Persistent Failure and Occasional Success: The Realities of Evidence-Based Interdisciplinary Scholarship by Design Faculty at Research Universities

Matthew Peterson

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Persistent Failure

Occasional Success

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*The Realities of
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Matthew Peterson
North Carolina State University

Abstract

Design units can better integrate themselves within research universities by producing scholarship consistent with institutional expectations, in the form of publications, grants, and patents. But significant challenges face the design faculty who must actualize this integration. I summarize my own strategic research program over three phases: an initial appointment as assistant professor; a second assistant professor appointment up to the submission of my tenure dossier; and the year following that submission. This story of phases in an early academic career illustrates challenges that are particular to junior faculty in design units, and it reveals the work required to secure publications and grants. In established research disciplines, junior faculty continue the work they began when earning their research degrees, much of which occurred in productive labs. But junior faculty in design must often initiate a research program from scratch, while already on the tenure clock. Furthermore, because research in design is heterogeneous, junior design faculty must define their own particular model of research, which also takes time, and advocate for their adopted model. I provide recommendations for design administrators and junior design faculty as a way to help elevate scholarship in design. My final recommendation for junior design faculty is to adopt the mindset of the hedonistic scholar, who does not depend upon success for personal fulfillment, but finds joy in the craft of scholarship. This is important because, as demonstrated by my own research program, significant scholarly outcomes are likely the product of years of dedication with numerous failures along the way.

Introduction

Two recent articles by Meredith Davis could serve as a primer for this special issue of *Visible Language* on sustained research programs in design: "Confronting the Limitations of the MFA as Preparation for PhD Study" (2016); and "Tenure and Design Research: A Disappointingly Familiar Discussion" (2020). Davis challenges the design discipline to encourage and enact scholarship that is as rigorous as, and is complementary to, that of other disciplines at research universities. Davis identifies *peer-reviewed publications, grants, and patents* as among the outcomes that "universities value most" (2020, pp. 208–209), which can demonstrate the value of design to other disciplines (2016, p. 126), especially in multidisciplinary teams. This special issue of *Visible Language* is an opportunity to reflect on the nature of the hard work required to better integrate design into the core activities of research universities. To that end, I report on my own experiences in sustained research as a junior faculty member in design. It should be obvious that one person's story is anecdotal, but an honest accounting can nevertheless contribute to a broader conversation.

I do not wish to give the impression, in telling my own story of sustained research, that I consider it to be exemplary. It is not. My story is perhaps best described as periodic success stimulated by nearly continuous failure. But it can be instructive without needing to be prescriptive. I hope to ensure this with sufficient detail for readers to draw reasonable conclusions that are applicable to their distinct situations.

Inextricably bound to interdisciplinary and evidence-based research involving design faculty are promotion criteria and the tenure clock. I thus provide recommendations for both junior design faculty and the administrators who evaluate them, which I hope will contribute to a disciplinary conversation about the practical implications of repositioning design within research universities.

Overview of a Strategic Research Program

This section covers a range of personal scholarly outcomes over more than a decade. The details will not be of interest to all readers. This paper can be read by skipping the following subsections: "Foundational Efforts," "Phase 1," "Phase 2," and "Phase 3." The final subsection in this section, "Trends Within the Phases" (page 24), is more important for the remainder of the paper.
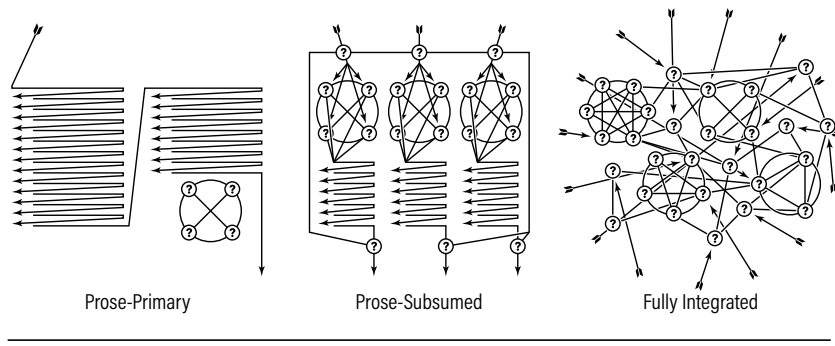
Foundational Efforts

My personal research program was initiated during my doctoral studies—in an evidence-based PhD program—and continues to evolve 11 years after graduation. I left my initial tenure-track assistant professor position at the end of my fifth year, and am now completing my sixth year in a subsequent tenure-track position. Both institutions are "very high research activity" doctoral universities, according to the Carnegie Classification. At my first institution I was in an art and design unit, and now I am in a design unit. During the preparation of this manuscript I was awarded tenure, and I will be promoted to associate professor as of next academic year. I will describe my research program in three distinct phases following graduation. It is important to note that these phases appear dissimilar (i.e., unequal) in a tenure dossier, and that my productivity in one phase was only possible because of what preceded it. This suggests that a certain degree of nuance is necessary in an equitable review of tenure dossiers in design, which I address in a later section.

For my dissertation (Peterson, 2011), I studied the integration of text and imagery in middle-school level science textbooks, for which I created three versions of textbook spreads: (1) *prose-primary,* in which a conventional center prose column references marginal figures; (2) *prose-subsumed,* in which shorter prose passages are organized by hierarchically superior pictures; and (3) *fully integrated,* in which small chunks of text are situated within pictorially rich visual displays (Figure 1). Though students consistently performed better on comprehension tests with the fully integrated spreads, the relationship was only statistically significant (with 95% confidence, $p<0.05$) in one of three treatments, with fully integrated spreads resulting in greater comprehension than prose-primary. Situational interest results were stronger, with higher degrees of integration consistently generating greater interest in the visual design. These results suggest that even at a young age, students can not only manage, but also benefit from complicated visuals, and that the standard textbook production model—for which designers are involved late in the process after a dominant prose text has been written (DiGiuseppe, 2014)—may benefit from a reconsideration, because the fully integrated strategy requires early collaboration with designers.

Completion of my dissertation arguably put me in an enviable position. I had a professional master's degree that qualified me for tenure-track positions in the United States, with an additional research degree. Furthermore, my dissertation was comparably rigorous to the work expected of research faculty, reducing the need for search committees to speculate about my scholarly capabilities. But despite this accomplishment, and the privilege underlying it, the first phase of my professional academic career felt intimidatingly open-ended and I did not have a subjective sense of momentum. With some effort, and over the course of five years, I did extend my earlier dissertation effort to produce four "lines" on my CV: a conference presentation; its corresponding proceedings paper (Peterson, 2014a); and two peer-reviewed journal articles, one in design (Peterson, 2014b) and the other in education (Peterson, 2016). Still, it was many years after

Integration Strategy Schematics

Prose-Primary   Prose-Subsumed   Fully Integrated

Treatment #2 Stimuli

Prose-Primary

Prose-Subsumed

Fully Integrated

Figure 1. (opposite) Three text–image integration strategies, from Peterson (2011), used in a quasi-experimental study with middle school students. The examples shown are from one of three treatments.

my dissertation that I felt I was truly continuing that work instead of simply reporting on it. I can only speculate about whether this was avoidable.

Phase 1

The first phase of my research program corresponds to the five years of my previous assistant professor appointment, August 2011–May 2016. My most common scholarly product over this period was a conference proceedings paper (along with its presentation), often as the sole author. However, four of the seven conference proceedings papers were, in some way, reports related to design education, which often does not count toward a research requirement.

One of those papers (Peterson, 2014c) reports on separate undergraduate courses that paired typography and image making, the first of which I developed and taught during my doctoral studies. For that course, I created—it seemed from scratch—an image function typology, describing a range of ways that imagery might guide cognition. I did this solely for the purpose of structuring coursework. I subsequently discovered a "picture function" body of literature with considerable overlap (Carney & Levin, 2002; Hannus & Hyönä, 1999; Lenzner et al., 2013; Levie & Lentz, 1982; Levin, 1979; Levin & Mayer, 1993; Pettersson, 1998, 2013), which presented an opportunity for me to make a contribution, since my early typology was more extensive and more cognitively focused than its precursors.

In an early draft of my dissertation I had included a section on image function, but my advisor suggested I remove it, viewing it as extraneous material. Yet by 2014—having revisited that section when I incorporated it into my instruction for the second time in 2012—I had created an extensive internal document on image function for myself, which totaled 28 pages, 8,000 words, and over 60 figures (Figure 2). I saw this as a means both to collect my thoughts before seeking out collaborators, and to lay the groundwork for a career research program. This is because my typology offered an organizational structure for a variety of interconnected endeavors, with individual functions (e.g., metaphorical function) worthy of dedicated investigation in a range of disciplines, and the overall structure as a means for relating outcomes to one another in a research narrative. I knew the importance of clarity in research efforts, and that faculty are expected to develop depth of expertise rather than breadth.

My internal document's figures were drawn from an extensive collection of sample imagery. Between the course offerings that centered on image function, dozens of students had collected and categorized imagery in analytical exercises, and I built a library with those examples. A small internal grant of $7,000 in 2014 supported, among other things, a research assistant, who continued to collect imagery that

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prompted continual revision of my nascent typology. This work helped me develop my ideas, but it was purely theoretical, which placed limits on publication, including pace—in my experience it is far more difficult to get a theoretical manuscript published than one with formal methods.

Following my internal document, this period ultimately produced two journal articles corresponding to specific functions (one on visual narrative and one on visual metaphor), and a conference proceedings paper on visual metaphor. The former (Peterson, 2019a) presented a framework on visual narrative and centered on an illustration found in a medieval manuscript (visible in Figure 2, middle left), while the latter pair (Peterson et al., 2017; Wise et al., 2017) reported on experiments with visual narrative advertisements in a collaborator's media lab. Figure 3 shows excerpts of preliminary notes on visual metaphor that preceded those experiments, and led to future work in Phase 2 (Delgado & Peterson, 2018; Peterson, 2019b).

