Design Problems

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This Essay draws on our empirical research into designers and their work to investigate the limits of intellectual property law for achieving its goal of progress in the design context. We focus on two related aspects of our research and also address a pressing doctrinal question in design patent law. The two research questions we discuss are: (1) How do designers conceive of and solve design problems through innovative design practice?; and (2) How do designers incorporate human values of coherence, inclusivity, and sustainability in their process, imbuing their practice with a kind of politics? The related doctrinal question concerns patent law's obviousness doctrine, which recently has been restored in the design patent context, but in ways we consider incomplete and to which we offer several improvements. Specifically, we emphasize the role of constraints under which designers work, and how those constraints can guide evaluation of the problems designers seek to solve.

Introduction

For more than 40 years, the Federal Circuit required courts evaluating whether a claimed design was obvious to use a rigid and narrow set of criteria that were disconnected from design practice and almost invariably led courts to the conclusion that the claimed design was patentable. Under the former *Rosen-Durling* test, a court could find a design obvious only if it could (1) find a single prior art reference, the design of which was "basically the same" as the claimed design (a "primary reference"); and then (2) find secondary references that were "so related" to the primary reference that the references suggested application of the design features to modify the primary reference.[1]

Defenders of the *Rosen-Durling* framework claimed it was necessary because design is so fundamentally different from invention that prior art

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1. Durling v. Spectrum Furniture Co., 101 F.3d 100, 103 (Fed. Cir. 1996) ("Before one can begin to combine prior art designs, however, one must find a single reference, 'a something in existence, the design characteristics of which are basically the same as the claimed design.'" (quoting *In re* Rosen, 673 F.2d 388, 391 (C.C.P.A. 1982))); Durling, 101 F.3d at 103 ("Once this primary reference is found, other references may be used to modify it to create a design that has the same overall visual appearance as the claimed design."); *id.* at 103 ("These secondary references may only be used to modify the primary reference if they are 'so related [to the primary reference] that the appearance of certain ornamental features in one would suggest the application of those features to the other.'" (quoting *In re* Borden, 90 F.3d 1570, 1575 (Fed. Cir. 1996))).

can't be evaluated the same way as it is in utility patent law. Unlike inventors, designers do not seek to solve problems and instead aim only to make articles beautiful. And because beauty is in the eye of the beholder, it makes no sense to ask whether the appearance of one design is obvious in light of a prior design.

Judge Lourie's "additional views" in the panel decision in *LKQ Corporation v. GM. Global Technology Operations LLC*[2] are representative:

> While 35 U.S.C. § 103, which deals with obviousness, does not differentiate between types of inventions, and hence applies to all types of patents, the considerations involved in determining obviousness are different in design patents. Obviousness of utility patents requires considerations such as unexpected properties, utility, and function. Design patents, on the other hand, relate to considerations such as the overall appearance, visual impressions, artistry, and style of ornamental subject matter. Ornament is in the eyes of the beholder. Functional utility is objective.
>
> What is the utility or function of something that is ornamental? To be sure, it may also be functional and have use, as do the fenders in the case before us, but that function is beside the point when considering whether its ornamental features would have been obvious. And what is an unexpected property in the context of design patents, for it must be related to ornament, as function is not to be considered in evaluating obviousness of a design?[3]

According to this view, only aesthetic similarity (or difference) was relevant to design patent obviousness, because designs cannot be evaluated in terms of technical problems and solutions. Aesthetic evaluation was presumed to be subjective, and that meant that near identity ("basically the same") had to be the standard; there are no objective criteria by which to judge the significance of differences from prior art. And that similarity analysis had to be anchored in a comparison to a single primary reference—otherwise courts would be tempted to assemble bits and pieces from prior art

2. No. 2021-2348, 2023 WL 328228 (Fed. Cir. Jan. 20, 2023).

3. *Id.* at *8 (Lourie, J., Additional Views). *See also* Janice M. Mueller & Daniel Harris Brean, *Overcoming the "Impossible Issue" of Nonobviousness in Design Patents*, 99 KY. L.J. 419, 439 (2010–2011) ("Any 'problem' that a designer addresses via aesthetics is necessarily ill-defined, elusive, and subjective."); *id.* at 511 ("Design, insofar as the aesthetic appearance is concerned, is an artistic endeavor that is not generally perceived as or likened to technical problem solving."); 1 DONALD S. CHISUM, CHISUM ON PATENTS § 23.03[6] (2024) ("With a design, the problem—how to make an article that is more ornamental and attractive to the eye—is normative in character and thus more open-ended. Not surprisingly, the courts openly admit that any assessment of the obviousness of the solution is necessarily subjective."); Sarah Burstein, *Visual Invention*, 16 LEWIS & CLARK L. REV. 169, 175 (2012) (describing a "designer's problem" as "a fairly open-ended one, with many possible—and few obvious—solutions").

references to make some kind of "Frankenart," an approach that would render all designs "obvious."[4]

The Federal Circuit has now rejected the *Rosen-Durling* framework and instructed courts to do precisely what the defenders of that framework claimed couldn't be done: identify analogous art and determine, from the perspective of an ordinary designer, whether the claimed design is obvious in light of that analogous art.[5] As we elaborate further below, our research confirms the Federal Circuit's new approach. Designers consider much more than ornamentality in pursuing design excellence, and they frequently reference a wide range of prior work—not to pick and choose features, but instead to gain inspiration and create something that coheres as a whole.

In the utility patent context, courts consider prior art to be "analogous" when it is either (a) from the same field of endeavor as the claimed invention, or (b) "reasonably pertinent to the particular problem with which the inventor is involved."[6] In *LKQ*, the Federal Circuit said that the first part of that approach (same field of endeavor) translated well to the design patent context, where courts should ask whether the prior art design is for "the same article of manufacture or articles sufficiently similar that a person of ordinary skill would look to such articles for their designs."[7] If the claimed design is for an automobile part, for example, then other automobile parts are relevant prior art because those designs are for the same article of manufacture.[8] But the Federal Circuit declined to say what it means for a prior art design to be

4. *See, e.g.*, Sarah Burstein, *In Defense of Rosen References*, PATENTLY-O (Dec. 6, 2022), https://patentlyo.com/patent/2022/12/defense-rosen-references.html [https://perma.cc/KAD2-FFGP] (criticizing the 'Frankenart' approach and arguing that such an approach would "devolve the § 103 inquiry into whether a designer *technically* could have created the claimed design based on the prior art, as opposed to (the more proper question of) whether it would have been *visually* obvious to do so").

