WHY THE FUTURE OF DESIGN PATENT PROTECTIONS WILL RELY ON MODERN NEUROSCIENCE, NOT CONSTITUTIONAL AND LEGAL REVERSIONISM

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I. INTRODUCTION

Our academic colleagues describe the current design patent protections system as a muddle, which the Oxford English Dictionary defines as "a state of disorder or . . . confusion."[1] We would posit that the current design patent system is not in a state of disorder or confusion. Rather, the system is suffering from large-scale variability in critical legal decision-making by the finders of fact, be they judges or juries. The ability to protect design rights grows increasingly unreliable for design patent owners. Litigation to protect highly valued design assets in an increasingly competitive marketplace has become costly, time-consuming, and unpredictable. There are two proposed approaches to solving this problem: 1) turn to outdated and unproven legal tests and methods from other intellectual property (IP) domains in the hope that new case law and methods will solve the problem or 2) turn to science to better understand the problem related to inconsistent outcomes and develop methods that objectively solve the problems impacting design IP litigation outcomes. We urge adoption of the second approach to push design patent litigation forward through the application of science and empiricism, not backward based on application of outdated and structurally flawed legal precedents. The problem we face is one of decision variability, not basic structural mechanics related to how one actually determines infringement or non-infringement.

The problems with design patent law are not best characterized as a muddle, but one of decisional inconsistency. How does one deal with inconsistency? In the past two decades, other major systems have solved this problem very effectively, but they did not do so by dismembering their core structural systems. Instead, they applied rigorous science to better understand the underlying problems and produce far more robust and reliable decision-making systems that led to massive advances in decision-making outcomes.

1. *Muddle*, OXFORD ENGLISH DICTIONARY (3d ed. 2003).

The examples are everywhere we look, including professional sports,[2] medicine,[3] finance,[4] and even military strategy.[5] These massively successful and rapidly evolving systems can show us how to use science to understand problems and optimize decision-making variables that led to the problems in the first place. In the last five years, neuroscience-based research has been adopted in some fields of law to better inform case decisions. A new research domain referred to as "NeuroLaw" has emerged to describe these efforts.[6] Top-tier law schools such as Harvard Law School have dedicated lectures and discussions on the implications of neuroscience for criminal law, tort law, and general legislation in the United States.[7] However, such research has yet to be utilized in design patent law or any other U.S. utility patent, copyright, or trademark frameworks.

In each of the commercial systems mentioned above, those domain experts most closely integrated into the historical framework and existing daily operations were the least likely to initially accept integrating science to improve decision-making. It took outsiders to bring science into these systems to fundamentally improve problem definition and, eventually, overall system performance. For example, when building their rosters in the past, Major League Baseball (MLB) scouts and managers would look for tangible and intangible professional baseball player qualities (e.g., hitting power, hitting average, arm strength) that would indicate to them that a certain player was the right choice. Data analysis and statistics were moreso used as talking points for sportscasters, sports journalists, and fans. However, with popularization and success of strategies such as the "Moneyball Theory" (i.e., employing statistical analysis focused on variables predictive of winning games rather than

2. *See, e.g.*, Matt McLaughlin, *Sports Data Analytics: How Teams Use Data To Gain Edge*, BIZTECH (Dec. 13 2018), https://biztechmagazine.com/article/2018/12/how-data-analytics-revolutionizing-sports.

3. *See, e.g.*, S. Swaroop Vedula & Gregory D. Hager, *Surgical Data Science: The New Knowledge Domain*, 2 INNOVATIVE SURGICAL SCI. 109 (2017).

4. *See, e.g.*, Jennifer Huttunen, Jaana Jauhiainen, Laura Lehti & Annina Nylund. *Big Data, Cloud Computing and Data Science Applications in Finance and Accounting*, 8 ACRN J. FIN. RISK PERSP. 16 (2019).

5. *See generally* ROBERT GANGER, JOHN COLES, JACOB EKSTRUM, TIMOTHY HANRATTY, ERIC HEILMAN, JASON BOSLAUGH & ZACHARY KENDRICK, ARMY INTELLIGENCE DATA SCIENCE WORKSHOP SUMMARY REPORT (2018).

6. *See, e.g.*, Francis X. Shen, *The Law and Neuroscience Bibliography: Navigating the Emerging Field of Neurolaw*, 38 INT'L J. LEGAL INFO. 352 (2010).

7. Francis Shen, Neuroscience and the Law event at the Harvard Law School hosted by the Law and Behavioral Sciences Association (Sept. 18, 2019), https://hls.harvard.edu/event/prof-francis-shen-neuroscience-and-the-law-hosted-by-law-and-behavioral-sciences-association-labs/.

individual player performance),[8] science now prevails as the primary means for assessing player performance and improving management decision-making.[9] The same transformation can occur with respect to the evaluation of visual design of products and their protection in the prevailing design patent framework through the capture of large sample data sets and robust statistical analysis. The important point is that seemingly subjective variables such as the visual design of products can be subjected to the same analytical rigor now common in other professional fields, where prior decision-making was once driven by personal intuition rather than science-based analytical methods.

The next evolution in design patent decision-making will not yield to a recasting of outdated legal tests scraped from other IP systems, such as copyright or trade dress. Support for this view is found in the fields of neuroaesthetics and shape perception science. Such fields have made possible development of new science-based consumer testing methods focused on understanding how consumers (ordinary observers) perform in the established ordinary observer test (OOT) framework. It turns out that modern neuroscience can and will help the finders of fact understand the complexity and biases inherent in shape perception and ornamental design assessments related to matters of infringement.

II. NOT SO SIMPLE

There are many lawyers, judges, and even legal scholars that fail to realize that the primary questions surrounding the ordinary observer test are now quantifiable science that can provide objective proof of infringement. These are not new methods but established scientific processes and statistical analyses. The world has changed in ways that have turned muddles into robust, high-functioning, new decision-making systems. Design patent infringement is going to be radically altered by modern neuroscience, whether our academic colleagues like it or not. This is not a battle that can be won by proffering outdated legal theory or practice. Science marches on, and as Galileo said, "Measure what can be measured, and make measurable what cannot be measured."[10]

8. *See generally* MICHAEL LEWIS, MONEYBALL: THE ART OF WINNING AN UNFAIR GAME (W. W. Norton & Company 2003).

9. Rocco P. Porreca, *General Managers and the Importance of Using Analytics*, SPORT J. (Sept. 15, 2016), https://thesportjournal.org/article/general-managers-and-the-importance-of-using-analytics/.

10. Quote by Galileo Galilei, GOODREADS (Apr. 6, 2021), https://www.goodreads.com/quotes/41204-measure-what-can-be-measured-and-make-measurable-what-cannot.

We urge our professional and academic colleagues to join in this empirical research approach and help move design IP into the future. There is nothing wrong with the core framework for determining design patent infringement, that is the OOT. It is worth noting here that our academic colleagues Professor Peter Menell and Ms. Ella Corren have not criticized the OOT in any meaningful manner in their guiding paper for this conference but have instead attacked the other processes that are upstream from the OOT itself.[11] They have attributed the muddle in design patent law to improper segmentation of claimed product shape and propose adopting outdated legal tests, such as filtration and abstraction, to address the so-called functional feature protection problem. Adopting such outdated tests will dramatically increase the complexity and cost of cases and further degrade the consistency of design patent outcomes. Instead, what we need is a scientifically driven, empirical ordinary observer test (EOOT) that provides finders of fact with valid and reliable data related to how representative consumers view the designs in question according to the key components of the OOT. Such an empirical test can significantly improve the accuracy and consistency of design patent infringement decision-making. We explain why below.