Phase 2

The second phase of my research program corresponds to the six years of my second assistant professor appointment, up to submission of my tenure dossier, May 2016–May 2021. Three of my aforementioned journal articles have publication dates during this phase, despite much of the work being done during Phase 1. Two more journal articles were nearing submission or were under review at the end of Phase 1 and were ultimately published in Phase 2, though one would require edits for a revise-and-resubmit result that rivaled the workload of the initial submission. The articles continued Phase 1 work on general image function (Peterson, 2017) and visual metaphor (Peterson, 2019b). Another general image function manuscript would be developed and eventually published as a journal article (Peterson, 2022a). And two additional journal articles covered topics that do not fit as readily into my overall research narrative (Peterson et al., 2020; Peterson, 2022b).

The work on visual metaphor is important to explain in greater detail because it led directly to another fruitful line of inquiry. In Phase 1 I had sought out a colleague in advertising for collaboration on visual metaphor (as documented in Figure 3) because the literature on visual metaphor in advertising addresses visual structure, which is a primary concern of image function. Phillips and McQuarrie (2004) built on previous work (Durand, 1987; Forceville, 1994, 1996; Kaplan, 1990, 1992; McQuarrie & Mick, 1996) to describe the range of ways that metaphorical sources and targets can pictorially suggest a metaphorical relationship.

In a metaphor, a *source* domain's characteristics are applied to a *target* domain, in order to imbue the target domain with a new meaning. In purely visual metaphor, sources and targets take the form

Document Pages

Rudimentary Frameworks
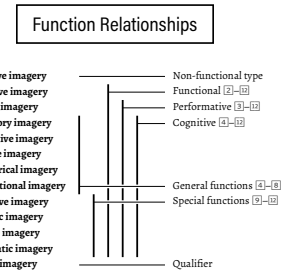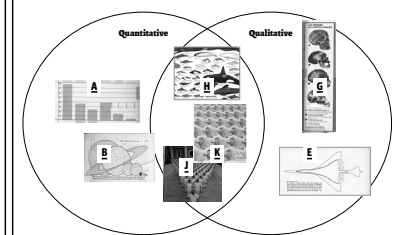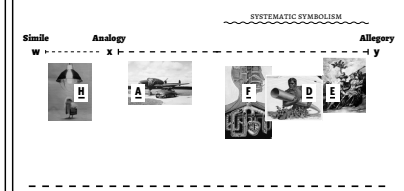
Figure 2. Internal document on image function, circa 2014. The document includes rudimentary frameworks that were revis-ited and revised for publications: "function relationships" and "metaphor strategies" in Peterson et al. (2021); "function distinctions" in Peterson (2022b); and "narrative strategies" in Peterson (2019a).

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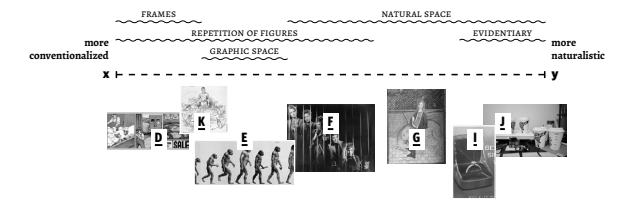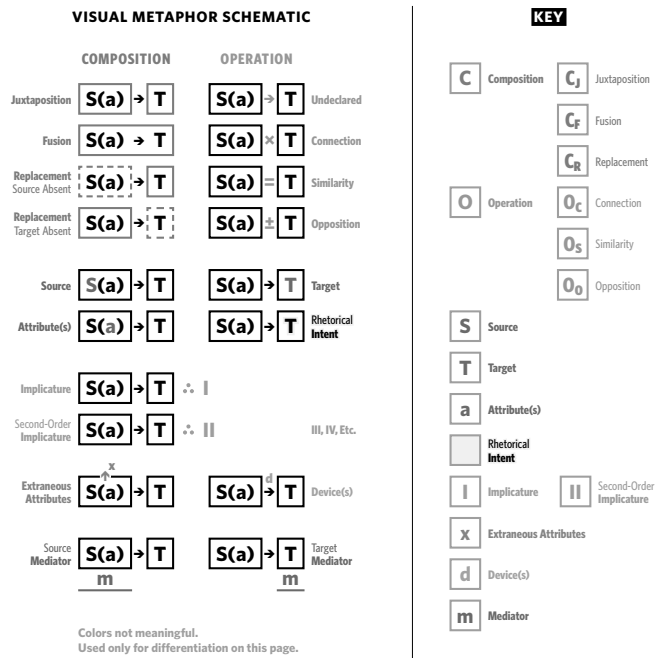
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Source (Attribute) → Target ∴ Implicature

VISUAL METAPHOR SCHEMATIC

KEY

Notation in Use for a Nested Metaphor

Thumb drive is enormous and speedy.

$$S(a) \times T \ (a) = T \ \therefore II_m$$

Cheetah (S)
Whale (T)

Cheetah–Whale (S)
Thumb Drive (T)

Intentional Target

m   Hyperbole:
Size & Agility/Speed

Figure 3.

A notation system for visual metaphor, with many distinctions that were later abandoned. Informally analyzing metaphorical advertisements to develop this notation system helped me to better recognize nuances of visual metaphor, enabling later work on Peterson (2019b), as evidenced in Figure 4. This analysis included recognition of nested visual metaphors (bottom), which led to 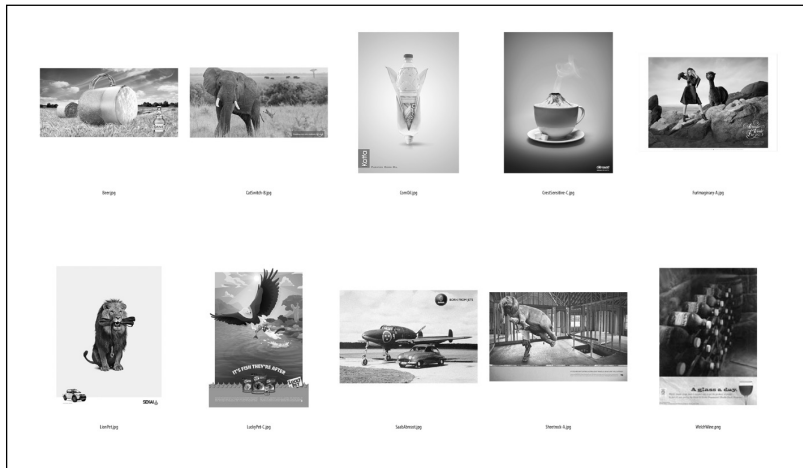an insight with a collaborator in Delgado and Peterson (2018), which related metaphorical mapping to Magaña et al.'s (2012) cognitive process of logical proportional reasoning. The advertisement was found on adsoftheworld.com, and is likely student work.

of pictured entities. Phillips and McQuarrie (2004) identified three structures by which this commonly occurs in advertisements, and my collaborator and I recognized that existing studies had not yet investigated these structures with "real-time behavioral measures" of cognition (Peterson et al., 2017, p. 65). In an experiment, and with research assistants, we found that *fusion* structures (in which source and target are hybridized together) required greater sustained cognitive processing than *juxtaposition* structures (in which source and target are complete and near one another), and that the former were also easier to recall than the latter. We ran two more experiments (also within the timeframe of my Phase 1) with ambiguous results that we published later at a conference (Wise et al., 2017). I also found another collaborator at my university in Phase 2 with an eye-tracking lab, and we fully prepared a follow-up experiment that would have further interrogated the theory on visual metaphor, but this colleague left the university before the experiment was conducted. This is an example of significant efforts that do not lead to reported outcomes.

During this time, I was putting great effort into a sole-authored manuscript that was ultimately published in another advertising journal (Peterson, 2019b). This theoretical paper further builds on the work of Phillips and McQuarrie (2004) by offering additional visual structures (Figure 4), doubling the total number of identified structures (from three to six). It also hypothesizes cognitive processing stages that will be differentially impacted by visual structure, and identifies additional variables of interest that should influence experimental results on visual metaphor in advertising.

Unlike my collaborator in the laboratory experiments, I did not have a disciplinary interest in advertising. Instead, it represented a stepping stone for me to explore image function in greater depth, and to gain expertise that I could take into my primary interest area: visualization and instructional media in science education. In the first year of Phase 2, I met with a few colleagues in my university's College of Education in hopes of finding a new collaborator. One colleague I met with is an expert on scale cognition in science. *Scale cognition* (Delgado, 2013; Delgado et al., 2007, 2015; Longo & Lourenco, 2007; Magaña et al., 2012; Tretter et al., 2006a, 2006b) refers to the cognitive processes necessary in using numbers and understanding "scale, proportion, and quantity," which is considered a crosscutting concept (National Research Council, 2012) that helps students make connections across topics, disciplines, and grades in science. Magaña and colleagues (2012) identified five distinct scale cognitive processes, including *logical proportional reasoning* (LPR), in which an analogy is created between entities of two equal ratios—e.g., a human is bigger than a chipmunk to the same degree that an elephant is bigger than a cat. My colleague and I realized that LPR could be extended by treating it as a *nested* metaphor—I had found examples of source–target pairs serving in turn as a

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"Problems" Document

Visual Structure

Modified Source	Structural Alternatives

collective source to an additional target in advertisements (an example can be seen in Figure 3). We surmised that if one entity appears in both parts of the LPR analogy—e.g., a human is bigger than a chipmunk to the same degree that the chipmunk is bigger than a honey bee—a chain of scale cognitive reasoning will be formed. We call this a special form of LPR: *nested logical proportional reasoning* (NLPR) (Delgado & Peterson, 2018). NLPR appears promising because people have a tendency to lose track of scale ranges (Tretter et al., 2006a), and it may help to connect extremes of scale back to more familiar scales. This further led us to an interest in virtual reality (VR) to give learners scale experiences that they cannot attain in everyday life, but which are important in science. We then found another collaborator with deep expertise in VR, who transformed and elevated our nascent endeavor, resulting in three collaborators with distinct expertise and equal stakes in the project.