5. LKQ Corp. v. GM Glob. Tech. Operations LLC, 102 F.4th 1280, 1299 (Fed. Cir. 2024) (en banc). Full disclosure: one of us (McKenna) was counsel to LKQ in the Federal Circuit proceedings. The views expressed in this Essay are our own and not LKQ's.

6. *Id.* at 1297; Airbus S.A.S. v. Firepass Corp., 941 F.3d 1374, 1379 (Fed. Cir. 2019) (quoting *In Re* Wood, 599 F.2d 1032, 1036 (C.C.P.A. 1979)).

7. *LKQ*, 102 F.4th at 1297 (quoting Hupp v. Siroflex of America, Inc., 122 F.3d 1456) ("We conclude that the first part of this two-part test applies to design patents in a straightforward manner. In other words, analogous art for a design patent includes art from the same field of endeavor as the article of manufacture of the claimed design.").

8. That aspect of *LKQ* was consistent with several recent cases in which the Federal Circuit had interpreted a claimed design by reference to the article of manufacture, treating the article of manufacture as a constraint on the scope of the claim. *See* Columbia Sportswear N. Am. v. Seirus Innovative Accessories, Inc., 80 F.4th 1363, 1379 (Fed Cir. 2023) ("[T]o qualify as comparison prior art, the prior-art design must be applied to the article of manufacture identified in the claim."); *In re* SurgiSil, L.L.P., 14 F.4th 1380, 1382 (Fed. Cir. 2021) (concluding that, for a prior-art design to anticipate, it must be applied to the article of manufacture identified in the claim); Curver Luxembourg, SARL v. Home Expressions Inc., 938 F.3d 1334, 1336, 1340, 1343 (Fed. Cir. 2019) (holding that, for an accused design to infringe, it must be applied to the article of manufacture identified in the claim).

"reasonably pertinent to the particular problem with which the inventor is involved,"[9] leaving it "to future cases to further develop the application of this standard."[10]

This Essay starts where the Federal Circuit left off. Our main goal is to refute the claim that there are no design "problems" or "solutions." As our qualitative research shows, designers regularly describe the design process in terms of problem solving.[11] Moreover, in their design practice, designers work within identifiable and objective constraints to explain and solve the problems they've identified. Ornamental design is therefore not simply "subjective," in the eyes of the beholder.

It is true that designers describe "problems" differently than the stylized inventors that dominate our thinking about utility patent law. For one thing, designers emphasize problem *finding* as an essential part of problem *solving.* In doing so, they make clear that the design process should be sufficiently flexible to enable rethinking and redefining the problems for which a solution is needed. It is also true that designers describe themselves as addressing a wider range of problems—they do not focus only on "mechanical" or "functional" problems (at least where "functional" is narrowly defined).[12] But the fact that designers think differently about design problems does not mean designers are not engaged in problem solving. By their own descriptions, that's exactly what designers are doing.

Next, drawing on examples from our interviews,[13] we explain the process of defining and solving design problems, and we offer guidance to lawyers and courts about where to look for relevant information about designers' practice and specific motivations. In doing so, we elaborate

9. *LKQ*, 102 F.4th at 1297.

10. *Id.* at 1297–98 (quoting Egyptian Goddess, Inc. v. Swisa, Inc., 543 F.3d 665, 679 (Fed. Cir. 2008)). Of particular relevance to this Essay, the Federal Circuit also noted in *LKQ* that "the parties disputed whether an ornamental design for an article of manufacture could be viewed as solving a problem." 102 F.4th at 1297.

11. As with utility patents, however, the identification of a problem and solution doesn't inevitably lead to a patentable invention.

12. The problem of defining relevant "functions" has plagued trademark functionality doctrine, where courts have sometimes distinguished "aesthetic features" from "mechanical" ones, while other courts have found that distinction unhelpful. *See, e.g.*, TrafFix Devices, Inc. v. Mktg. Displays, Inc., 532 U.S. 23, 33 (2001) ("It is proper to inquire into a 'significant non-reputation-related disadvantage' in cases of esthetic functionality, the question involved in *Qualitex.* Where the design is functional under the *Inwood* formulation there is no need to proceed further to consider if there is a competitive necessity for the feature."); *see also* Christian Louboutin S.A. v. Yves Saint Laurent Am. Holdings, 696 F.3d 206, 219–22 (2d Cir. 2012) (describing the aesthetic functionality doctrine and distinguishing it from "utilitarian functionality"); PIM Brands Inc. v. Haribo of Am. Inc., 81 F.4th 317, 321 (3d Cir. 2023) (omitting discussion on types of functionality and declaring that a "design is functional if it is useful for anything beyond branding" (emphasis omitted)).

13. *See generally* Mark McKenna & Jessica Silbey, *Investigating Design*, 84 U. PITT. L. REV. 127 (2022) (reporting the results of interview study of designers, with emphasis on the lessons for intellectual property law).

techniques and principles that guide designers in their practice. These guidelines reveal how designers frequently understand their work to be constrained by field (the way artistic genres are constrained by form). Design work is also deeply informed by generalizable aesthetic principles, such as coherence and minimalism, as well as human values, such as efficiency and inclusivity.

The accounts of these designers directly contradict the claim that aesthetic choices and human values relevant to design are subjective and unconstrained. As we explain, designers solve problems within identifiable disciplinary constraints that arise from, among other places, field expertise, educational standards, organizational structures of design firms and companies that employ designers, and from the development of professional design ethics.