III. THE REAL PROBLEM IS VARIABILITY, NOT MUDDLE

Recent design patent infringement decisions, and specifically those made at summary judgment, suggest that judges, lawyers, and academics approach the judgment of product shape infringement as a simple, intuitive process.[12] Much like judging pornography…they know it when they see it.[13] The impression that visual design assessment is intuitive and can be based on personal opinion is driven in large part by the fact that the human mind processes shapes of products extremely quickly and without any perceptible cognitive effort.[14] The human mind is a masterful and highly efficient processor of the shapes of things that populate our everyday world. However, such speed and lack of perceptual effort does not equal simplicity or lack of bias. Modern neuroscience has shown that the process is far more complex, as

11. Peter S. Menell & Ella Corren, *Design Patent Law's Identity Crisis*, 36 BERKELEY TECH. L.J. 1, 125–26 (2021).

12. *See, e.g.*, Lanard Toys, Ltd. v. Dolgencorp LLC, 958 F.3d 1337 (Fed. Cir. 2020); Dyson, Inc. v. SharkNinja Operating LLC, No. 14 C 9442, 2019 U.S. Dist. LEXIS 56028 (N.D. Ill. Mar. 31, 2019).

13. *See* Jacobellis v. Ohio, 378 U.S. 184, 197 (1964) (Stewart, J., concurring) (acknowledging the difficulty in defining "what may indefinable" but stating one knows it when one sees it).

14. Shimon Ullman, *Visual Routines: Where Bottom-Up and Top-Down Processing Meet*, 2 PATTERN RECOGNITION BY HUMS. & MACHS. 178 (1986).

judgments of shapes and similarity specifically involve several levels of visual and higher order cognitive processing that are replete with judgment biases.[15] It turns out that answering the question of "how different is different" is far more complex than almost anyone in the current legal system understands. Yet there are validated and science-based methods for answering this exact question.[16] The most important insight from modern neuroscience is that no individual judge, lawyer, or legal academic can ever represent the hypothetical ordinary observer. This is simply because there is too much real variation in how a given consumer population judges the shapes of objects in our everyday world, as well as in response to the critical components of the OOT.

IV. HOW HUMAN VARIABILITY DRIVES DESIGN PATENT LITIGATION OUTCOME VARIABILITY

The central problem facing design patent litigation today is a lack of decision-making consistency. It was our hypothesis, based on extensive experience in consumer decision-making and shape perception science, that consumers are inconsistent when judging the design of products. It is a fact that the most effective real assessment of infringement is the consumer's very first viewing of the product, without context or biases being applied by the actual legal design patent infringement process. Even when removing such context and biases to the extent possible, humans still innately vary in their sensitivity to design,[17] which directly impacts their design patent infringement decision-making. In this critical regard, the U.S. Supreme Court (SCOTUS) has called for a "hypothetical" ordinary observer.[18] However, a review of case law shows that there has been virtually no attempt to define the hypothetical observer using experimentally validated and statistically rigorous research. Such research would provide critical information for reducing the variability in design patent infringement decision-making. We have designed and executed such research to address this problem.

15. STEPHEN E. PALMER, VISION SCIENCE: PHOTONS TO PHENOMENOLOGY (MIT Press 1999).

16. DANIELA BŬCHLER, HOW DIFFERENT IS DIFFERENT?: VISUAL PERCEPTION OF THE DESIGNED OBJECT (VDM Verlag Dr. Müller 2011).

17. Peter H. Bloch, Frédéric F. Brunel & Todd J. Arnold, *Individual Differences in the Centrality of Visual Product Aesthetics: Concept and Measurement*, 29 J. CONSUMER RSCH. 551, 552 (2003).

18. Elizabeth D. Ferrill & Clare A. Cornell, *Ordinary Observer and Informed User Walk into a Bar: A Transatlantic Conversation About Design Infringement*, FINNEGAN (Dec. 14, 2017), https://www.finnegan.com/en/insights/ordinary-observer-and-informed-user-walk-into-a-bar-a-transatlantic-conversation-about-design-infringement.html.

V. DEFINING A STATISTICALLY VALIDATED HYPOTHETICAL ORDINARY OBSERVER

In the following summary, we describe the design and execution of the first scientifically validated study to define the hypothetical ordinary observer utilizing a modern large-sample online study and related data capture methods. This was the first step in the validation of an empirical ordinary observer test,[19] discussed later in this paper. The study involved a comprehensive and statistically valid examination of how consumer sensitivity to the visual design of products varies across a sample of properly recruited, screened, and compensated consumers for a given product category. Specifically, the validation study utilized a sample of 400 consumers screened for their intent and experience related to purchasing flatware. The sample user profile was derived from a database of over one million consumers based on screening criteria developed and validated to yield a statistically reliable sample of U.S. adult consumers. The product category selected was based on the landmark SCOTUS design patent case, *Gorham Mfg. Co. v. White* (hereinafter *Gorham v. White*),[20] which dealt with flatware design. The formal empirical ordinary observer test validation study also utilized the flatware designs related to *Gorham v. White* as a product category.[21] The hypotheses tested and confirmed with this research were: 1) consumer variation in terms of sensitivity to visual product design can be scientifically determined; 2) such consumer variation has a measurable impact on how consumers evaluate the visual design of products; 3) utilizing such research methods leads to the most accurate hypothetical ordinary observer definition, a fact of significant value to the finders of fact; and 4) taking into account the variability in ordinary observers' decision-making related to the visual design of products improves our understanding of the problem with design patent litigation outcome variability and can form the basis for the development of an empirical ordinary observer test.

VI. THE STUDY DESIGN AND RELATED FINDINGS

We confirmed the variability in innate design sensitivity for a population of consumers using the validated research tool known as the Centrality of Visuality Products Aesthetics Scale (CVPA).[22] The CVPA is used to assess

19. Charles Mauro, Chris Morley & Paul Thurman, *Development and Initial Evaluation of an Empirical Ordinary Observer Test for Design Patent Infringement* 19–36 (June 5, 2020), https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3620088.

20. Gorham Mfg. Co. v. White, 81 U.S. 511 (1871).

21. Mauro et al., *supra* note 19, at 19–36.

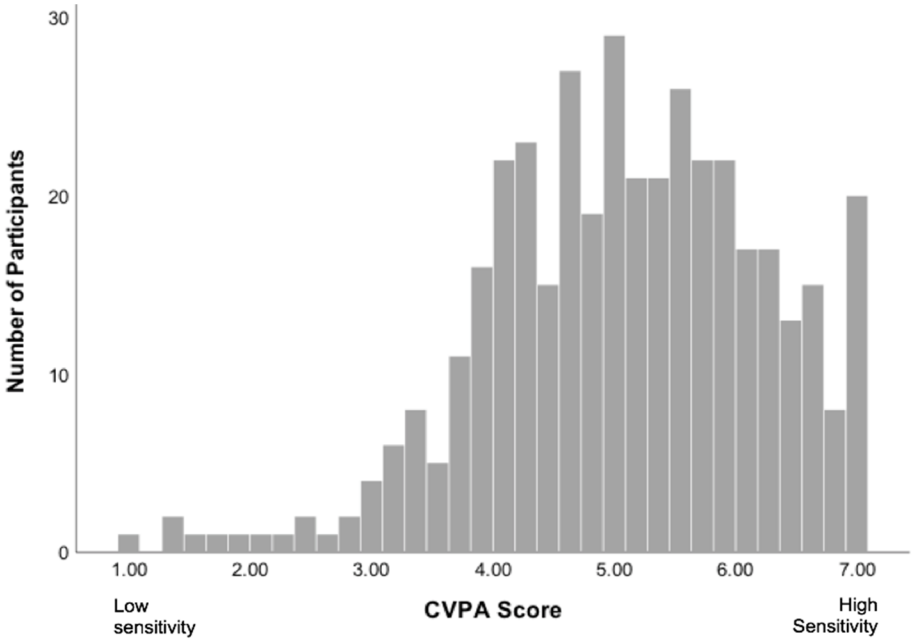
22. Bloch et al., *supra* note 17, at 551–65.