Following a $4,000 internal grant in 2018 that funded the development of a prototype (Figure 5), and perseverance through declined grant proposals, we were ultimately awarded a grant of over $1.3 million by the National Science Foundation (NSF) (Chen et al., n.d.). This is a transformative accomplishment in my career because it funds extensive interdisciplinary research that will in turn produce many tangible outcomes. I discuss it briefly in the section on Phase 3, due to the project's starting date. But other work was being completed concurrently with our successful proposal to NSF, which is a further culmination of my work conducted at the beginning of Phase 1.

My scale cognition collaborator and I extended my earlier work on image function with additional collaborators, completing an analysis of science textbooks and a resulting extension of my image function typology into what we now consider a taxonomy (Peterson et al., 2021). We reported on a basic qualitative research design using a constant comparison method (Corbin & Strauss, 2008) to achieve agreement between two coders when assigning specific image functions to visual displays in science textbooks. This process resulted in an expanded and actionable taxonomy that is both attuned to science visualization practices and significantly more extensive than the earlier picture function typologies. Our taxonomy includes a processing model that may facilitate future experimental work on image function. It also includes a structural framework (Figure 6), which permits the deconstruction of complex visual displays into constituent semiotic elements. This structural framework was realized as an extension of visual structure in visual metaphor (Peterson, 2019b; Phillips & McQuarrie, 2004), and thus my exploration of metaphor in advertising ultimately helped me return to image function—my earliest work in Phase 1—and apply it to my primary interest area. Thus, our expanded image function taxonomy sits at the far end of a 10-year strategic process. My collaborator and I have conceived of further work to follow this publication, which we believe is
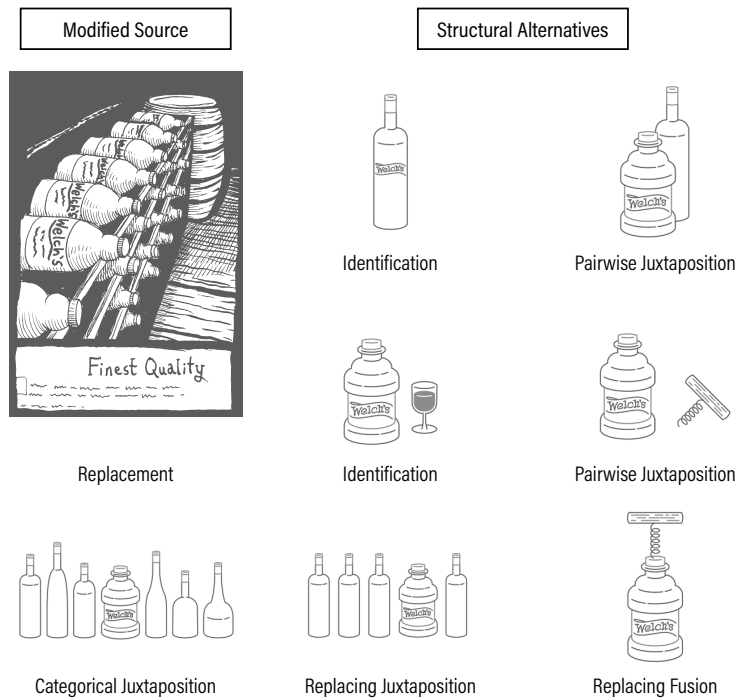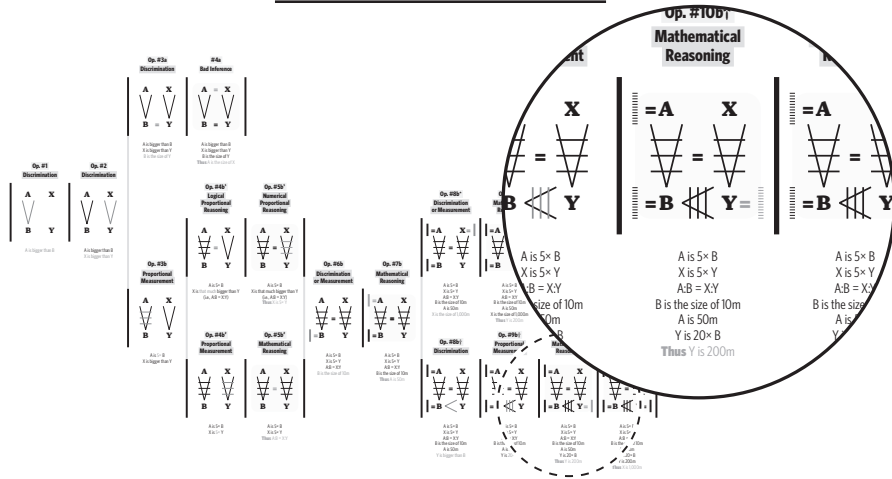
Figure 4.

Developmental work on visual metaphor to expand Phillips and McQuarrie's (2004) visual structure dimension. I compiled advertisements that presented problems when I tried to apply Phillips and McQuarrie's typology to classify them (top). This ultimately led to my proposing additional visual structures in Peterson (2019b) (bottom). Illustration by Lucas Albrecht and Eric Pryor.

Theory "Rabbit Hole" Document

Scale Worlds Prototype

Internal User's View

External View

fundable, and we are actively pursuing related opportunities. These efforts will involve the development of new visual displays for science education, and the evaluation of their efficacy for learning.

Phase 3

The third phase of my research program is ongoing (I write this in spring 2022), beginning with the submission of my tenure dossier in May 2021. Our NSF-funded project allowed me to reduce my teaching load at the start of Phase 3, and I am using the increased flexibility that comes with fewer scheduled classes to increase my productivity. I have two external grant proposals underway, which will be submitted soon. I have a few co-authored manuscripts in varying degrees of development and peer review.

My personal responsibilities on our funded project include front-end development of two versions of an immersive environment, called Scale Worlds, that permits users to scale themselves up or down by powers of ten when manipulating numeric representations. I am also involved in our development of manuscripts for publication and data analysis on studies with human subjects, which has already begun and will intensify in the second year of activity. In the interest of brevity, I will not describe our project in more detail than is supplied in Figure 7. But I do want to emphasize some of the implications Scale Worlds has for my own experience as junior faculty.

My earliest Phase 1 efforts were entirely isolated, and they felt rudimentary at the time. I did begin working with some collaborators during Phase 1, however, and this suggested a new reality. In Phase 2, I became more deliberate in seeking collaboration. However, I was still frequently working on sole-authored manuscripts, and meetings with collaborators were brief interactions that occurred following long periods working alone. In Phase 3, because of Scale Worlds, I am far more connected to colleagues, and there is greater variety in my efforts.

The Scale Worlds project team consists of three principal investigators (PIs), each of whom has a dedicated research assistant (RA), in three disciplines: engineering, education, and design. All PIs and RAs meet together for two hours every week. I have additional extended weekly meetings with the design RA, and have had as many as two other design students working hourly. This environment is consistent with other

Internal Structure of Imagery

Function Relationships

Figure 6.

Refinement of theory on image function. The structural framework (top) permits the deconstruction of visual displays into their constituent semiotic elements, as reported in Peterson (2022b)—icon, index, and symbol are references to Charles Sanders Peirce's work (Burks, 1949). Relationships among entities in a visual display can be described as functions. The arrangement of functions (bottom) represents a refinement of "function relationships" in Figure 2, and this was refined further with collaborators in Peterson et al. (2021). Illustration by Micaelah Scott.
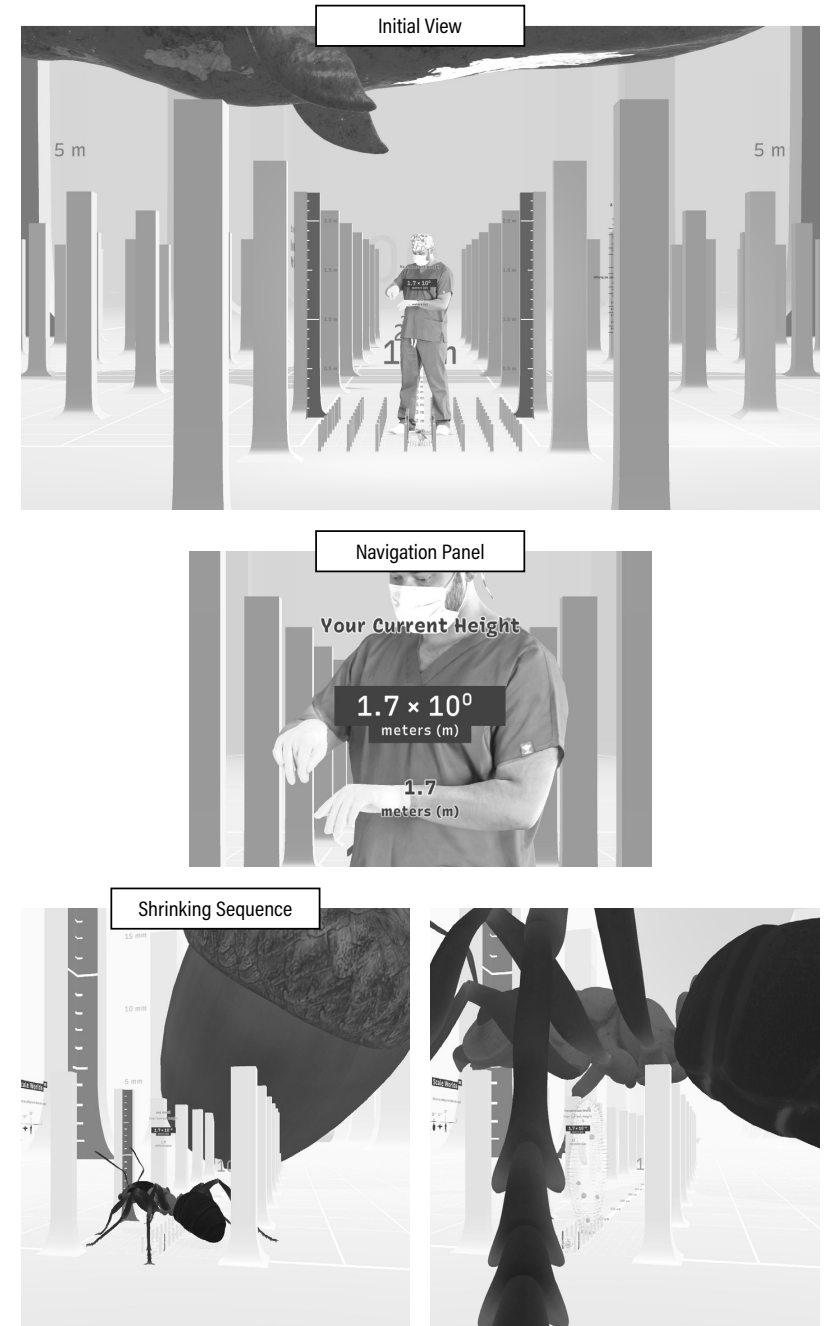
Figure 7.