This Essay proceeds in five parts. Part I describes how designers talk about themselves as problem solvers and what they mean by "problems." Part II describes the range of problems designers solve and their process for identifying problems in order to solve them. Part III describes the design-specific process of solving problems that is human-centered, iterative, and interdisciplinary. This leads to Part IV—most relevant for the obviousness inquiry and this symposium's question of the politics of design—which offers specific examples of constraints on the best design solutions to specific problems related to coherence, minimalism, inclusivity, and sustainability. Part V concludes with thoughts on the relationship between our research data and the patentability standard of obviousness, which seems an especially important place in the law to take account of designers' ordinary and systematic practices.

I. Designers as Problem Solvers

As we explained at length in previous scholarship, designers routinely describe the design process in terms of problem solving and themselves as problem solvers.[14] Indeed, many of the designers in our study differentiated modern design practice from a prior (perhaps apocryphal) age where designers' emphasis was primarily on form-giving. According to Michael Kahwaji, a manager and senior designer at Whirlpool, "there's been a shift . . . from designers thinking of themselves as form-givers to thinking of themselves as problem-solvers."[15] That is true for all types of designers: "[i]t

14. *Id.* at 168–72.

15. Interview with Michael Kahwaji, Senior Design Manager, Whirlpool, in Benton Harbor, Mich. (Aug. 7, 2019). For biographies of the designers we interviewed, anonymized where necessary to reflect interviewee preferences, see McKenna & Silbey, *supra* note 13, at Appendix B.

doesn't matter what your title is, you just solve the situation. Solve the topic at hand, because designers are capable of wearing many hats."[16]

From this "many hats" approach, designers in diverse fields use problem-solving terms to describe the value they add for a range of clients in a variety of businesses. For emphasis, Kahwaji told us that "[i]n the '90s, [for] my first business card, [my employer] said, 'What do you want your title to be?' I was like, 'Creative Problem Solver.' That's what I am . . . . I've always thought of myself as a problem solver."[17]

Perhaps surprisingly, designers of household goods, like glassware or kitchen tools, describe themselves as solving problems that are not functional but perceptual—they are not (just) focused on the way a dustpan functions, but how it *feels* to use it. Improving the experience of using a dustpan is a previously unappreciated opportunity for the everyday object. "[T]he true magic of OXO I think is when we solve problems people don't realize are problems until we solve them,"[18] explained a designer at OXO.

A Chicago-based designer of furniture and glassware explained that "designing a glass, or . . . a building, for me it's one and the same, it's a design problem."[19] And by this she meant specifically solving problems of uniformity and clutter across a range of objects that are meant to coexist in a single space. A designer at Facebook described the problems she solves in terms of human relationships and helping people connect in ways that make it easier to balance work and home. She was solving for work-life balance and doing so through the social media platform's adjustable affordances:

> [R]ight now, people with kids are struggling, and they are trying to balance their kids working from home right now, along with their own jobs, and so that's a real people problem that we know exists. There's plenty of data on it, and that's something that we look to help with. What can Facebook do using their superpowers and ability to connect people and provide helping information? What can they do? That's the problem that I would go out and try to solve.[20]

Even landscape architects, whose design work might be regarded in more aesthetic terms, perhaps akin to interior designers, describe themselves as solving problems of three-dimensional outdoor natural spaces:

> I like earth work, and grading, and really solving complex sort of issues on sites. . . . I know . . . plants and I can tell you what the plants are, but someone else could probably do that better, right? I mean,

16. Interview with Michael Kahwaji, *supra* note 15.

17. *Id.*

18. Interview with "Kate," Mktg. and Design Pro., OXO, in N.Y.C., N.Y. (Dec. 11, 2018).

19. Interview with Felicia Ferrone, Housewares and Furniture Designer, in Chi., Ill. (Feb. 6, 2019).

20. Zoom Interview with "Jennifer," Designer, Facebook (Oct. 28, 2020).

> they love it, they have a passion for plants. And I love plants, but my passion is more the earth work and the technical, and really solving problems that people just can't even wrap their heads around . . . like three-dimensional problems.[21]

Many designers working in consultancies work with clients in ways that resemble the projects of management consultants, but the designers in our study strongly distinguished themselves from management consultants in terms of their processes (more on that below). These designers report solving problems within business organizations by redesigning business units and the manner in which departments work together in order to improve the delivery of their services. These designers call their work "experience design," and it comes in many forms. Here is Denise Burchell of Salesforce talking about her work as an "experience designer" for clients:

> [E]xperience design is as much about how things behave as it is about what they look like. So first you want to look at, OK, what's the problem that I'm solving? Then you want to look at, where does this problem appear in the ecosystem of the organization . . . ? Does it show up in . . . a call center [?] Does it show up in a physical store? And how does it manifest in all of those places? . . . [O]ne of the key things that I have spent my career trying to do is to try and help big organizations stitch experiences together across their business units or silos . . . [t]o help them understand, "Yes, you have this problem. Do you talk to the guy over in a different department? Cause he's got a pretty similar problem. What if you guys came together? Could you solve a bigger problem? Could you have more impact?"[22]

The "problems" these designers refer to might cast design in quite a different light than the hypothetical designers that design patent courts refer to—designers who are only aiming for ornamentation of an article of manufacture. But that is a poverty of design patent law. In practice, designers consider these and many other "problems." Those problems sometimes have unique and non-obvious solutions, and sometimes they do not. But, as we describe further below, the solutions are identified by designers through the design process.

II. Problem Finding and Problem Solving

Design practitioners follow specific processes for identifying problems in order to solve them. The result of these processes (which we describe in Part III) is a diverse range of problems to be solved and solutions that are tailored to specific situations and clients. This means there are many more

21. Interview with Michelle Crowley & Naomi Cottrell, Co-Partners, Crowley Cottrell, in Bos., Mass. (Apr. 11, 2019).

22. Interview with Denise Burchell, Designer, Salesforce, in S.F., Cal. (Feb. 26, 2020).

problems than initially appreciated but also that the best solutions are often bespoke. Designers are both problem solvers and problem finders.