individuals' innate sensitivity to visual design when examining products. The CVPA tool includes eleven items that encompass three dimensions: personal and social value of design, acumen, and level of response. For example, one CVPA item is "Being able to see subtle differences in product designs is one skill that I have developed over time." Respondents rate their agreement or disagreement with each item on a 7-point Likert scale (1 denotes Strongly Disagree, 4 denotes Neither Agree Nor Disagree, 7 denotes Strongly Agree) and their responses are averaged to calculate a CVPA score. As the CVPA items all describe factors that suggest the individual exhibits innate design sensitivity, higher CVPA scores indicate higher agreement with such statements and thus, higher sensitivity to visual design. In the 400-respondent online survey study described above, we observed substantial variability in design sensitivity from the respondent sample (Mean CVPA score = 5.04, Median = 5.09, Standard Deviation = 1.14). As can be seen in Figure 1 below, the data demonstrate a slight negative skew (i.e., the left tail is long relative to the right tail, indicating a tendency toward ratings slightly higher than average) and were not normally distributed according to a Shapiro-Wilk Test of Normality ($p < .001$).[23] This negative skew may be explained by the well-known psychological phenomena of superiority bias, which describes how individuals often rate their own abilities as greater than average.[24] The CVPA data distribution aligns with the authors' expectations with respect to the validated data sample, focusing on population variance for human physical, cognitive, and attitudinal attributes of a given population of consumers. The authors have observed such a non-normal, slightly negatively skewed CVPA score distribution in later empirical ordinary observer test applications in which CVPA data were collected for the study sample. Ongoing advanced statistical analyses are being conducted to investigate how well a sample of twelve jurors can represent the entire relevant consumer population in terms of innate design sensitivity, as measured by CVPA.

23. *See generally* S. S. Shapiro & M.B. Wilk, An Analysis of Variance Test for Normality (Complete Samples), 52 BIOMETRIKA 591 (1965).

24. Vera Hoorens, Self-enhancement and Superiority Biases in Social Comparison, 4 EUR. REV. SOC. PSYCH. 113, 117 (1993).

Figure 1: CVPA Score Distribution



As can be seen in the data plot in Figure 1, on the right are consumers with high design sensitivity and on the left are consumers with low design sensitivity. One can think of these data as the first actual statistically validated hypothetical ordinary observer. As can be seen clearly from the data above, there is a wide range of actual human variation in terms of design sensitivity, as measured by the CVPA instrument. Deeper analysis also confirmed that the observed variation in design sensitivity (as measured by the CVPA) impacts how consumers actually evaluate product designs in a measurable and meaningful way. Specifically, we discovered via logistic regression analysis that individual CVPA items such as "Being able to see subtle differences in product designs is one skill I have developed over time" ($p = .04$) and "I see things in a product's design that other people tend to pass over" ($p = .03$) were significant predictors of similarity/difference judgments between patented design, accused design, and prior art. This confirmed that variability in design sensitivity does lead individuals to judge products differently and is likely a substantial contributor to the current variation in design patent litigation outcomes.

VII. WHY ARE THESE DATA CRITICAL TO UNDERSTANDING THE VARIATION IN DESIGN PATENT LITIGATION OUTCOMES?

There is virtually no way to understand the extent to which a jury or judge represents the decision-making of the consumer population purchasing a given product unless data are collected from a large sample of representative consumers for the given product category. This problem becomes even more pronounced when decision-making is executed by a single judge who only represents a single point on the design sensitivity distribution. Judges and juries do not submit to a CVPA test and receive no special training in the science of shape perception and the well-understood biases that reside in their decision-making model as currently applied. It can be assumed that the variability depicted in Figure 1 is also present in judge and jury populations. Thus, if a judge's CVPA score happens to be at either extreme end of the distribution, their assessment of whether two designs are substantially the same or not is nothing more than a biased personal opinion without any basis in how the actual population of consumers judges the designs in question. This insight may explain why we are seeing such staggering variability in design patent infringement determinations, especially those executed by judges at summary judgment. Based on these data described above, it is clear that no judge should proffer a decision on summary judgement without the benefit of a scientifically validated survey of ordinary observers responding through the framework of an empirical ordinary observer test. It is simply not possible for a judge to understand and make decisions based on the hypothetical ordinary observer without such a survey.

VIII. THE CURRENT LITIGATION PROCESS FUNDAMENTALLY BIASES OUTCOMES IN FAVOR OF THE DEFENDANT

Another important problem facing design patent litigation is how patented and accused designs are presented to the finder of fact in court. When an ordinary observer is presented a product for examination, their perception of the shape of the product is highly influenced by their prior experiences and expectations for the product, so much so that the shape they perceive may not directly match the physical shape of the object in the real world.[25] Modern neuroscience research suggests that, to increase the efficiency of our object recognition, we automatically draw inferences about the visual data entering

25. Anil Seth, *How We Build Perception from the Inside Out*, AEON (June 30, 2020), https://aeon.co/videos/anil-seth-on-why-our-senses-are-fine-tuned-for-utility-not-for-reality.

our eye based on our expectations and prior experience.[26] Such inferences modify our processing and subsequent perception of the visual data. When an individual has substantial prior experience with a product shape, they establish a mental model for the product shape that facilitates immediate and robust inferences for object recognition whenever that shape is viewed. In general, we apply visual processing shortcuts whenever possible to quicken our object recognition and require very little detail about the product shape to confirm our inferences. This speedy and nearly automatic processing leads us to frequently identify products based only on the overall product shape.[27] We often do not process product details any further after the overall product shape is identified.

In the context of design patent litigation, the finder of fact's prior experience and expectations will greatly influence their perception of the product shapes. Not only does each finder of fact enter their infringement decision with different prior experience, expectations, and design sensitivity (as described in the Section above, such variability across finders of fact can lead to inconsistent design patent litigation outcomes), but lawyers in design patent litigation often cue the finder of fact to details of the products that an ordinary observer would likely not examine when viewing the products in the marketplace (i.e., it is most likely that the ordinary observer would rely only on overall product shape in the marketplace for most efficient object recognition). Lawyers focusing the finder of fact on such details likely biases the finder of fact in favor of non-infringement, as the finder of fact is artificially influenced to attend to and process details of the designs that they would not process when viewing the products in the real-world marketplace. Such behavior leads to an artificial examination of the products compared to what would be exhibited by an ordinary observer in the real world. Importantly, once the finder of fact is cued to details and differences between the two designs, they cannot "unsee" such differences in later viewings, due to the large influence of prior experience and already formed mental models on shape perception and object recognition.[28]

A more valid and reliable approach would involve presenting patented and accused designs to a large sample of representative consumers without cueing them to examine the designs in any specific way. This approach would eliminate the biases that defendants often insert into design patent litigation when they cue the finder of fact to differences between patented and accused designs. It is scientifically valid to say that the only reliable impression in terms of the "the eye of an ordinary observer, giving such attention as a purchaser

26. PALMER, *supra* note 15, at 85.
27. Ullman, *supra* note 14, at 178.
28. *See* PALMER, *supra* note 15, at 85.

usually gives"[29] is the initial viewing of the shape.[30] All subsequent viewing is revisionist history.