A recent version of Scale Worlds. Users can flip the exponent in scientific notation, or move the decimal in standard notation, to grow or shrink by powers of ten. Each power of ten is represented by a distinct entity (e.g., human, robin, acorn, ant). Scale Worlds is actively under development by an extensive team of collaborators, listed here in alphabetical order: Karen Chen (PI), Cesar Delgado (Co-PI), Tyler Gampp (RA), Meghan Jack (technician), Matthew Peterson (Co-PI), Brian Sekelsky (RA), and Linfeng Wu (RA). This work is supported by the National Science Foundation (DRL-2055680).

more established research disciplines. The design RA, who is currently a master's student, is gaining experience not only in design development in an academic context, but in research with human subjects, data analysis, manuscript preparation, and grant writing, and will graduate with a publication record—a rarity in design in the United States at the master's level. But this situation is only possible because of years of dedicated preliminary work, which required strategy, discipline, perseverance, and support. I had to create the necessary momentum over time, though I hope that my own students—if I can continue to be successful in securing external funding—will begin their junior faculty positions with significant momentum.

Trends Within the Phases

Figure 8 charts five kinds of outcomes through Phase 1 and Phase 2: refereed conference presentations, conference proceedings papers, book chapters, peer-reviewed journal articles, and grants, each of which represents one line on a CV. But Figure 8 quantifies scholarly outcomes equivalently— i.e., at equal height units—which is misleading. CVs are evaluated not simply according to the number of lines present, but the perceived quality of those lines. This evaluation will vary from individual to individual, especially because design is not a mature research discipline, and faculty and even administrators have varying knowledge levels, assumptions, and values— especially when design programs are placed within art units.
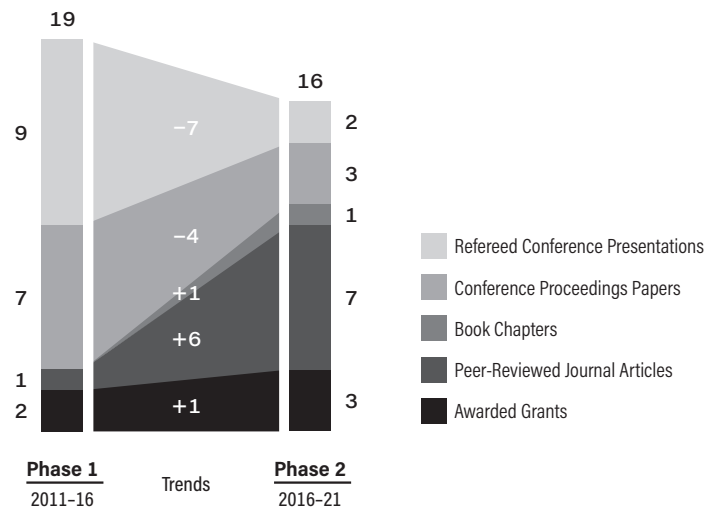
Figure 8.

Scholarly outcomes through two phases of a research program.

Particularly misleading in Figure 8 is the increase in awarded grants from two total in Phase 1 to three total in Phase 2, or

an increase of 50% by count. Unlike publications, grants are easily quantified by total funding. In fact, my Phase 1 awarded grants in research were $11,000 total, while my Phase 2 grants were $1,360,070 total, or an increase of 12,264% by dollar. This is an extreme example that illustrates the need to evaluate CVs carefully.

Figure 8 does not report all activity. I have excluded outcomes that do not fit into these stated categories, such as invited presentations. Outcomes shift dramatically from Phase 1 to Phase 2. In Phase 1, more than half of my conference proceedings papers were focused on design education, which is not considered research. Furthermore, conference outcomes dominate Phase 1, while more highly valued journal articles dominate Phase 2. My journal articles represent a greater accomplishment than my conference proceedings papers, and required much more work. However, as described above, some Phase 2 journal articles were largely products of Phase 1 efforts. Likewise, two more journal articles were ultimately published in the first year of Phase 3, though they were largely products of Phase 2 efforts.

Figure 9 plots the scholarly outcomes of Figure 8 on a timeline, and includes grant proposals that were declined in Phase 2 (I have inadequate records to supply the same for Phase 1, though I only
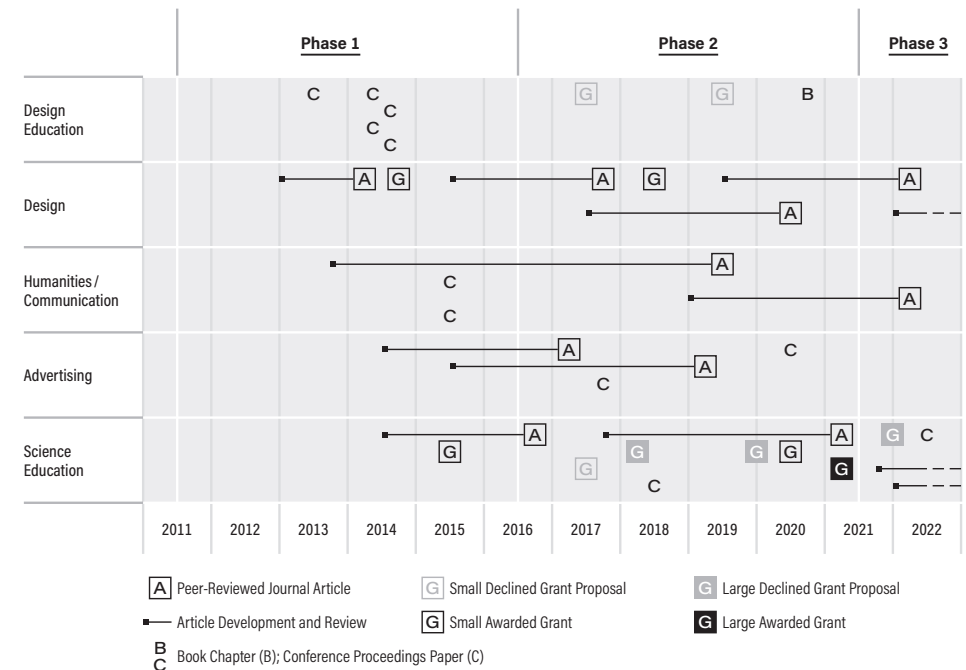
Figure 9.

Scholarly outcomes timeline by venue discipline. Large grant proposals are over $1 million, and small grant proposals are below $25,000.

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submitted a few small internal grants). For journal articles—which take time to develop, complete the peer review process (including rejections and revisions), and go from "in press" status to publication—I have drawn lines that indicate the full development and review process. In this case, development may begin for a theoretical paper when an outline is created, or for a report on an empirical study when a research design is drafted.

Figure 9 suggests a fallow period at the beginning of my initial academic appointment. I was actually completing my PhD in fall 2011 (my first semester of employment), writing the remainder of my dissertation, and defending it (I already had a terminal master's degree). Thus, my sole outcome that semester was the dissertation itself, which does not count toward the publication record. Doing this while starting my first full-time teaching position was, as could be expected, overwhelming. But no scholarly outcomes appear the following calendar year, either. I was certainly preoccupied with teaching and curriculum design, recovering from the PhD process, and having to strategize a new research program. Some of my time was spent studying visual metaphor, and it took a great deal of study for me to be capable of making a contribution of my own. The earliest journal article in Figure 9 (Peterson, 2014b) was in development no later than early 2013 (my records are incomplete), and this article "hit" during Phase 1. But the main story of Phase 1 is that other publication efforts were underway, with five additional manuscripts targeting peer-reviewed journals either in early development, under review, or in press. However, such delays must be appreciated by administrators reviewing a tenure dossier, and though each of the five manuscripts was ultimately published, this was not a given. The picture of Phase 1 may suggest a position of weakness, depending upon interpretation and review criteria, while Phase 2 suggests a position of strength (though it may not in many other more established research disciplines).

Phase 2 in Figure 9 reveals a concentration of efforts related to science education, particularly in grants submitted (all four large grant proposals were submitted to the NSF). Each of the large grant proposals was a massive undertaking. And these grants are highly competitive—with success rates as low as 8–12%—so pursuing one means sacrificing other possible endeavors. I was only able to pursue these grants for three reasons. First, my work had matured to the point that I could argue for my expertise based on a publication record, and in pursuing that publication record I had become more capable of contributing to a competitive proposal. I could not have made a respectable contribution to an NSF grant proposal in Phase 1. Second, my Phase 1 efforts were slowly becoming Phase 2 outcomes, which allowed me to appear reasonably productive in Phase 2 while "stealing" time away for grant writing. Third, I was leading a multi-year accreditation effort for our undergraduate and graduate programs, and for this my department head granted me course releases in multiple years,

slightly reducing my teaching load. While the course releases were fair to the department and did not give me more time than I otherwise would have had overall—that is, the amount of time I put into accreditation was equal to the teaching I would have done instead—the flexibility I gained in scheduling activities was transformative. I could ignore accreditation work for weeks before devoting heavy hours to it over a shorter period of time, and in doing so I was able to schedule devoted periods of grant writing. Writing complicated grant proposals, like preparing complicated manuscripts, cannot be done well in small blocks of time. I have found that for these activities, I need to occasionally devote three or so full consecutive days, and enter something like a fugue state while engrossed in the problem.