Designers commonly distinguish the design process from other forms of professional practice by reference to the designer's particular emphasis on problem definition discovered through an open, iterative process.[23] They call this "tuning the problem statement" in which designers question the problem clients describe by reframing it.[24] Designers conceive of their special skill as helping clients think about their "problem" from different perspectives, opening up new opportunities for innovative and surprising solutions.

Problem-finding requires a conceptual framework and a flexible approach tailored to the specific client and/or situation. Here is Mike Smith of Jump Associates in Redwood City describing how designers approach "problems" and "solutions" through their particular process:

> I used the iPhone as an example here, so [the problem] would be like [pause] "give people an easy way to go back to the last place they were." . . . And that [becomes] . . . you know, the back button, right? . . . Design principles, like good designers . . . are really good experts at building design principles from strategy and things that we're seeing in the world. And so like, me, it's actually pretty easy to say, like, "[g]ive people a physical affordance so they can always go back to the last place they were." That's actually kind of hard to do.[25]

Smith's point is that the more capacious the problem statement (e.g., letting users "go back to the last place they were"), the more possible solutions there are. Programmers think in terms of code, not buttons. But a designer working with programmers can, through conceptual problem solving, scope the problem more broadly, which then makes space for other options to solve for "[getting] back to the last place."[26] That problem statement includes buttons and other simple tactile controls. Thus, the back button was born.

Jay Newman, also of Jump Associates, described helping the U.S. government reframe the problem they were having at the General Services Administration of sluggish and inefficient procurement processes. As with Smith's example, the manner of scoping the problem opened up a wider range of solutions for reinventing "the future of procurement" as a more integrated digital marketplace that was tailored to the U.S. government's future needs:

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23. MICHAEL HAGES, PRICE HENEVELD LLP, A DESIGN-CENTRIC APPROACH TO PATENTS 7 (2019), https://www.priceheneveld.com/wp-content/uploads/2019/04/A-Design-Centric-Approach-to-Patents.pdf [https://perma.cc/TJW4-6TRU].

24. Interview with "Allen," Designer, IDEO, in Cambridge, Mass. (Apr. 11, 2019).

25. Interview with Mike Smith, Designer, Jump Assocs., in Redwood City, Cal. (Feb. 26, 2020).

26. *Id.*

> [T]he user experience felt slow and outdated. And we had to sit there and sort of coach them on looking at that problem in a very different way, because there's only one portion of buying in the federal government that actually has to do with . . . small-value purchases. . . . And the GSA serves those folks in a really important way, but what the GSA is most about is basically equipping the larger government with its purchasing power, right? To take advantage of and coordinate its purchasing power. So we basically reframed that problem with them as one of the future of procurement and digital procurement in the U.S. federal government, and what was the GSA's role in that? . . . [I]f you understood what they intended to be for the future, and what their kind of customers, the other agencies, and the CFOs, and Chief Procurement Officers of the other agencies needed, then what approach to digital technology would you take?[27]

The point of both examples is to demonstrate that designers begin their process by defining the problem to be addressed, and that approach to problem definition is an essential part of the process of designing the solution. Problems aren't predefined or preexisting. Problems need to be understood inductively through study of the situation. Designers bring their interdisciplinary training to the initial problem-finding phase to help think beyond the established framework for a creative solution. Here is Alissa Rantanen, Design Manager at Insight Product Development, describing her interdisciplinary role at Insight and how she draws on it to design medical devices:

> Here at Insight, I, because we are small, I do industrial design. I do UI-UX. I do graphic design. I do research. I do the design strategy. I do all of that, which is really great. . . . I personally like the complex problems. I like taking the big picture of something and thinking, "OK, what does it need to be? Does it need to be UI-UX? Does it need to be a product, service, something else?" To address this problem, distilling down something really complicated with multiple stakeholders into something understandable, and then have a solution for it.[28]

When Rantanen says "does it need to be UI-UX?" she means, "does this problem call for a solution related to user interface design?" She is drawing on her toolkit of design approaches and testing possible solutions to a problem that is "really complicated with multiple stakeholders into something understandable."[29] Problem finding and problem solving is like

27. Interview with Jay Newman, Dir., Jump Assocs., in Redwood City, Cal. (Feb. 26, 2020).

28. Interview with Alissa Rantanen, Design Manager, Insight Prod. Dev., in Chi., Ill. (Feb. 5, 2019).

29. *Id.*

matchmaking for designers, and it requires extensive research and experimentation.

Many "problems" initially have no clear definitions or boundaries, and the designer's job is to help clients identify the scope of the problems and solutions. Ann Marie Conrado, a Professor at the University of Notre Dame, references "wicked problems" and how designers are particularly skilled at addressing them through their design practice:

> [T]he idea of a wicked problem is one in which the boundaries, the parameters, the framing, is all blurry and can be contested. So if I want to solve hunger in America, right, some people are gonna think it's a logistics problem, we just need to get more food to market. Other people are going to look at it and say, "This is a problem around food deserts, and access." And then other people are gonna look at it and say, "This is a political problem, and we need to" . . . you know? So none of them are righter or wronger, they're just different ways to see the same problem. And so . . . the term 'wicked problem' is coined I think to express the way a designer thinks is to be so nimble to be able to envelope all those different, and manage those competing visions. . . . [W]e define a wicked problem as one in which the boundaries and the framing of that problem can be contested. Where does that problem start and stop? And how does it blur into a whole host of other problems, right? And then the second part of that is, the solutions, there's no one right way to solve it, right? You're gonna have to, you know, be open.[30]

A designer's task is to scope the "wicked problem" in order to offer solutions that might include physical objects, guided interactions, and/or business methods.

III. Human-Centered Design Process: In Pursuit of Good Design

As the designers in our study repeatedly made clear, designers are not management consultants, and the distinction they draw is precisely about the nature of their method: the problem-finding and problem-solving process. Designers are trained in particular fields (such as graphic arts, UI/UX, architecture, automotive, etc.) and follow a process that resembles an ethnographic and qualitative study of human behavior to identify problems and solutions.[31] Lee Moreau, formerly of Millenium, told us:

> [A] management consultant will tell you how, they have a known answer. So they already know what the answer is. And so basically, how do you engineer a process to hit that target . . . . When we do our

30. Interview with Ann Marie Conrado, Professor of Indus. Design, Univ. of Notre Dame, in Notre Dame, Ind. (Aug. 7, 2019).