IX. THE CURRENT SUMMARY JUDGMENT PROCEDURE IS FUNDAMENTALLY FLAWED

An additional critical bias present in the current design patent legal system is related to judgments of similarity/difference being undertaken at the summary judgment stage without reference to prior art (i.e., in the first stage of summary judgment in which the judge determines whether the designs in question are sufficiently distinct/plainly dissimilar or not).[31] As described above, our perception of product shape is highly based on prior experiences and expectations.[32] Building a robust mental model for a product shape involves several factors including length and frequency of exposure, focus of the observer, and familiarity with similar products (i.e., prior art). Consideration of prior art in matters of design patent infringement is critical, as our familiarity with similar products greatly informs our mental models, inferences, and perception of products currently under examination. Current design patent law allows summary judgment decisions to occur without examining or referring to prior art when a judge deems a patented and accused design to be sufficiently distinct/plainly dissimilar from one another.[33] This further pushes design patent infringement decision-making away from the ordinary observer's actual experience in the marketplace. Simply put, examining products for similarities and differences without familiarity of relevant prior art is unrepresentative of how the ordinary observer would experience and examine such products in the marketplace. Thus, it is critical for prior art to be taken into consideration, even at the first stage of summary judgment when the judge decides whether the two designs are sufficiently distinct or not.

Related to this issue, we ran a study to examine the impact of prior art on design patent infringement decision-making. We again used the flatware

29. *Gorham Mfg. Co. v. White*, 81 U.S. 511, 528 (1871).

30. PALMER, *supra* note 15, at 85.

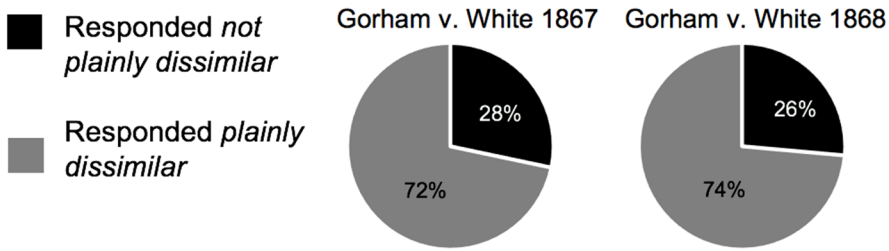
31. Egyptian Goddess, Inc. v. Swisa, Inc., 543 F.3d 665, 678 (Fed. Cir. 2008).

32. Seth, *supra* note 25.

33. *See, e.g.*, Wallace v. Ideavillage Prods. Corp., No. 06-cv-5673, 2014 WL 4637216, at *4 (D.N.J. Sept. 15, 2014) (stating, pursuant to the teaching of *Egyptian Goddess*, district courts have granted summary judgment based solely on comparison between accused and patented designs, without referring to prior art, and citing examples of such cases); Voltstar Tech., Inc. v. Amazon.com, Inc., No. 13-C-5570, 2014 WL 3725860 (N.D. Ill. July 8, 2014) (recognizing that courts consistently grant summary judgment without examining the prior art and citing examples of cases).

designs from the seminal SCOTUS design patent case, *Gorham v. White*. We presented 106 consumer survey respondents, who were screened for intent and experience related to purchasing flatware, the patented Gorham design, and one of the accused White designs. There were two accused White flatware designs in the *Gorham v. White* case; participants in our study were either assigned to evaluate *Gorham v. White* 1867 or *Gorham v. White* 1868. Respondents were asked to indicate whether the designs they were presented were plainly dissimilar or not plainly dissimilar in terms of overall visual design without referencing any prior art. As seen in Figure 2 below, the majority of respondents reported that the patented and accused designs were plainly dissimilar for both the *Gorham v. White* 1867 and *Gorham v. White* 1868 pairs. One-sample binomial tests confirmed that the percentage of respondents who indicated that the designs were plainly dissimilar was significantly greater than chance probability (i.e., 50%) for both *Gorham v. White* 1867 ($p = .002$) and Gorham v. White 1868 pairs ($p = .001$).

Figure 2: Percentage of Plainly Dissimilar and Not Plainly Dissimilar Responses for *Gorham v. White* Simulated Summary Judgment Task



Such findings suggest that, even the cornerstone example of design patent infringement, *Gorham v. White*, would have ended at summary judgment and a decision of non-infringement if the decision was made without consideration of prior art. Interestingly, when a different sample of 400 respondents screened according to the same criteria[34] were presented with the *Gorham v. White* 1867 or *Gorham v. White* 1868 designs and the relevant prior art and were asked to

34. The same respondent sample was not presented both tasks, as repeated exposure to the designs and execution of different tasks involving such designs may lead to carryover effects that influence response behavior in unpredictable ways. *See* Ludvig Daae Bjorndal, *Carryover Effects: What Are They, Why Are They Problematic, and What Can You Do About Them?*, STUDENTS FOR BEST EVIDENCE (Aug. 23 2018), https://s4be.cochrane.org/blog/2018/08/23/carryover-effects-what-are-they-why-are-they-problematic-and-what-can-you-do-about-them/.

report whether the design pairs were substantially the same or not substantially the same (according to the text of the OOT), the majority of respondents reported that the design pairs were substantially the same. Specifically, 68.9% of respondents reported that the *Gorham v. White* 1867 designs were substantially the same and 56.1% of respondents reported that the *Gorham v. White* 1868 designs were substantially the same. Based on these data, the *Gorham v. White* designs would have been considered infringing if the decision was made based on the OOT rubric and familiarity with prior art. There is clearly an impact of familiarity with prior art on similarity/difference judgments related to design patent infringement determinations and an issue with how summary judgments are currently conducted.

X. THE NEED FOR AN EMPIRICAL ORDINARY OBSERVER TEST

The very nature of the variability in consumer design sensitivity and prior experience demands the use of science to actually resolve the muddle problem. When a scientist encounters such a problem, they use the scientific process to analyze it. The scientific process involves sampling a large number of individuals from the representative population to participate in scientifically valid experiments. Using proper study design and statistical analysis, one can derive valid conclusions regarding how the population responds to critical questions related to the problem of interest. A scientifically-driven empirical ordinary observer test that relies on well-understood study design and reliable statistical methods to better inform design patent infringement decision-making would prove very useful to solving the muddle problem. Critically, such a methodology would not replace the finder of fact, but provide the finder of fact valid and reliable data to better inform their design patent infringement decision-making.