These three supports for my grant writing have important implications for junior faculty in design. The first support, *personal research maturity,* will not usually develop for design faculty until late in a tenure track position or even after the tenure clock has run out—I was simply more capable in my second consecutive assistant professor position. The second support, *benefitting from earlier delayed efforts,* would normally only be available for the rare design faculty member who worked in a productive lab during their studies. I had this benefit instead because I was in a second assistant professor position. The third support, *reduced teaching load,* is normally only available on the rare occasion that a design faculty member is awarded a large external grant that pays for release time, which presents a catch-22 (or a chicken-and-egg paradox). The three supports I utilized are typically absent.

Challenges for Junior Design Faculty in Interdisciplinary and Evidence-Based Research

Challenges Particular to Design Faculty

A challenge endemic to design units at research universities is the disproportionately heavy teaching load for design faculty, which puts them at a disadvantage in relation to their colleagues elsewhere in the university. Corresponding to heavy teaching loads is reduced infrastructure that supports research: the more faculty in design teach, the less they collectively produce in research activity, and the less justification design units have for investing limited funds in research support.

Many of the most impactful endeavors at research universities are interdisciplinary collaborations. Engaging as equals with collaborators in mature research disciplines is challenging for junior design faculty. Many design faculty start at a disadvantage because their highest degree is a professional master's degree, which is the field's terminal degree in the United States, and they must gradually integrate with other col-leagues' research practices by familiarizing themselves with those practices on the job. (To be clear, this is not a criticism. Because the professional master's degree—e.g., MFA, MDes, MGD—is indeed the terminal degree, the field would be remiss to erect barriers for design faculty who rightfully hold one.) Other design faculty have a professional doctoral degree, which does not always involve training in evidence-based research.

Interdisciplinary collaboration requires publica-tion and grant writing in non-design venues. Writing for another discipline's audience is exceptionally difficult, as disciplines have tacit schemas by which members operate. Members of these disciplines grow into their schemas both consciously and unconsciously as students engaged in research de-grees. Outsiders have difficulty perceiving unwritten standards.

For large external grants, design faculty must collaborate with other disciplines. The more prestigious and lucrative the grant, the more rigorous the review, and the lower the success rate. In highly competitive reviews, a single weakness can be enough to doom a proposal, since program officers and reviewers need to differentiate among a set of strong proposals. There is also luck involved—luck of the draw of reviewers, luck of the pool of proposals in which a proposal falls, and luck of other kinds. Evonne Miller (2021) recounted receiving successive declined proposals in what made the process feel like a "lottery" (p. 180). Her proposal was rated in the top 10% in one year but did not quite get the award. The following year she tried again with the same proposal, but it was then rated in the bottom 50%.

The comments received from grant reviewers can be disheartening. But they are also invaluable in interrogating both one's assumptions and the quality of a concept that a grant writer is predisposed to rate highly themself. A senior faculty member explained to me the benefit of unfiltered reviewer comments:

> When I first started writing grant proposals, I was surprised and pleased (in a perverse way) to have the critical feedback. It alone almost made the [grant]-writing worth the effort (almost). Insightful, honest feedback is a rare commodity. I think professors, who can become little lords in their class-rooms—always right—always surrounded by inferiors as far as knowledge goes [as opposed to "superiors" in terms of classroom hierarchy], particularly benefit from a little critical feedback on their ideas.

Targeting and Appraising Publications

A successful publication record is dependent upon the publication venues themselves. Junior design faculty are at a disadvantage in targeting and appraising publication venues due to the heterogeneous nature of research and creative work in design. Other, more established disciplines have un-written standards that are internally reinforced through continuous within-member interactions. In design, faculty are more often isolated by their particular kinds of research engagement. Design faculty can draw parallels between their work and another discipline, but no parallel is complete, and thus there will inevitably be some sense of uncertainty.

When a scholar has the earliest inkling of a concept for a project, they should begin considering what venue might be appropriate for it, as well as how publishing in that venue will be valued. Table 1 presents my general sense of publication values in a fuzzy area that combines related disciplines in the social sciences. It is my own aggregate impression, drawn from observing conversations (online and in-person)

Relative Ranking	Publication Venue	Source of Merit
Highest value	Authored book	Scholarship's merit and scholar's reputation—dependent upon publisher's credibility
	Journal article	Scholarship's merit—dependent upon journal's credibility
High value	Conference keynote	Scholar's reputation—dependent upon conference's credibility
	Book chapter	Often scholar's reputation and sometimes scholarship's merit—dependent upon invitation or open call, and in the latter case, the model of peer review
	Conference proceedings paper	Scholarship's merit
Moderate value	Conference poster or presentation	Scholarship's merit
Inconsistently valued	Book review	Scholar's reputation
Devalued	External blog post	Scholar's reputation
	Self-published book	*Not applicable*
	Personal blog post	*Not applicable*

Table 1.   A "reasonable" rank ordering of publication types, not an abso-lute one, and not one applicable   across all disciplines. The edited book is purposely excluded, as it is particularly difficult to assess   without declaring a discipline.

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among members of other disciplines (e.g., science education, psychology) about the rank-ordering of publication types. Even if it is a fair aggregate impression, it may not accurately describe any single discipline.

While there can be a mystique to books, journal articles are almost universally valued over book chapters (with the caveat that "always" is almost never true). I offer a partial explanation for this in Table 1: book chapters are sometimes invited, which is a matter of reputation, whereas an academic journal usually evaluates scholarship directly, with anonymous versions of submitted manuscripts placed under the scrutiny of peer review. Some scholars devalue book chapters because of delayed publication, limited access, and the investment costs in pursuing them over other outcomes (Blattman, 2014a, 2014b; Pacheco-Vega, 2014); or characterize book chapters as an appropriate career outcome for senior faculty specifically (Mathieson, 2013). But this valuation does not apply across all disciplines, and such bias may not apply to many design faculty. It is also important to recognize that some important work only has a home in books, as academic journals select articles according to their respective missions, which may be limited.

In contrast to varying opinions on the book chapter, the journal article is consistently considered the height of peer review. Thus in a post on advice for junior faculty, Greg Mankiw (2007) wrote: "Your focus should be on getting papers published in refereed journals. Everything else is secondary." But recommendations change dramatically over the course of a career, as reflected in Manya Whitaker's (2019) advice:

— After 25 years on the job, many academics take a step back from the publishing rat race and focus on scholarly mentoring. I don't mean guiding a handful of people through their careers. Rather, I mean creating opportunities for younger scholars to publish—for example, editing a book series, directing institutes and centers, or curating performances, exhibitions, and productions.

Note that in Table 1, I make no mention of faculty effort—that is, how much time was put into a publication. Some junior design faculty may assume that their effort is being evaluated. But the merit of their scholarship or their reputation is another matter. This is why self-publication does not even register in established disciplines—a self-publication has not been validated. It is also important to note that "peer review" is a specialized term. It does not refer to just any kind of review offered by anybody like a peer. As Whitaker (2019) stated:

— Other permutations of peer review won't count as much [as the double-blind review by an academic journal]: for example, when academics in an edited collection give feedback on your chapter or when press editors offer revision suggestions. Sure,

there is an element of peer review in both cases, but that's not what the term means when it comes to high quality, rigorous publishing on your way to tenure and/or promotion.

Even when junior faculty in design feel relatively certain that they have a viable publication strategy, and that their administration will view their choice of publication types fairly, they must be able to differentiate publication venues themselves. Publication in a conference's proceedings will be valued in accordance with the conference's credibility, and a more exclusive conference will carry more weight, as measured in a lower percentage of papers accepted. Likewise, a journal article's value is dependent upon its journal's credibility. Junior faculty may be unaware of how a given journal is viewed by more experienced scholars.

There are predatory journals that reach out to faculty, offering easy publication, often with a publication fee. I have found it easy to vet unfamiliar journals by simply conducting an online search for the journal name appended with "predatory," which will reveal online conversations between scholars. A single conversation is not definitive, but it is a starting point. Some venues—journal, conference, or otherwise—are not predatory, but still have lower value in the eyes of more experienced scholars. Even in this gray area, online conversations can give the junior faculty member some understanding of a venue's credibility by "overhearing" senior faculty. For instance, one publisher was discussed on a "PhD in Design" discussion list in relation to its general quality as a venue for publication:

— With respect to the journals from [the publisher], it is worth noting that [they are] not a predatory publisher. Rather, they have developed a dicey business model that manages to mimic some of the attributes of serious publishing without doing the real work of editing journals or managing serious conferences.

— As a result, they produce apparently real journals of low quality. Because the quality is low, nearly nothing they publish is cited. The special trick of their business model is to arrange swift conversion from conference paper to journal article while inviting authors to review other papers for a credit as an "associate editor" of the journal. This means three ticks on an author's CV. Conference participants who become journal reviewers and authors present a conference paper, publish a journal article, and attain an "associate editor" designation, all for the same price. The problem is that none of these credits is meaningful.

— …The [corresponding] conference series is linked to the [publisher's] journals. There have been two main changes to

the journals since my first posts. Instead of the 17 journals that they published with the same two editors, they now publish something like 77 (!) journals. Their pitch is a bit more clever than it once was, and they have added new editors. The same two editors no longer edit every… journal. The single design journal they once published has grown to become a collection of six journals and a yearbook — seven (7!) publications. (Friedman, 2017)

I provide the above excerpt (cf. Cope, 2017) without having ever interacted with the publisher in question, and so I have withheld the publisher's name. I include the excerpt because it is a good example of an experienced scholar parsing out factors that lead to disciplinary judgments, and the post is in fact publicly available online. It demonstrates that targeting and appraising publication venues is a problematic enterprise, and should be done with care.