31. McKenna & Silbey, *supra* note 13, at 134–35.

> work with design consulting, you don't know what the answer is. It's unknown outcome, so our learning is generative. . . . [W]hen we're out doing that learning, that qualitative learning, it's generative, meaning I'm trying to generate ideas from the experience I'm having. Not evaluate between good and bad. This is not AB testing, it's not red versus blue, it's like, "Hm. These are the experiences people are having. This is what people value." . . . . And what people care about is not what kind of food they buy at Chili's. What they care about is their long-term health. They care about the health of their children. And then you see, are they making choices, is the marketplace allowing them to make choices that supports their value system. And quite often, they don't. Which is where product and services offerings emerge.[32]

Designers describe their practice of problem finding and solving as user-centered, iterative, and interdisciplinary. The result may be a wide range of problems and solutions, but the process of identifying the problems and solutions is not wide-ranging.

Designers are adamant that their aim is to improve users' actual experience of the design outputs, whether objects or services. There is, therefore, good design and bad design. Designers don't talk about politics explicitly, but they do discuss addressing real human needs as opposed to simply putting new things in the world. Rantanen explained:

> I really appreciate aesthetics, and look and feel, and beautiful things . . . [and] that's part of, I feel like, my passion. But I do not want to do something superficial. Because I don't think this world needs more junk, [laughs] for lack of a better word. . . . [T]he ideal is some balance . . . and something that I know will have a real impact.[33]

The OXO executive said something similar when she said that, in her company, designers are always asking themselves if there's really a need for a new product: "[D]oes the world need yet another pizza cutter? . . . I feel like there needs to be a real rationale, especially for a brand like ours, as to why everything exists. It needs to be purposeful, it needs to be doing something different . . . "[34] Mike Smith, at Jump Associates, also confirmed that "the main anchor of solving the problems is we go find the needs that people have, we don't go look for wants that people have."[35]

So how does this occur? Throughout our interviews, designers described their problem-solving process in remarkably consistent ways. No matter their original field of design expertise or the present context in which they are working, they described a user-centered approach that draws on

32. Interview with Lee Moreau, Continuum (formerly), in Bos., Mass. (Apr. 10, 2019).
33. Interview with Alissa Rantanen, *supra* note 28.
34. Interview with "Kate," *supra* note 18.
35. Interview with Mike Smith, *supra* note 25.

grounded empirical research and human-centered inquiry that explicitly recognizes a professional obligation to improve situations. The literature in the design field is similarly consistent in the approach to contemporary design practice.[36] The process follows disciplinary standards that, to field experts, produce optimal results for clients. Here are two examples of similar processes for designing solutions to very different problems.

A young designer in a design consultancy described the process of learning about problems and solutions in the context of diaper design by conducting focus groups with parents of infants. He described learning from a mentor at the design firm that practicing as a designer is about "figuring out how to figure it out."[37] He explains:

> It's like every time they go on projects, like "What are the best ways we can learn what we need to learn to design the best products?" So . . . , they went to do this project about diapers in China, 'cause [they're] not used the same way. And understanding how diapers could be of value for consumers in China [was part of the project], and they had this exercise with different cards, each describing a specific key situation . . . when raising a baby . . . and each of these cards, he described, they have no faces on the people to have a neutral emotion, right? And the idea is that when they talk about it with people, with mothers, they themselves can project their feelings. "This is a terrible moment. This is a great moment." And I like this idea of trying to figure out what's the best tool to learn what you need to learn. . . . [T]hat's kind of what I like about user-centered design. It's not just about the result. It's also about the process along the way.[38]

This young designer was describing how to understand parental experiences with infants, be they difficult or joyful, in a cross-cultural context.[39] Based on the designers' learning about those experiences, the problem was redefined not as simply how to design an improved essential good (the diaper), but how to ameliorate or amplify the experience of using diapers for one's children.[40] Diapers may get "better" not because they function better as diapers per se, but because they help parents experience their infant in more pleasurable and less challenging ways.

Another designer, Maggie Waller, described the process of solving problems associated with something equally basic but very distinct: cooking

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36. The literature is vast. *See, e.g.*, DON NORMAN, THE DESIGN OF EVERYDAY THINGS 8–9 (2013); IDEO.ORG, THE FIELD GUIDE TO HUMAN-CENTERED DESIGN 49, 126 (2015). For a collection of open-source design resources, *see* THE ENCYCLOPEDIA OF HUMAN-COMPUTER INTERACTION (Interaction Design Found. ed., 2d ed.), https://www.interaction-design.org/literature [https://perma.cc/8LRY-QYMY].

37. Interview with "Frank," Designer, Intuitive, in N.Y.C., N.Y. (May 15, 2019).

38. *Id.*

39. *Id.*

40. *Id.*

in small kitchens. In a similar human-centered process but in a completely different context, she describes studying the people affected by the problem:

> [T]he way that we designed every project . . . was . . . exploring an issue, figuring out why that issue exists, and then coming up with ways to solve the problem. . . . So it was never really based on "Oh I have an idea for a product, and I'm gonna design this product," it was always, "I have a really hard time cooking in my kitchen 'cause I have no counter space. That's the problem. Now how do I solve that problem?" And then doing ethnographic research and all these different research studies on "OK, how are people cooking in small kitchens? What utensils are you using? What bowls are you using? Are you buying an extra island?" We . . . gather all this information, and then take what we . . . learned, and . . . say, "OK. These are the main things that I'm highlighting from my research, and these are maybe the five implications that I really want to focus on in designing the product to help solve this solution."[41]

Like other designers, Waller objects to designing a product just because she has an idea for it.[42] A designer's task, she explains, is to identify problems by studying human behavior and then address those problems with either an improved product or some other intervention.[43] This is how designers identify human needs.