The current OOT process is full of perceptual biases and all manner of experts who claim to represent the ordinary observer. There is a reason why the case law defines the ordinary observer as "hypothetical." The ordinary observer is not intended to represent any single individual with specific characteristics. The ordinary observer is often defined in the courts as the ordinary purchaser of the accused infringing product or, in some cases, an industrial purchaser.[35] If the ordinary observer is not meant to represent a

35. Elizabeth D. Ferrill & Clare A. Cornell, *Ordinary Observer and Informed User Walk into a Bar: A Transatlantic Conversation About Design Infringement*, FINNEGAN (last visited Apr. 4, 2021), https://www.finnegan.com/en/insights/ordinary-observer-and-informed-user-walk-into-a-bar-a-transatlantic-conversation-about-design-infringement.html; *see also* Goodyear Tire & Rubber Co. v. Hercules Tire & Rubber Co., Inc., 162 F.3d 1113, 1117 (Fed. Cir. 2008), *abrogated on other grounds by* Egyptian Goddess, Inc. v. Swisa, Inc., 543 F.3d 665 (Fed. Cir. 2008) (finding

single individual, how would a single individual be able to accurately proffer an opinion on behalf of the ordinary observer's perspective, especially considering the variability in design sensitivity and prior experience across consumers, as discussed above?

It is also important to note that in design patent cases, there is a startling lack of rigor related to analysis, proffering of opinions, and provision of data that meets Daubert[36] and Federal Rule of Evidence 702 and 703 rules.[37] Industrial design experts routinely proffer opinions on consumer perception related to the ordinary observer test without formal education or training in shape perception science, or actual supportable research made possible through application of the neuroscience-based empirical methods. A review of undergraduate and graduate industrial design curriculum from well-regarded industrial design programs clearly reveals no formal coursework in neuroscience, neuroaesthetics, shape perception science, or research study design and statistical analysis.[38] Expertise in such topics is required to proffer reliable opinions related to the ordinary observer test under Daubert and Federal Rule of Evidence 702 and 703 rules. Why is this acceptable in design patent litigation when it would never be allowed in utility patent matters? Is it a lack of focus on the actual legal standards for expert testimony? Is it a lack of scholarship on the part of design patent academics? Or is it simply, as we would proffer now, a failure on the part of the U.S. design patent system to embrace a science-based approach to the application of the ordinary observer test? We know the problem begins with human variation in terms of prior experience and innate sensitivity to ornamental design. The effects of this problem are seen in the aggressive series of recent case decisions that continue to dilute the effectiveness of design patent protections in terms of both theory and practice.[39]

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the ordinary observer to be the truck or fleet operator); Minka Lighting, Inc. v. Craftmade Int'l, Inc., No. 3:00-cv-888, 2001 WL 36186585, at *12 (N.D. Tex. May 16, 2001) ("[T]he viewpoint for determining infringement is that of a person who is the ordinary purchaser of the article charged to be in infringement.").

36. *Daubert Standard*, LEGAL INFO. INSTIT., https://www.law.cornell.edu/wex/daubert_standard (last visited Apr. 4, 2021).

37. FED. R. EVID. 702, 703.

38. *Undergraduate Curriculum*, GA. TECH SCH. INDUS. DESIGN, https://id.gatech.edu/academics/bsid/undergraduate-curriculum (last visited Apr. 4, 2021); *Graduate Industrial Design Course of Study*, ARTCENTER COLL. DESIGN, http://www.artcenter.edu/academics/graduate-degrees/industrial-design/course-of-study/overview.html (last visited Apr. 4, 2021).

39. *See* Perry Saidman, *Federal Circuit Dodges Design Patent Damages Issue and Goes Loco Over Infringer's Logo*, DESIGNLAW PERSPS. (Nov. 17, 2019), https://www.designlawperspectives.com/blog/federal-circuit-dodges-design-patent-damages-issue-and-goes-loco-with-infringers-logo; Perry Saidman, *Chalk Up Another for the Copycats*,

Determining design patent infringement from the perspective of the ordinary observer clearly calls for surveying a large sample of representative consumers regarding the critical legal questions surrounding the OOT and executing appropriate statistical analyses on the resulting data. To increase reliability in any system, it is necessary to first determine the true range of variability and then apply robust scientific testing. This is how problems similar to the variability in design patent litigation outcomes have been solved historically. Science is the answer, not reversion to structural changes in the design patent system, which are not based on any real validated research. Much legal precedent in design patent litigation up to this point has been based on faulty decision-making and ever greater reliance on intuition, instead of scientific investigation.

In summary, the core problem facing design patent litigation outcomes is variability in the application of the ordinary observer test due to large variation in how humans perceive and make decisions related to product shapes. Importantly, the problem is not the OOT itself or how the design patent system is structured in terms of allowable art. Perhaps the simplest way to think about what is perceived as a muddle is really nothing more than a scientific variance problem.

XI. THE EMPIRICAL ORDINARY OBSERVER TEST

How does one build a reliable and empirical ordinary observer test? The most important question to be answered by a reliable and empirical OOT is what level of similarity between patented and accused design constitutes design patent infringement according to the critical components of the OOT legal test. Collecting data related to the critical components of the OOT from a large sample of representative consumers for the product would provide reliable insights regarding how the hypothetical ordinary observer views the patented and accused design according to the OOT. Importantly, such a reliable and empirical OOT would not replace the decision-making of the finder of fact. Rather, such an empirical OOT would provide the finder of fact with data to better inform their design patent infringement decision-making.

Mauro, Morley, and Thurman recently developed a valid and reliable methodology for providing the finder of fact with such data, which was recently accepted in court based on three studies.[40] The EOOT methodology

DESIGNLAW PERSPS. (May 19, 2020), https://www.designlawperspectives.com/blog/chalk-up-another-one-for-the-copycats-1.

40. Delta T, LLC v. Dan's Fan City, Inc., No. 8:19-CV-1731-VMC-SPF, 2021 WL 458022 (M.D. Fla. Feb. 9, 2021) (denying *Daubert* Motion to Disqualify Charles L. Mauro and Exclude His Testimony and finding Mr. Mauro's methodologies "sufficiently reliable under *Daubert*").

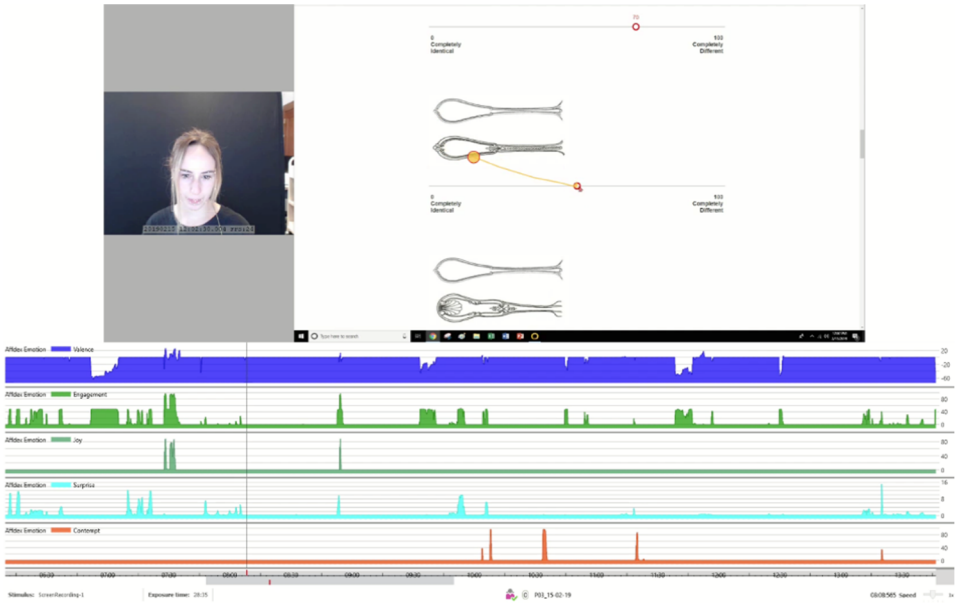
leverages modern neuroscience study design, data capture, and related statistical analysis to mitigate evaluative bias in the application of the ordinary observer test.[41] The EOOT collects data from a large sample of representative consumers of the product in question regarding each critical component of the OOT. The EOOT features tasks and question sets that capture data useful to the finder of fact related to each critical component of the OOT under *Gorham v. White*, as well as under *Egyptian Goddess, Inc. v. Swisa, Inc.*[42] Specifically, data are captured related to (1) the eye of an ordinary observer, giving such attention as a purchaser usually gives, (2) an ordinary observer, familiar with the prior art, (3) two designs are substantially the same, and (4) if the resemblance is such as to deceive such an observer, inducing him to purchase one supposing it to be the other.