Temporal and Emotional Dimensions of the Publication Cycle

Publication is its own challenge, for all faculty. What is unique about design faculty is that their administrators may not appreciate how difficult and time consuming publication in competitive peer-reviewed academic journals can be. Figure 9 plots lines for journal articles that indicate the full duration of manuscript development to publication for my own articles. In some cases delays occurred because I could not find the time to return to a revision. In other cases a manuscript was locked in a single round of peer review for over a year. Table 2 offers more detail on four publications, though I am identifying neither the publications nor the journals by name (some publications are co-authored, and my co-authors may not be as comfortable revealing these details as I am). Table 3 provides a more granular timeline of one manuscript's development, review cycle, and accumulation of citations (according to Google Scholar, which in its automation can slightly inflate citations). Citation count is a useful indicator of a publication's impact, though there are disciplinary bounds that must be considered. Because design is an immature discipline, publications receive a small fraction of the citations compared to those in some other disciplines, especially in medicine and science. And because publication can take so long, citations accumulate slowly; they are the result of other publications, after all, which are subject to the same publication cycle.

The manuscripts documented in Table 2 are fairly representative. Though I have had a manuscript accepted for publication on the first attempt, I am more accustomed to receiving two rejections before acceptance. In most cases, a rejection comes with comments, either from

Manuscript	Journal	Result	Review Cycle Duration
Manuscript A: visual communication or design	Journal A	Publication suspended, unable to review	2 years and 10 months from initial submission to indexed publication, with 6 submitted drafts
	Journal B	Desk rejection	
	Journal C	Revise and resubmit	
		Rejection	
	Journal D	Minor revision	
		Accepted	
Manuscript B: design	Journal E	Revise and resubmit	2 years and 2 months, with 7 submitted drafts
		Rejection (by editorial board review)	
	Journal F	Rejection	
	Journal C	Revise and resubmit	
		Rejection	
	Journal A	Minor revision	
		Accepted	
Manuscript C: advertising	Journal G	Desk rejection	2 years and 6 months, with 4 submitted drafts
	Journal H	Desk rejection	
	Journal I	Revise and resubmit	
		Accepted	
Manuscript D: design	Journal C	Rejection	2 years and 6 months, with 4 submitted drafts
	Journal J	Rejection	
	Journal K	Minor revision	
		Accepted	

Table 2.   Results of submitted drafts leading to publication.

the editor alone (in the case of a desk rejection), or from two or three peer reviewers. In the case of a revise-and-resubmit, in which the journal does not accept the paper but encourages a revision, comments become available while the possibility of publication in that journal remains. Reviewer and editor comments can be invaluable, drastically improving the quality of a manuscript. For this reason, it should not be assumed that the journals that accepted a manuscript in Table 2 are lesser than those that rejected it.

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Year	Month	Event	Status
2015	January	**Internal document on notation for visual metaphor created** (general work becomes particular project)	—
	June	**Notes for manuscript development created**	
2016	January	**Document outlining begun**	In development
	February	**Commissioned illustration for the article begun**	
	April 3	**Writing begun**	
	June 12	**First draft completed**	
	June 15	**Second draft completed**	
	June 15	**Submitted to the *Journal of Advertising***	Under review
	June 22	**Desk rejection**	In development
	July	**Submitted to *Marketing Theory***	Under review
	July 20	**Desk rejection**	In development
	July 28	**Submitted to the *International Journal of Advertising***	Under review
	October 9	**Rejected with request to revise and resubmit**	In development
2017	December 16	**Revision resubmitted**	Under review
2018	February 25	**Accepted**	In press
	April	**Pre-published online** (but absent in some search results)	Early view
	End-of-year	Citation count: 1	
2019	January	**Published and indexed** (38.1: 67–96)	2019
	End-of-year	Citation count: 1 (+0)	
2020	End-of-year	Citation count: 10 (+9)	
2021	As of April	Citation count: 13 (+3)	
2022	As of April	Citation count: 25 (+12)	

Table 3.   Development and publication
                                timeline for one manuscript.

In many cases a third or fourth submission is profoundly superior to the initial one.

However helpful reviewer and editor comments can be, they must be parsed and addressed selectively. And on a personal level, comments can be difficult to process, especially when they come with

a rejection. Most top journals employ a double-blind review process, meaning that the peer reviewers do not know who submitted the anonymized version of the manuscript they are reviewing, and the authors do not know the identity of the reviewers. Consequently, reviewers are famously brusque. Editors, in contrast, are most often courteous. Though I am accustomed to rejections, and the copious critical comments that accompany them, I found the following editor's comments upon one rejection to be insulting:

—   This article makes the world more difficult to understand because it uses a seemingly theoretical language disconnected from the world it attempts to describe. I suspect that this is a writing problem rather than a thinking problem, but we can't do the paragraph-by-paragraph editorial work with you that we'd need to do to clarify this. Only when the article becomes clear, will it be easy to understand the conceptual content. I have two suggestions for you, one short term and one long term. The long term suggestion involves learning to write more effectively. I recommend that you make use of three books — *Elements of Style* by Strunk and White, *Clear and Simple as the Truth: Writing Classic Prose* by Thomas and Turner, and *Stylish Academic Writing* by Sword. This will take some time, but you have a long career ahead of you, and learning to write well is a worth while investment. My short term suggestion is that you ask an experienced author to join you as second author of this article. . . . As it is, we are rejecting the article. We hope that you can work with a skilled co-author to clarify and improve it for another journal.

This editor knew my identity, and had access to my publication record, and so the suggestion to work with a "skilled co-author" felt different than it would coming from a peer reviewer. Of course, each editor is a particular person, and each journal is a particular institution, and authors must decide what to make of commentary. It is good for junior faculty to occasionally seek feedback (and possibly support) from senior faculty, to help them interpret comments and cope with failure. In response to another rejection of the same manuscript in another journal, a senior faculty member wrote to me and conveyed knowledge of that journal's particular tendencies that helped me interpret negative commentary, and said: "Keep at it—you'll break through." I did eventually.

Both negative and positive comments are likely in any peer review, irrespective of the quality of the manuscript and even the outcome of its evaluation. For instance, the following reviewer comment accompanied a journal's *rejection* of one of my manuscripts:

—   A fantastic paper. Articulate with a streamlined flow. I did not see anything that needed modification.

Ironically, the same manuscript received the following comment from a reviewer when an improved version was *accepted* by another journal, which requested only minor revisions for publication:

— I'm just scrolling hoping in your conclusion you make this effort useful. So far, the work is exceedingly dull.... I appreciate the use of outside sources as models for a cognitive reading of images, but does the work need to be so strikingly dull?

This comment is not very helpful. But in cases where a review is ongoing (e.g., minor or major revision; revise and resubmit), the author must respond to reviewers. In some cases this entails explaining elements of a revision, and in other cases it is a justification for not addressing a specific comment. For instance, my response to the above "dull" comment was:

— The writing or the figures used as examples? If the writing, I believe these concepts need to be explained plainly and (technically) with careful terminology. If the figures: I am focusing on what are not necessarily "remarkable" works precisely because I discuss conventional practices. Indeed, at least as this work matures, it should describe the mundane as well as the exquisite. It is not a means to make such a judgment. A narrative picture can be exciting or disappointing.… But the important thing here is the internal structure of the picture.

Addressing reviewer comments often requires additional work, as in this example:

— As presented, the paper is well argued but theoretical. Including more description of the evidence that led to this picture/image typology would give necessary weight and credibility to the typology put forward in the paper.

I addressed this comment directly. It reveals a bias against purely theoretical manuscripts—a bias that I consider fair. Theoretical papers are necessary, but disciplinary knowledge must be built up from evidence, and a discipline should only accumulate so much untested theory.

Table 4 collects reviewer comments along with portions of my responses, arranged according to the workload required. (All comments come from peer review for the manuscript documented in Table 3.) Structural changes to manuscripts can be extremely time-consuming, often more so than significant additions. What unifies all the reviewer comments in Table 4 is how insightful they are.

Perhaps the most common type of comment from peer reviewers is to address literature that the reviewer assumes the author has overlooked. In at least one case, I have been profoundly embarrassed that I was unaware of literature that was essential to my manuscript's argument. In many cases, the literature that is referenced can be incorporated

Reviewer Comment	Relative Workload and Author Response
"On page 23, I am not sure what you mean by 'illustration style'? How is this distinct from other factors, such as distractor presence, environmental apportions, etc.?"	**Very light workload.** This required a single expanded explanation in a single location. "The bullet point on illustration style now includes a brief list of possibilities to make it clear to the reader what kind of variation is envisioned here."
"The paper sets its foundation on the work of Phillips and McQuarrie (2004), but these authors were trying to explain all visual rhetoric, not just visual metaphor. I think this is a distinction worth explaining near the beginning of your paper,… It is fine that you draw on only part of Phillips and McQuarrie's work, as metaphor is complex enough for its own paper, but you tend to blur the differences between the goals of the two typologies."	**Light workload.** This required tracking terminology throughout the entire manuscript, but changes were relatively simple. "Thank you for noticing this issue, where I had oversimplified. I have addressed this comment through a number of mentions of 'visual rhetoric' where appropriate (instead of 'visual metaphor'). There are also new passages that attempt to be more explicit."
"Your new typology has implications for advertising practitioners who are trying to encourage consumers to process their metaphorical ads toward a positive outcome. I think you should mention this in the conclusion, as [the journal] has both a theoretical and managerial focus."	**Moderate workload.** This required writing a new subsection, but did not require editing other text elsewhere. "This has become a new subsection under Discussion. That subsection introduces a few new sources."
"I think you cannot create an example of (7) fusion for the grape juice ad because (7) is not a valid structural category. The corn example also fits into (6), as you explain. For a consumer to recognize fusion, some visual aspect of each of the two objects must be present, so fusion is always replacement fusion (6), with one part of object A replacing a part of object B. Or provide a real-world example of (7)."	**Heavy workload.** This required illustrating additional ads, and adding new explanations for them. "A new figure has been added that gives examples of fusion and replacing fusion. This figure uses examples with different source–target pairs. There is a corresponding explanation in the text. In addressing this and the previous issues the manuscript increased in word count following the list of types."
"…the main body of the manuscript (from 'Formal dimensions of visual metaphor' to 'Other critical variables: Towards a profile of visual metaphor' sections) needs to be re-structured to help readers better understand the essence of the current study. It should be clear on which parts are the review of previous work, and what are the expanded typology developed by the authors."	**Very heavy workload.** This required fundamentally restructuring a lengthy manuscript—with an investment in time simply planning a new structure, and possibly the editing of more sentences than those left unaltered. "The paper has been reordered to more clearly delineate lit review from the authors contributions. There are now two top level sections that have parallel internal structures. The top-level sections differentiate visual metaphor form and visual metaphor processing. In each case sub-sections begin in lit review with a final sub-section on proposed changes. Furthermore, the verbiage 'a proposed…' is used in both cases to clearly indicate the authors contributions."