Sometimes addressing those needs requires adjusting a designer's best guess at an optimal solution. This is an important moment in the design process, when designers must be flexible and open to the variation in human experience. It sometimes produces surprising outcomes—what some might call non-obvious solutions—even if, once created, those solutions seem inevitable to the user.[44] Kathleen Low describes an "epiphany" during her human-centered research redesigning healthcare platforms and studying their varied users:

> [I]t was really through my first few months of working with the healthcare teams that I was able to understand that solutions are entirely different for all users. [laughs] It was like an epiphany. It was like, "Oh. It's so different for everybody. Of course I should have known this." And I really started to think of, OK, really what's the value that the designs are bringing? Does the button have to be here in this color, when they prefer it here in this [laughs] color, where it might not be the best placement. So just really understanding them more . . . [45]

41. Interview with Maggie Waller, Designer, Hypebeast, in N.Y.C., N.Y. (Dec. 11, 2018).
42. *Id.*
43. *Id.*
44. That is to say that designers also recognize the potential for hindsight bias.
45. Zoom Interview with Kathleen Low, Sr. Design Manager, Impossible (Oct. 20, 2020).

Low describes humility in her approach, common to most of the designers we interviewed and necessary to ethnographic work, which respects the responses and experiences of the users whose perspectives must be understood for the design to meet their needs.[46] Low had an idea of the "best placement" for a button, but that idea turned out not to match users' preferences, and she realized that her "best" will not serve those who use the platform.[47] This kind of adjustment based on grounded, empirical human-centered research is a hallmark of design practice. And it means that design-practice metrics do not respond to utility in some general way—be it cost or function for example—but to specific, contextual needs as defined by the population and activity at issue.[48] Designers are trained to identify these needs through their practice. And because they often make presentations to teams or clients about their processes, findings, prototypes, and reasons for adjustments, designers justify their choices and routinely evaluate better or worse design as a matter of professional habit.

None of this means that design solutions are idiosyncratic, random, or purely preference-driven in a subjective and standardless sense. Designers are bullish about working within articulable constraints, such as those driven by field specifications (e.g., related to automotive design, household goods, platform and digital affordances). Fields have standards, deviation from which may lead to rejection for explainable and systematic reasons. Beyond field experts and standards, constraints also come from a designer's education and training, how designers work in firms and with companies, and professional design ethics—which relate to values we discuss in the next part.

IV. Designing Under Constraints

Typical constraints for most business entities include cost, time, and efficacy. These are not the kind of constraints on which designers most focus when describing their process, as these constraints are assumed into most projects on which designers work.[49] To be sure, designers are interested in success based on measures of cost, time, and efficacy. But market success is not the only, or even primary, problem a design solves. Designs can be successful by designers' standards even if those designs are not widely adopted or never get to market.[50] Other designs are market successes even

46. *Id.*

47. *Id.*

48. *See, e.g.*, KAREN HOLTZBLATT & HUGH R. BEYER, THE ENCYCLOPEDIA OF HUMAN-COMPUTER INTERACTION ch. 8 (Interaction Design Found. ed., 2d ed.), https://www.interaction-design.org/literature/book/the-encyclopedia-of-human-computer-interaction-2nd-ed/contextual-design #chapter_start [https://perma.cc/VT6W-BA8Q].

49. *See, e.g.*, Interview with Lee Moreau, *supra* note 32.

50. Design consultant, Lee Moreau, relayed this sentiment:

though they are basic, obvious, or even counterintuitive from the perspective of users.[51] Many of designers' alternative measures of success are explicitly normative or political insofar as they seek to improve human experience according to values designers espouse as "good."

Across our interviews, designers consistently identified the goals of minimalism, coherence, sustainability, accessibility, and inclusivity—all of which impose constraints on design choices. The first two measures may seem like aesthetic constraints, but they are also material and environmental to the extent that designers repeated the mantras of "nothing extra" and "everything has a reason" in their accounts of design practice.[52] Wasted material and wasteful products are to be avoided. The last three measures may seem like functional constraints, but they are also socio-political and emotional insofar as what it means for an object to be usable by all hands (as is OXO's motto) or for a building's landscape to enable everyone to enter by the front door (as a landscape designer informed us)[53] are about how communities flourish. We provide brief examples of each of these constraints (which are also values) below in the context of solving design problems.

Minimalism and coherence are often discussed in terms of balance and visual harmony. Designers of all kinds (of cars, household goods, or digital platforms) describe seeking the design that solves the particular problem using the least amount of form and material while also making sense—being coherent—to the user. Denise Burchell says that designing platform interfaces is "about alignment, it [is] about balance, it [is] about information

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> [JESSICA SILBEY]: So that makes me think about how you evaluate the product as a success. I mean, is it always in terms of the consumer value measured by the market, or are there examples of excellent design that didn't actually find an audience, but you would still say it's excellent?
>
> PARTICIPANT [MOREAU]: I think those exist. As a designer who appreciates design and beautiful things, absolutely, there are super successful designs that don't find the size of market that we would all say, wow, that was both dazzling from a creative perspective, changed the way people live, and made companies billions of dollars. There are plenty of things I think that do that.

Interview with Lee Moreau, *supra* note 32.

51. This is why the Federal Circuit credits secondary considerations like commercial success only when there is a "nexus" between those factors and the nonobviousness of designs. *See, e.g.*, Campbell Soup Co. v. Gamon Plus, Inc., 10 F.4th 1268, 1278–79 (Fed. Cir. 2021) (finding claimed design for a "gravity feed dispenser" obvious and refusing to consider commercial success of the product because there was no nexus between objective indicia and the design claim's unique characteristics).

52. As one designer explains:

> [O]ne of the most satisfying projects I worked on was one . . . similar to the insulin pen example. I could explain why it was the way that it was, down to every detail. There was a rational logic, reason, behind every decision that we made . . . . Nothing is "just because." Which . . . mean[s] that there's nothing extra.

Interview with Alissa Rantanen, *supra* note 28. *See also* McKenna & Silbey, *supra* note 13, at 187–89 (describing goals of coherence and simplicity).