The EOOT is primarily an online survey-based methodology. However, lab-based applications are available, which allow for use of more advanced and high-precision neuroscience-based methodologies including eye-tracking, micro-facial expression analysis (MFEA), galvanic skin response, and electroencephalography, which provide deeper insights into the perspective of the ordinary observer. Figure 3 below shows a participant completing an EOOT task that involves rating the similarity/difference of relevant designs (flatware) on a sliding scale while eye-tracking and MFEA data are collected.

41. Mauro et al., *supra* note 19.

42. Egyptian Goddess, Inc. v. Swisa, Inc., 543 F.3d 665, 672 (Fed. Cir. 2008) (saying that the ordinary observer is familiar with the prior art).

Figure 3: Participant Completing an EOOT Task



Importantly, the EOOT is designed to meet Federal Rule of Evidence 703 requirements[43] and guidance from the Federal Judicial Center Reference Manual on Scientific Evidence[44] to ensure proper respondent sampling, study design, and data analysis.[45] The EOOT was validated on the designs from the landmark SCOTUS design patent infringement case *Gorham v. White*.[46] It was designed to be a versatile methodology that can be customized for different design patent litigation matters, as well as different product types. The EOOT offers a solution to the aforementioned issues related to finders of fact varying in how they perceive designs due to different design sensitivity and prior experience. Consistent application of the EOOT may result in more standardized design patent infringement decision-making across cases, ultimately resulting in a stronger and fairer design patent protection system in the United States.

43. FED. R. EVID. 703.

44. *See* SHARI SEIDMAN DIAMOND, REFERENCE MANUAL ON SCIENTIFIC EVIDENCE 359–417 (3d ed. 2011), https://www.fjc.gov/content/reference-guide-survey-research-2.

45. *See* Sarah Butler & Kent Van Liere, *The Use of Surveys in Litigation: Recent Trends*, NERA ECON. CONSULTING (2010).

46. Mauro et al., *supra* note 19, at 50.

XII. DESIGN PATENTS COVERING PARTIAL DESIGNS ARE ESSENTIAL AND VALID

Another key variable often raised when discussing current issues with design patent protections and litigation is design patents covering partial designs. Some of our academic colleagues argue that design patents should only be granted for whole designs.[47] However, modern vision science and shape perception research supports that partial designs can provide enough information to allow recognition of the design as a whole, as well as ornamental value. Related to this concept is the well-established principle of cognitive minimization, which suggests that the human information processing system limits the mental effort required to process objects as much as possible to better manage the vast and complex information present in our everyday world.[48] As described earlier, we routinely leverage our prior experience and expectations to shortcut the visual processing required to recognize objects. We do not build our mental images directly from visual input from the real world, but instead confirm our expectations based on the least amount of information possible.[49] Accordingly, it is often the case that a partial design provides enough information for source identification, as our information processing system is well-tuned for object recognition based on limited visual information.

The salience of the partial design relative to the whole design, however, may impact source identification. Much shape perception research has been conducted regarding the salience of parts of designs in relation to total design. For example, Hoffman and Singh identified three factors that determine the salience of parts of objects and provide insight into whether a given element of a design provides enough information to allow recognition of the design as a whole.[50] The factors Hoffman and Singh identified are (1) the size of the part relative to the whole object, (2) the degree to which a part protrudes from the whole object, and (3) the strength of the part's boundaries. Each of these factors impact the ordinary observer's perception of a product design and, thus, should be taken into consideration in infringement of design patents covering partial designs.

Based on the principle of cognitive minimization and research on the salience of parts of designs, it is clear that partial designs can allow source identification. However, the degree to which partial designs provide enough information for source identification may be impacted by the salience of the

47. Sarah Burnstein, *Whole Designs*, 92 U. COLO. L. REV. 181 (2020).

48. Ullman, *supra* note 14, at 178.

49. Seth, *supra* note 25.

50. Donald D. Hoffman & Manish Singh, *Salience of Visual Parts*, 63 COGNITION 29, 29 (1997).

partial design relative to the whole design. Thus, partial designs should be protected under design patent law, but the salience of the partial design relative to the total design should be considered when weighing the impact of a partial design on design patent infringement and related damages calculation. In sum, the issue of partial designs is a question of weight rather than admissibility or exclusion.

XIII. ORNAMENTAL DESIGN AND UTILITARIAN FEATURES

Another issue often debated in design patent litigation is whether ornamental design can be a means of expressing and claiming underlying utilitarian features of the product. Often judges, lawyers, and juries fail to understand that ornamental design represents all of the underlying utilitarian features in a product, and not an individual utilitarian functional feature in the same manner as engineering-based functional features.[51] Our academic colleagues also exhibit this misunderstanding, which has led to all manner of hand-wringing and prognostication on the topic of claiming utilitarian features by securing an ornamental design patent.

Modern neuroscience shows that the visual/ornamental aspects of a product shape are category-defining and behavior-directing attributes. They are not another utilitarian feature protected by the utility patent process. An ornamental design encapsulates a given product's utilitarian features. One can think of this in much the same way that the face of an individual is the way in which we identify the whole person; however, the human face tells us little about the trustworthiness, behavior, attitudes, and capabilities of that individual. This is a fundamental difference with respect to the concept of protecting utilitarian features by way of design patent.

An additional example is when you first viewed the iPhone rounded rectangle, you did not see one feature, but instead, the total composite of the product's capability, meaning, and status. This is because shape conveys the total product in the mind of the ordinary observer (consumer).[52] Our academic colleagues have failed to integrate this basic neuroscience-based fact and would have us treat ornamental design of the iPhone as a "feature," such as memory capacity, processor speed, screen resolution or even higher level features such as email or web browsing.[53] This failure to grasp the neurological components

51. Brief of Amici Curiae 113 Distinguished Industrial Design Professionals and Educators In Support of Respondent at 6, *Samsung Elecs. Co. v. Apple Inc.*, 137 S. Ct. 429 (2016) (No. 15-777) [hereinafter Brief for Respondent].