Table 4.   Reviewer comments, workload   Peer review of one manuscript.
                     required to process, and author
                     responses.

with only minor edits, without fundamentally changing the manuscript. In other cases, the literature is not particularly relevant to the manuscript, and the author must make the case to the editor that it should not be incorporated, despite a reviewer's suggestion.

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Ultimately, manuscripts will be rejected frequently. One way to view Table 2 is as a story of my personal failures. Each manuscript was rejected by two or three journals before being accepted to a third or fourth. But failure has utility (Young, 2019). Melanie Stefane (2010) noted that:

—
> As scientists, we construct a narrative of success that renders our setbacks invisible both to ourselves and to others. Often, other scientists' careers seem to be a constant, streamlined series of triumphs. Therefore, whenever we experience an individual failure, we feel alone and dejected. (p. 467)

Stefane suggested that scholars keep a "CV of failures," which catalogs each rejected manuscript and declined grant proposal. Table 2 is a small version of what would be my own CV of failures.

Benefits for
Design Units Within
Research Universities

It is well established that design remains immature as a research discipline (Cash, 2018; Corazzo et al., 2020; Davis, 2008, 2020; Fisher et al., 2018; Littlejohn, 2017). Fisher and colleagues (2018) found discrepancies in conceptions of research between design academics and design practitioners, and one is particularly emblematic of the state of research in design: practitioners did not consider "being explicitly systematic or formal" in research to be "a high priority," and even academics felt some ambivalence about systematicity in research being relevant to designers (pp. 68–71). One thing that distinguishes scientific knowledge among types of knowledge is "being more systematic" (Hoyningen-Huene, 2020, p. 85), but even absent an emphasis on science, any proper research activity (e.g., by a trained historian) seeks knowledge that is systematically rooted. Systematicity is such a fundamental aspect of true research that demonstrating this would seem unnecessary—even ridiculous. Addressing the nature of research from a design perspective, Friedman (2003) connected the most practical forms of research—applied and clinical—to basic research, situating basic research as a foundation. Basic research is the search for general principles that are "abstracted and generalized to cover a variety of situations and cases" (p. 510), with those situations and cases coming to the surface to increasing degrees in applied and clinical research.

What is considered scholarship in design—and especially what is routinely counted as a form of research productivity for design faculty—is remarkably heterogeneous, in stark contrast to the strict (but distinct) disciplinary standards upheld in most non-art and non-design units at universities. Davis (2016) outlined the challenges faculty face in an environment where definitions of scholarship are murky. She argued that design units weaken their positions and opt out of university agendas when they ask for too much special treatment (p. 125), and that "it is through research that design demonstrates its value to other fields with scholarly interest in its domain" (p. 126). Research, and thus the generation of new knowledge, is inseparable from the basic concept and mission of the research university. While there are certainly many institutions of higher education with an exclusively vocational focus, research universities represent another area of great impact and opportunity. And there are nearly 150 research universities in the United States at the highest level of activity (R1, "very high research activity") according to the Carnegie Classification, with an additional 120 at the next highest level (R2, "high research activity").

A major factor distinguishing the research university is the degree of external funding secured by its faculty. The sources of the greatest external funding require extensive empirical research that is incompatible with many of the models of scholarship tacitly recognized in design. This means that opportunities for design units to benefit from these sources of funding—and the prestige within the broader university community that accompanies them—are limited.

A large external grant channels indirect costs (or overhead) into a university as finances that can be allocated anywhere to further the university's agenda. These indirect costs are negotiated between the university and the sponsor. For instance, at my university, indirect costs for NSF projects are calculated at 52% over expenditures (direct costs), though certain expenditures are exempt from indirect costs (e.g., tuition for research assistants, equipment over $5,000). Thus, a project with $1 million in expenditures will require a total award to the university of up to $1,520,000. There is usually a trickle-down effect for indirect costs. The university likely diverts a significant portion of funds generated by these costs to fund internal grants. Therefore, a faculty member responsible for generating indirect costs for an external grant is contributing to the internal grants that will support other faculty, often for preliminary research that may in turn lead to other external grants. The university then likely diverts some of the remaining generated funds to the colleges of the principal investigator (PI) and Co-PIs, commensurate with their portions of the award as reflected in budget segments. Colleges may use these funds in any number of ways, but regardless, the faculty member has reversed the normal direction of support in financially contributing to their college. The college may further divert some of the funds to the faculty member themself, as a discretionary fund to support further preliminary research and perpetuate the funding cycle—though this is less likely in colleges unaccustomed to faculty generating indirect costs. It is important to note that, in many cases where

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a design faculty member is a "collaborator" on a grant but not a PI or Co-PI, the chain of funds generated by indirect costs does not pass through their college. It is often the case that design faculty are invited to join established research teams as collaborators, and this has financial implications.

Aside from the money, external grants support highly impactful and visible work that matters both to universities and—though it sounds grandiose—to humanity and the world. The largest sponsors have high standards to ensure this. For instance, the NSF has two core criteria applied to all proposal evaluations: intellectual merit and broader impacts. *Intellectual merit* concerns the contribution of knowledge generation. *Broader impacts* concerns the direct benefit of research to society—for instance, a project may include outreach activities to broaden participation in STEM by creating career pathways for underrepresented students.

It is noteworthy that the largest sponsors of research do not have singular design missions. Instead, their missions are in areas for which design may be *relevant*, such as medicine (NIH), science (NSF), or defense (DOD). Thus, it is through interdisciplinary engagement that design finds a path toward more lucrative research activities, and elevation within research universities.

Even absent large external grants, design faculty can collaborate with faculty in other colleges to produce meaningful research that situates or integrates design within the broader university community. If this is the case, deans of design colleges will likely find increased success when advocating to university administration for resources.

Recommendations for Administrators in Design

The research production expectations of design faculty are increasing over time in established design units within universities. This means that the junior faculty of today are usually held to higher standards for promotion than those the senior faculty reviewing them had to meet. The support of faculty in design units must evolve in kind. Unfortunately, junior design faculty are too frequently expected to elevate a design unit's research profile without adequate infrastructure in the form of administrative support.

The recent proliferation of teaching assistant and clinical assistant professor positions in design units, which may entirely remove scholarship as an area of responsibility in favor of a higher teaching load for individual faculty members, is an unnecessary impediment to design's maturation as a research discipline. Faculty lines are limited and thus precious. A faculty member who, by the stated requirements of their

position, rightly does not engage in scholarship decreases a design unit's collective potential for research production. This is no fault of the faculty in question; rather, it is a direct result of administrative strategy that sacrifices scholarship for what is only a slight increase in a program's total teaching capacity. Often, the faculty in these positions are as qualified in research as those whose duties explicitly include scholarship, and they could produce equally impactful work.

Though these positions exchange teaching loads for research productivity in quantifications of faculty academic year effort, such exchanges are too infrequently used to differentiate scholarly production among other faculty. One way administrators can promote research productivity among traditional tenure-track and tenured faculty is to decrease teaching loads only for faculty more deeply engaged in scholarship. This is politically fraught. But absent such adjustments, should a design unit have aspirations of better integration within its university, the incentivization of faculty pursuits is diametrically opposed to an ambitious research agenda. Teaching loads for design faculty are famously heavy. This is a historical problem that is as familiar to administrators as it is seemingly intractable. Any college-wide reduction in teaching loads has profound financial implications. But administrators in design must find a way to change the standard teaching load in the field. It is a matter of equity within the broader university community.

Administrators should provide course releases for junior faculty in their first year of employment. It is difficult to build momentum on a research program, and adjusting to a new environment and a distinct student population is overwhelming. A junior faculty member can easily "come up for air" at the end of their first year of teaching and realize that they have made no progress on their research program, or worse, that they still have no discernible plan—with a full fifth of the time available for productivity exhausted. Classes are hard-scheduled, which reduces the flexibility for producing scholarship. Being productive in scholarship while managing a teaching load is an advanced skill that faculty need to develop. An early course release or two can be helpful in that regard.

Junior faculty must not simply find the time to engage in scholarship, but they need to understand the scope of engagement required of them. To that end, administrators should provide clear articulation of research requirements for junior faculty. In some design units, only vague notions of "research" are mentioned, and annual reports are informal exercises. In contrast, my current university maintains a statement of faculty responsibilities (SFR), which divides 100% of academic year effort into categories of activity. The SFR suggests specific outcomes, and even quantifies production. It provides the structure for the annual report, in which each faculty member lists the year's accomplishments under a given category. For instance, my current SFR quantifies my academic year effort as such:

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— Teaching and mentoring undergraduate and graduate students: 60%

— Discovery of knowledge through discipline-guided inquiry: 25%

— Service in professional societies, and service and engagement within the university: 15%

Thus, I do not need to engage in outreach activities to "meet expectations" (though I can report on any outreach in an "other achievements" category). Due to the heterogeneous nature of design research and what is considered equivalent to research in design, expectations of scholarship should be stated explicitly. (In other disciplines this is unnecessary, because expectations are more universal and are tacitly agreed upon and continually reinforced.) My SFR recently articulated my research requirement as such:

— Make original and valuable contributions to the body of knowledge about design or design education with funded research and scholarly publication. Two peer-reviewed papers or outcomes of equivalent significance (such as funded research projects, scholarly books/book chapters by publishers, peer reviewed conference papers, curated exhibitions, patented inventions, and sponsored studio projects) are expected to be accomplished every academic year.

