but something you learn how to make.

A Concluding Remark

In this paper I have argued that complexity and uncertainty are intertwined in design, but perhaps not necessarily in the ways one might initially think of. I have argued that the perceived increase in complexity in design does not (only) stem from external factors, but from an inherent, continuous and critical questioning of what design is and could be. And that it is this critical attitude that has allowed the scope of design to grow, as less and less of what designing must be like has been taken for granted. To conclude, let us therefore take a look at two arguments regarding the future of design education sometimes heard from our surrounding context in academia: that design needs to be based on research, and that it needs to develop a stable theoretical basis. I would agree that both research and theory are of significance to us, and that both are likely to become even more important as design evolves. But I profoundly disagree as to why this will be the case. Research has always been central to design, as it was placed at its heart when making things was replaced by making things possible. Theory will become central, in the sense that designing will more actively engage in making the concepts and conceptual spaces needed to open new possibilities and address complexity. But neither research nor theory will be used to bring order and stability to design. On the contrary, we will use them to make things less certain.

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Declaration of Interests

There are no conflicts of interest involved in this article.

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