52. *Id.*

53. Claudia Townsend & Sonjay Sood, *The Inherent Primacy of Aesthetic Attribute Processing*, *in* PSYCHOLOGY OF DESIGN 208 (Rajeev Batra, Colleen Seifert & Diann Brei eds., 2016) (stating that consumers respond differently to ornamental design compared to functional

of ornamental design can lead legal teams to use improper research methods for determining the value of design. Research methods such as conjoint analysis are useful to obtain a basic understanding of how consumers assign value to different utilitarian features; however, conjoint analysis cannot accurately assess the value of ornamental design because ornamental design is processed in entirely different ways neurologically compared to utilitarian features.[54] Importantly, the use of improper research methodologies to assess value of ornamental design can undervalue ornamental design severely.

With this understanding in mind, it is the authors' opinion that, in the Samsung v. Apple case, the District Court awarded the proper level of damages, given that neuroscience defines the relative importance of the ornamental design presented in the Apple design patents.[55] It is important to note that the Apple design patents asserted against Samsung did, in aggregate, cover the core brand-identifying visual design attributes presented to consumers in the marketplace. This way of thinking is apparently lost on our academic colleagues but has profound impact on the "muddle" problem described by Menell and Corren in their guiding paper for this conference.[56] The shape of a product is not a feature in the way that utility patents cover features. Any feature of a product that is present in the visual inspection of the product shape is by definition carrying information different from its underlying functional operation. We emphasize that shape conveys the total product in the mind of the ordinary observer.[57] By the total product, we mean the underlying functions in aggregate, as well as variables examined in early stages of information processing, including product category, brand attributes, meaning and emotional engagement. These attributes can all be measured scientifically using new research methods including MFEA and others.

XIV. LEVERAGING AVAILABLE SCIENCE TO SOLVE THE MUDDLE PROBLEM AND PROTECT DESIGN IP

Relying on case law and legal precedent for resolution of the muddle problem facing design protections completely ignores the last decade of valuable neuroscience research related to shape perception. Design patent protection has been flying blind in the hands of judges and juries who are following methods that have no basis in actual human perception or behavior research. This has produced a staggering level of variation in legal outcomes,

attributes, i.e., features, as ornamental design is processed more quickly and with less effort from the visual system compared to functional attributes).

54. *Id.*

55. *Samsung Elecs. Co. v. Apple Inc.*, 137 U.S. 429 (2016).

56. Menell & Corren, *supra* note 11, at 118–119, 125–26.

57. Brief for Respondent, *supra* note 51, at 10–13.

driven up litigation costs, and empowered an academic trajectory to weaken design patent protections.

Our academic colleagues have been clipping at the edges of the design patent protection framework, most aggressively since Samsung v. Apple. They have relentlessly attacked the Samsung v. Apple case and related damages, claiming it to be an example of design protections "run amok."[58] However, this was a once in a lifetime event, which was made possible in the end by Apple yielding to Samsung and their core article of manufacture theory. We doubt Apple or other design-driven entities will make such a decision again.

XV. APPLICATION OF COPYRIGHT FILTRATION AND ABSTRACTION TO DESIGN PATENT INFRINGEMENT ANALYSIS AND WHY IT WILL NEVER WORK

In the primary paper for our academic colleagues' push to resolve the design patent muddle problem, Menell and Corren proposed the introduction of a concept from copyright law for dealing with, what they believe to be, the issue with functional features in design patents.[59] In general terms, the proposed concept is known as filtration and abstraction. The proposed analytical framework is based on the legal test for determining copyright infringement, which involves both an extrinsic test, which "considers whether two works share a similarity of ideas and expression as measured by external, objective criteria," and an intrinsic test, which looks to determine whether "subjectively[,] the 'ordinary, reasonable person would find the total concept and feel of the [two works] to be substantially similar."[60] Both extrinsic and intrinsic tests are applied to determine whether the copyright-protected elements are substantially similar to those of the accused works.[61] Accordingly, it is necessary to first distinguish between the protected and unprotected material in a plaintiff's work before applying the extrinsic and intrinsic tests.[62] This is where filtration and abstraction come into play.

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58. *Id.*

59. *Id.*

60. *Swirsky v. Carey*, 376 F.3d 841, 845, 847 (9th Cir. 2004) (quoting Three Boys Music *Corp. v. Bolton*, 212 F.3d 477, 485 (9th Cir. 2000), *overruled on other grounds by* Skidmore as Tr. for *Randy Craig Wolfe Tr. v. Led Zeppelin*, 952 F.3d 1051 (9th Cir. 2020)).

61. *See, e.g.*, *Jada Toys, Inc. v. Mattel, Inc.*, 518 F.3d 628, 637 (9th Cir. 2008) ("This Court has traditionally employed a two-part test to determine whether two works are substantially similar: an extrinsic test and an intrinsic test.").

62. *See, e.g.*, *Lanard Toys Ltd. v. Novelty, Inc.*, 511 F. Supp. 2d 1020, 1037–38 (C.D. Cal. 2007) ("Because the requirement is one of substantial similarity to *protected* elements of the copyrighted work, a court must distinguish between the protected and unprotected material in a plaintiff's work.").

Filtration is the identification of unprotectable functional features. Abstraction is the removal of the unprotectable functional features from the protected design in an effort to define the features of the copyright-protected useful article that remain for infringement analysis. At first glance, this seems like a reasonable approach. However, based on extensive experience as an expert in copyright infringement and executing filtration and abstraction analyses a number of times, it is immediately clear that filtration and abstraction as a concept for dealing with functional features in the design patent context is simply not workable. Below are three reasons why:

1) The legal framework for obtaining a copyright is fundamentally different from the legal framework for obtaining a design patent. The U.S. Copyright Office does undertake an examination of a copyright application and that examination process includes "whether the work constitutes copyrightable subject matter."[63] However, any analysis of unprotectable functional elements executed by the Copyright Office during the copyright application process is much less detailed than that executed by the U.S. Patent and Trademark Office (USPTO) during the design patent application process. Accordingly, copyright litigation cases often require a strict functionality test, including filtration and abstraction, simply because the Copyright Office has not yet dealt with this question in a rigorous way prior to the onset of litigation. Therefore, the filtration and abstraction rubric is an essential aspect of copyright jurisprudence and copyright infringement analysis. On the other hand, the design patent legal framework, for the most part, allows for some advanced identification of functional features by the patent examiner during the patent application process. Thus, there is usually no need to conduct a second analysis during design patent litigation that focuses on filtration and abstraction based on what the defendant may proffer as features dictated purely by function. However, it is also true that during the examination process, the USPTO may fail to identify aspects of a design patent application that can later be seen by the court as dictated by function and, therefore, are not protectable under current design patent law. In litigation where the defendant can make a convincing case for the presence of such features, the court can rule accordingly. However, such instances are rare and certainly do not require adoption of the filtration and abstraction as a required legal procedure in all design patent litigation matters before the court.