53. *See infra* note 63 and accompanying text; interview with Felicia Ferrone, *supra* note 19.

hierarchy on the screen, it [is] about finding ways to kind of visually anchor things, and understanding where white space [is] gonna be useful to let somebody's eye wander. Just like a basic, basic tenet of design."[54] Michael Kahwaji, from Whirlpool, describes minimalism and coherence this way:

> [W]e want to be surrounded by balance and serenity and I think that aesthetically pleasing items help enhance life, and good design products also give you the semantics of how a product is supposed to be used. You know what I mean? Like, a well-designed product doesn't need instructions. So there's a lot of things like that. . . . How do we simplify people's lives?[55]

Both of these descriptions are of ornamental features, but they also represent normative values. The OXO executive explains that for designers:

> there needs to be a real rationale, especially for a brand like ours, as to why everything exists. It needs to be purposeful, it needs to be doing something different or have a slightly different point of view within the world of the brand, otherwise you'll just make multiples, you know, it's like you're actually adding complexity to the design equation.[56]

Felicia Ferrone, a designer of household goods, explains that coherence staves off chaos, both visual and emotional, and thus coherence can help build community and help people feel a sense of belonging. Ferrone describes how this works in terms of the origins of her "Revolution" glassware:

> [T]he Revolution Collection . . . certainly came from a very like architectural standpoint . . . where it was like, at the end of a dinner, you know, especially in Italy, where I was at the time, . . . there are three million different types of glasses on the table. . . . Wines and waters and liqueurs and grappas and, you know, whatever, afterwards, and so for me it was just like total visual chaos. And so I was like, "Oh, how could we kind of clean this up?" And architects are obsessed . . . [with] everything kind of aligning, so that collection is this repeating proportion that you can find throughout, so there's this consistent datum across the table at the end of the meal . . . [57]

In a very different context but anchored by similar concepts, Michael Rock explains how university campus signage draws boundaries around the community in an otherwise urban setting, cohering people in space and identity. He analogizes it to highway signage, noting that simple aesthetic cues indicate to drivers where they are. Both forms of signage cohere

54. Interview with Denise Burchell, *supra* note 22.
55. Interview with Michael Kahwaji, *supra* note 15.
56. Interview with "Kate," *supra* note 18.
57. Interview with Felicia Ferrone, *supra* note 19.

communities and situate people in space emotionally and materially, defending against dislocation and social or physical chaos. Rock says:

> [H]ow do I know when I'm on campus, you know. If you think of those blue security lights, right? There's a kind of network that says, "I'm within this network now." You know, and you can think basically about ways you move through the world. You move through all these different kinds of coherences all the time, like, "I'm on the federal highway system, now I'm off the federal highway system," how do I know? Because of the green signs, right? So you always have a kind of graphic representation of invisible systems. . . . [I]t's an absolutely natural way that we try to organize the world in a way that makes us all understand it, right? Otherwise, it's chaos.[58]

What do these constraints of minimalism and coherence mean for design standards of excellence? They indicate that when designing to solve problems of community building on campus, or coherence and legibility on highways, for example, the choices for design are limited by existing standards and forms, and complexity is to be avoided.[59]

Meeting design standards of excellence can be difficult in highly constrained contexts, such as with household appliances and graphic art. As automotive designer, Richard Gresens, explained:

> I always have a lot of respect for product designers and/or graphic designers too, because in a lot of ways, the product is much more difficult to design. And what I mean by that is that a washing machine has to fit within a certain box, parameter. Right? So how do you distinguish your washing machine from the next guy who's got to fit in the same box, right? An automobile has a package, and generally the same size, but there's a lot of freedom on the outside in what you do with that.[60]

Notably, Gresens identifies another constraint here, as did the OXO executive above, which is that new products should be distinct from one another. Making another washing machine just like the last one is not "good" design. Difference matters. But the kind of difference that counts as good design is not just any difference; it is a difference that conforms with other design values, such as human need, social impact, or sustainability.

We've already quoted Alissa Rantanen above, explaining how "this world [doesn't] need[] more junk . . . , the ideal is some balance . . . and something that . . . will have a real impact."[61] Denise Burchell, at Salesforce,

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58. Interview with Michael Rock, Partner and Creative Dir., 2x4, in N.Y.C., N.Y. (May 15, 2019).

59. Whether the standards are consistent with patentability standards of novelty and non-obviousness is a different question we raise at the end of this Essay.

60. Zoom Interview with Richard Gresens, Designer, Gresenrich Design (June 25, 2020).

61. Interview with Alissa Rantanen, *supra* note 28.

made explicit that the constraint of making a difference, of designing with purpose, is ethical.

> [W]e're in a real moment of being faced with our own optimism. I think that we have to do a better job of thinking about not just what could this [object or service] become, but what could this become in the wrong hands? We have to think about the sort of ethical implications of what we've been designing and putting out in the world.[62]

Along with designing with purpose and without waste comes social values not only of sustainability but also inclusivity and accessibility. These specific ethical constraints arise in various contexts, but most commonly in the context of landscapes and objects, which have to be widely accessible and usable. Here is Michelle Crowley talking about designing landscapes according to these principles of accessibility and inclusivity:

> But our big thing, which has to do with love, is accessibility, and getting people in the front door equitably, right? Like forever it was, "You can go around the back, and there's a ramp in the back to the loading dock, and you can take some freight elevator up," right? I mean everything now is changing, which is great, you know, it's, we want everybody going in the front door. So we integrate all of our accessibility as best as we can into the landscape so that anyone who is disabled feels like . . . they belong in there, or everybody's just using the same way.[63]

Crowley's partner, Naomi Cottrell, also talks about how designing outdoor environments as useful and usable to as many as possible is essential to humanity generally. This design aims for big impact! She said to us: "I believe that designed landscapes, especially in the urban or suburban environment, where we've lost our connection to nature, is an essential part of humanity . . . [a]nd will save the world. Quote me on that."[64] To Crowley, designing inclusively and accessibly is about "love" because "getting people in the front door equitably" is about making sure people feel like they belong.[65] This may sound overly idealistic, but "universal design" has been a buzzword since architect and industrial designer Ronald Mace popularized it in 1997.[66] And its integration into broad swaths of design practice since

62. Interview with Denise Burchell, *supra* note 22.

63. Interview with Michelle Crowley & Naomi Cottrell, *supra* note 21.

64. *Id.*

65. *Id.*

66. Wolfgang Saxon, *Ronald L. Mace, 58, Designer of Buildings Accessible to All*, N.Y. TIMES, July 13, 1998, at B9. *See About Universal Design*, CTR. FOR EXCEL. IN UNIVERSAL DESIGN, https://universaldesign.ie/about-universal-design [https://perma.cc/G7YS-RGLB] (describing the concept of universal design and its history).

then signals its generalizable values of inclusivity and accessibility within the design profession.