I requested an addition to the list of "outcomes of equivalent significance," and my department head thankfully updated my SFR in kind. The parenthetical list of outcomes now includes a second outcome related to grants, as italicized here:

— …or outcomes of equivalent significance (such as funded research projects, *external grant proposals over $500,000 as PI or Co-PI,*…

This addition acknowledges the heavy workload associated with large external grant proposals, even when they are ultimately unsuccessful, and incentivizes pursuit of external grants. In the absence of this, it would be a reasonable strategic calculation for junior faculty to forego the most competitive grants because success, however lucrative, is so unlikely. Administrators should be careful to incentivize the activities they are most interested in seeing their faculty pursue. And they should, as in the above example, support junior faculty by defining expectations in a reasonable way. However, if design units intend to increase their overall engagement in high-impact research, administrators should be careful not to accommodate all possible activities under the guise of research. Otherwise, junior faculty are not likely to further the unit's research agenda. *Something* is always being incentivized—be it the most impactful,

most comfortable, or least difficult activity—and administrators should recognize this and be purposeful in creating incentives.

Mentorship can help junior faculty align their activities with an incentivized research agenda. Administrators should thus provide junior faculty with senior faculty mentors whose scholarship is similar to what they will likely produce. They should also follow up on mentorship to ensure that mentors are actively involved, and assign new mentors if they are not.

In reappointment, promotion, and tenure reviews, as well as in the articulation of expectations, administrators should not expect the same scholarly products—either in quality or quantity—in the periods preceding reappointment, between reappointment and promotion, and following promotion. The highest impact scholarship is predicated on earlier activity that is far less impressive (Figure 8 and Figure 9 together are a stark example of this). Thus, expectations should not only be stated clearly, they should also be dynamic. Junior faculty should know what is expected of them, and how they will be evaluated, in each period of reappointment, promotion, and tenure.

These expectations should also be communicated to members of tenure review committees at the university level. In other disciplines, students engage in disciplinary research even at the undergraduate level, and when they earn their PhDs—for them, the terminal degree—they are often embedded in a lab and producing the same kinds of outcomes they will continue to produce as junior faculty. But in design, junior faculty typically arrive with a professional master's degree, and have no sense of continuity in research, nor momentum. Administrators in design should make this reality clear to others—and not assume that it is evident—so that design faculty are evaluated fairly.

Recommendations for Junior Faculty in Design

Sustained research by junior faculty in design requires: a long-term strategy to guide activity in the short term; the discipline to initiate years-long projects in a timely manner despite ever-present teaching demands; and the resilience to overcome frequent failure in high-leverage, highly competitive endeavors. Regarding resilience, I have occasionally had difficulty handling failures, by losing sight of their inevitability (and their hidden utility), even in cases of competitions with well-documented low success rates. It is important to contextualize failures—e.g., a rejected manuscript with reviewer comments is an opportunity to improve the work—but faculty also need support systems.

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Regarding strategy, prospective faculty should articulate a research plan in the job application process. This can be embedded within a required research statement. A research plan should be explicit about an interest area, its outcomes, how those outcomes will change over time, and connections that can be made across the university. In the latter case, institutional resources must be readily available for enactment of a research program—faculty cannot act in isolation and expect to generate high-impact outcomes. The research plan should connect early outcomes to the later outcomes they will enable, ideally envisioning productivity following promotion. This will reveal the value of early outcomes.

Junior faculty in design should seek out any tenure guidelines published internally or externally by their university and unit. They should discuss their research plans with their department heads, and request direct feedback on how their planned outcomes are likely to be viewed by administrators and senior faculty in their units during reappointment, promotion, and tenure reviews. But junior faculty also need to advocate for their own productivity by ensuring that most of their efforts fit a coherent narrative. An effective narrative is not concocted retroactively following disconnected activities. It should guide the activities themselves, and it will likely suggest the avoidance of certain activities to maximize the productivity that will prove most compelling.

In the first year of employment, junior faculty should make use of their previous work to begin delivering short-term outcomes. A thesis project from graduate school likely has some receptive venue available for presenting or extending it. With a robust strategy, junior faculty can embed minor outcomes into the early stages of major endeavors. A workshop for a class can lead to a conference presentation with proceedings, which can lead to a small internal grant, which can produce preliminary work that makes an article in a respected academic journal more feasible. That article can serve as the basis of a large external grant.

Junior faculty should take the first steps on years-long projects as early as possible. They should reach out to colleagues at other colleges whose work is adjacent to their interest areas (I have found that other junior faculty are more receptive). I have facilitated initial one-hour meetings with university colleagues to share work, with roughly a third of these meetings resulting in long-term collaborations with multiple scholarly outcomes—my own most significant successes all began this way. (And the meetings that proved fruitless only cost an hour of my time apiece.)

Junior faculty should avail themselves of institutional workshops and colloquia related to research, and they should pursue small internal grants. They should expect to reapply for any grant multiple times, and not be overly discouraged upon the first rejection.

Everything should be produced with an ideal venue in mind. A grant proposal needs to be written in response to the specifics of a call for proposals, and a manuscript must advance the mission of the journal to which it is being submitted. Junior faculty should recognize the importance of peer review and prioritize venues that will carry weight, instead of favoring what is easy or familiar. Junior faculty, especially in design, are doing something that is new to them, and should not expect to feel entirely comfortable doing it. There must be some faith that investment will ultimately lead to success, with a considerable delay of gratification.

In a single week late in a recent summer, I received three rejections from academic journals. Most of my active scholarly work work was temporarily shut down as of that moment, as these three projects had dominated my efforts for many months. More recently, having a single large external grant proposal declined weighed heavily—not because rejection was a new experience, but because I spent too much time ideating on the new professional reality that would await me should I be successful. Perhaps one way to persevere through such inevitable setbacks is to adopt the mindset of the *hedonistic scholar,* and this is my final recommendation for junior faculty in design.

The hedonistic scholar may believe in the destination, but they are focused on the journey. And once a journey is complete, they obsess over the next one and do not look back, as the source of pleasure is now exhausted. To the hedonistic scholar, a journey is complete when a proposal or a manuscript is submitted—that is, the destination is *submission,* not *success.* If the grant is awarded, or the article is published, a new journey begins. For an article, the process of making edits and checking proofs is its own journey, with its own pleasures. For a funded project, an entire series of journeys awaits.

The hedonistic scholar finds joy in the seemingly mundane details of research activity. They have a perverse aesthetic sense. A grant proposal can be beautiful in its taut logic. A manuscript can be tantalizing in the accessibility its organization bestows upon difficult concepts—and the hedonistic scholar recognizes this, even if somebody else might find it "exceedingly" or "strikingly dull." The hedonistic scholar does not wait until a manuscript is complete before creating its figures, but works on the figures early in the process so that their presence may emotionally enhance the writing process. The hedonistic scholar seeks out collaborators whose joy matches their own, and whose specialized knowledge is intimidating but promises new experiences that would otherwise be inaccessible.

The hedonistic scholar values personal growth, and is eager to undergo the discomfort necessary for it. They do so selfishly. They are rewarded by developing and expressing their own expertise. They are motivated by the prospect of "moving easy in harness," which was Robert Frost's way of describing the "unstrained fulfillment of one's difficulties" (Ciardi & Williams, 1975, p. 11). John Ciardi reported on the sense of fulfillment in poetry (using gendered pronouns I retain from the original):

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W. H. Auden was once asked what advice he would give a young man who wished to become a poet. Auden replied that he would ask the young man why he wanted to write poetry. If the answer was "because I have something to say," Auden would conclude that there was no hope for the young man as a poet. If on the other hand the answer was something like "because I like to hang around words and overhear them talking to one another," then that young man was at least interested in a fundamental part of the poetic process and there was hope for him. (Ciardi & Williams, 1975, p. 3)

So too is it in research. The hedonistic scholar likes to *hang around knowledge and overhear categories, concepts, and principles talking to one another.* There is, indeed, hope for them. Where others see a 200-word abstract that encapsulates a project of great complexity, the hedonistic scholar sees poetry.

Conclusion

Design units at universities are under increasing institutional pressure to collaborate with non-design units and produce high-impact research outcomes. Design, with or without designers, is relevant to so many worthwhile endeavors that the question is not whether design has value to more established research disciplines, but rather how design units in universities can make this truth evident. I have used my own experience in developing and maintaining a strategic research program to reveal some of the challenges that junior design faculty face in this environment. Especially concerning is the disconnect between the increasing expectations for their scholarship without a corresponding reduction in teaching loads or, in some units, a robust support infrastructure. I have also provided specific recommendations for junior design faculty and their administrators.

I have written a paper here that emphasizes problems. But I would be remiss not to counterbalance that, in some small way, with an affirmation that pursuing scholarship in design is both important and rewarding work. I finished with my recommendation for junior design faculty to be hedonistic scholars, which is another way of saying that there is *craft* in everything—scholarship is no exception—and all designers should recognize that there is real pleasure in developing and expressing good craft. But more directly, a faculty position in design is a special opportunity to develop one's own particular research program and to argue for its significance, away from the industry pressure to provide immediate value to a single corporation. We design faculty can instead pursue the meaningful contribution to human knowledge that we can best justify and that we personally find most compelling. And that is a privilege, but not a self-serving one.

Acknowledgments

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