Michael Kahwaji, of Whirlpool, a designer for over two decades, explained that universal design is fundamental to most curricula.[67] In fact, he went to graduate school to focus on universal design.[68]

> Basically creating all products accessible by all people, so you're not creating adaptive equipment . . . . [A] good example is like a door lever versus a doorknob. A door lever serves everyone, a doorknob only serves the abled. And we'd argue that a door lever could really help the abled who just have groceries in their hand, or a baby in their hand, or slippery hands, or whatever.[69]

Like Michelle Crowley, Kahwaji understands the value of universal design not just to help those who use wheelchairs or prosthetic limbs, but to improve the lives of all people.

Interestingly, these design constraints may sometimes lead to an inevitable design that is not new or distinctive but is necessary for the product or service. The feature might be functional or useful, conform to a technical standard, or maximize cost savings. But sometimes it may be purely aesthetic and yet still demanded by the design values that constrain the process described above. Here is an IDEO designer explaining how that occurred with the cell phone:

> [W]e've been having a conversation with . . . iPhones and phones in general . . . . [T]hey're sort of all converging to the same thing, and . . . it's a flat screen, it's probably almost no interactions, there're subtle differences . . . on the radius of, you know, the corner, and on the thickness and . . . the shape of the camera, but in the end like a lot of these things reduce down to their . . . fundamental sort of instantiation, if you will. And a lot of that happens . . . especially in design of objects, it's like you're trying to create a simplicity, and we're firm believers in [ ] not creating unnecessary complexity, right? Like why are we adding features, whether it's functional features, or design elements or features, with no reason? So if you start to think that way, then a lot of just like aesthetically pure and beautiful designs . . . have a logical conclusion, and many times those conclusions are actually shared by others, designers doing good design, looking at . . . a similar problem, right? And it's not that you're copying their design, you're sort of maybe arriving at a similar place . . . because it's kind of a logical one.[70]

67. Interview with Michael Kahwaji, *supra* note 15.
68. *Id.*
69. *Id.*
70. Interview with "Allen," *supra* note 24.

We end with this example to emphasize that not all excellent design will (or should) be patentable. The design values are the constraints on the process and end product. Satisfying those constraints—being constrained by the professional metrics that define what is good design—distinguishes good design from poor design. What it might say about patentable design we leave for Part V and our concluding thoughts.

V. Concluding Thoughts on Patentability Standards

Designers engage in a systematic process of identifying and solving problems. They define a solution after an open and iterative process that focuses on benefitting users through outputs designed according to specific criteria, whether those outputs are objects, spaces, websites, or even (less tangibly) "experiences." That understanding of design work contradicts the argument that designers do not solve problems or that their designs lack objective criteria by which they can be evaluated. Designers work under various constraints, some disciplinary or material, others normative and values-based, and all according to professional methods on which they are trained that are discernible to the ordinary designer.

This account makes clear that the vision of designers that animated the *Rosen-Durling* framework was disconnected from modern design practice. Since the obviousness inquiry is explicitly about how designers understand and develop new designs, that disconnect was particularly problematic on design patent law's own terms. Design is not simply about aesthetics, even if aesthetic experience is often a relevant consideration. Design practice requires the combination of aesthetic and useful features, actively resisting their separation, and describes the hardest design problems as efficiently cohering these features to solve real problems in light of expressed values.[71] Designers describe their practice in problem-solving terms, even about some of the most "aesthetic" designs (tableware, for example).[72] Importantly for design patent law's purposes, designers' choices can be evaluated according to the various constraints designers operate under, which are usually discoverable in the context of the design at issue.[73]

Designers are not patent lawyers, but they describe in their practice the equivalent of the criteria for "analogous art" by which obviousness may be evaluated. When designers compare their designs to prior designs, draw inspiration from associated articles, and contemplate how problems can be

71. For a general discussion of coherence of form and function as a designer's ultimate goal, see McKenna & Silbey, *supra* note 13, at 182–94.

72. *See supra* Part IV.

73. Would design practice have to change? While beyond the scope of this Essay, we do think importing a written description requirement into design patent law and allowing design patents only of whole configurations rather than parts would significantly improve the law and align with design practice.

solved by considering other "art" that addresses the same or similar problem, they map the precedents and references for the obviousness inquiry.[74] To designers, this practice of connecting affiliated references is part of the user-centered investigation they are trained to pursue. It is a practiced, disciplinary endeavor. Design law can learn from designers' practice to guide the obviousness inquiry. The obviousness doctrine is the exact right place to ask about the ordinary designer and her practice in order to identify analogous art that is "reasonably pertinent to the particular problem" with which the designer is involved.[75]

74. Indeed, in the years before the Federal Circuit took exclusive jurisdiction over patent cases, courts sometimes recognized this use of prior art to solve problems. *See* Sidewinder Marine, Inc. v. Starbuck Kustom Boats and Prods., Inc., 597 F.2d 201, 209 (10th Cir. 1979) (holding that, from the perspective of an ordinary designer, the design of a speedboat was obvious in light of prior art).

75. Airbus S.A.S. v. Firepass Corp., 941 F.3d 1374, 1379 (Fed. Cir. 2019) (quoting *In Re* Wood, 599 F.2d 1032, 1036 (C.C.P.A. 1979)).