2) There is no clearly defined methodology for conducting a filtration and abstraction analysis. When actually applied at trial, filtration and abstraction are simply a give-and-take between the litigating parties and their experts,

63. *See* U.S. COPYRIGHT OFF., COMPENDIUM CHAPTER 600—EXAMINATION PRACTICES 3 (2017), https://www.copyright.gov/comp3/chap600/chap600-draft.pdf.

focusing on the dismembering of the product in ways that often make little sense and lack underlying science-based decision-making. In the end, judges often slice up the useful article equitably, hoping to appease each party. Such a process is rarely an informed science-based analysis but, instead, is generally a subjective balancing act based on what may appear as logically correct based on the arguments of the litigating parties. Critically, judges in these cases rarely proceed based on information derived from science-based research focused on what is or is not actually purely functional. It is understandable that such an approach leads to an increasing level of inconsistency across copyright cases for useful articles. Furthermore, requiring filtration and abstraction dramatically drives up the cost of litigation by expanding the length of cases, increasing the complexity of decisions made by the court, increasing the number of briefs and filings, increasing the number of experts, and opening up the courts for more appeals and reversals. Often the results are near total chaos, leaving the finder of fact to consider whether or not the protected and accused works are substantially similar or not based on examination of a dismembered and fragmented jumble of component parts. Adoption of filtration and abstraction in design patent litigation would only add jumble to the muddle.

3) Adopting filtration and abstraction would further complicate damages calculation, especially after the SCOTUS decision in Samsung v. Apple, which allows for damages to be determined on less than total profits based on the definition of the article of manufacture.[64] The high court in Samsung v. Apple allowed for scaled damages[65] but failed entirely to proffer how to execute the required analysis, leaving the problem to the lower courts. Adding filtration and abstraction to this already degraded design IP framework will do nothing to solve the muddle and will in fact further degrade the design patent system. Whereas the SCOTUS decision was death by dismemberment, filtration and abstraction is death by a thousand cuts.

There is virtually nothing in the current body of design patent case law and certainly nothing in neuroaesthetics research that supports filtration and abstraction of ornamental features which have underlying functional attributes. These practices run contrary to modern neuroscience related to the perception of the shape and ornamental design of useful articles. Again, a useful analogy is the human face: one cannot simply filter and abstract facial features without altering the visual processing and subsequent identification, recognition, and meaning of the face being manipulated. The point is that the ornamental features of the human face, in much the same way as ornamental

64. Samsung Elecs. Co. v. Apple Inc., 137 S. Ct. 429, 434–36 (2016).
65. *Id.*

features of a product, have underlying functions such as hearing, smell, vision, or speech, that are not actually described in functional terms by a given individual's unique ear, nose, mouth, or eye ornamental visual shapes. Abstraction of any ornamental features from a patented product should never be undertaken as a means of ensuring that ornamental design is not protecting functional features better protected by utility regimes.

XVI. LOOKING BACK AND NOT AHEAD

In the end, the opinions expressed by our academic colleagues are not based on a single case or legal outcome that supports their views. Similar unsupported opinion-proffering occurred when *Samsung* pushed through the *Samsung v. Apple* article of manufacture SCOTUS decision based on the now famous car and cup holder example,[66] likely inspired by the thinking in Professor Mark Lemley's *Brief Amici Curiae of 27 Law Professors in Support of Appellant Samsung*.[67] The attacks on design patent protections from our academic colleagues are becoming more frequent and expansive, as well as less supported by legal decisions or empirical research.

XVII. CONCLUSION

The U.S. Constitution, Article 1 Section 8, Clause 8 states, "[The Congress shall have Power] To promote the Progress of Science and useful Arts, by securing for limited Times to Authors and Inventors the exclusive Right to their respective Writings and Discoveries."[68] It is clear from this Clause that protection of discoveries was a core tenet embraced by the Framers of the Constitution. Notably this Clause is surprisingly general in nature, leaving the exact implementation to Congress. However, make no mistake: protection of discoveries was a front-and-center concern in the drafting of the Constitution. For example, in personal correspondences between Thomas Jefferson and James Madison, the two discussed how the protection of discoveries might lead to "monopoly power" on the part of those who would seek extraordinary or unintended use of the U.S. IP system.[69] This remains a valid concern today in other IP frameworks but has not been objectively proven to be present in design patent litigation matters.

66. Ami Shin & Dara Brown, *Samsung Electronics Co. v. Apple*, LEGAL INFO. INST. (last visited Apr. 4, 2021), https://www.law.cornell.edu/supct/cert/15-777.

67. Brief Amici Curiae of 27 Law Professors In Support of Appellant Samsung at 7–15, Samsung Elecs. Co. v. Apple Inc., 809 F.3d 633 (Fed. Cir. 2015) (No. 2014-1335, 1368).

68. U.S. CONST. art. I, § 8.

69. Stephen G. Calabresi & Larissa Leibowitz, *Monopolies and the Constitution: A History of Crony Capitalism*, 36 Harv. J.L. & Pub. Pol'y 983, 1010–11 (2013).

There are virtually no actual examples in design patent case law of "monopoly power" derived from the ornamental design of an article of manufacture. Our academic colleagues' constant use of the iPhone "rounded rectangle" as such an example is without scientific support or legal precedent. Modern shape perception science shows exactly what Samsung could have done to alter the design of the infringing phones, but failed to do. Apple does not claim all rounded rectangles, but most specifically the rounded rectangle that is associated with the iPhone. It is high time our academic colleagues stopped proffering hypothetical instances of such events and instead focus on science-based legal scholarship leading to properly validated methods for addressing the "monopoly power" question.

Neither the Framers of the Constitution, nor Congress declared that the methods and formal legal tests for design patent infringement must remain mired in outdated 18th-century legal academic thinking and ignore advances in modern decision-making and analytical neuroscience research. In fact, leveraging such scientific advances would greatly improve the design patent protection system's ability to ensure that monopoly power is not given to those who seek it. The future of design patent theory and practice will utilize science-based analytical methods to rebut attempts at monopoly power, as well as validate and strengthen the rights of those who seek to obtain valid protection for their often significant investments in ornamental design innovations. This view does not rest solely on the opinion of the authors, but on the increasing importance of ornamental design as a primary and protectable discovery and business asset. As Thomas J. Watson said in 1973, "good design is good business."[70] Today we now know, based on valid research, that companies employing design as a strategic advantage outperform their peer group on a market asset value basis of 228%.[71]

Despite the extensive and sometimes overwrought prognostications of our academic colleagues, the outcome of Samsung v. Apple was not an aberration or example of monopoly power, but a foreshadowing of what is to come. It is even more true today that good design is good business and protecting good design is a business imperative. The authors predict that design patents will soon rise dramatically in both importance and value as the underpinnings of modern neuroaesthetics reveals how ornamental design drives much of human behavior in an increasingly complex and competitive global marketplace.

70. Anne Quito, *Why Are We Still Arguing for the Business Value Of Design?*, QUARTZ (Oct. 23, 2018), https://qz.com/1431875/revisiting-ibms-good-design-is-good-business-slogan/.

71. Jeneanne Rae, *What Is the Real Value of Design?*, DMI 33 (2013), https://cdn.ymaws.com/sites/www.dmi.org/resource/resmgr/pdf_files/TheRealValueOfDesign.pdf.

Ornamental design is not a feature of a product, but is the product in the eyes and mind of the consumer.

Our academic colleagues have the right to ponder and draft on the question of monopoly power in the design patent system. However, their reliance on outdated legal tests and case law may simply be a problem attributable to a lack of awareness of the newly developing fields of neuroaesthetics and science-based empirical methods finding their place in many aspects of the law and, more recently, landing in the intellectual property domain of design patents and copyright. In this context, the authors welcome a collaboration with our academic colleagues and feel that empirical methods will benefit all players in the increasingly complex design patent litigation space. In the opinion of the authors, there is a lack of empirical and science-based academic scholarship on the part of the current legal academic community. Much of the current academic publications on design patents is overcited and under-researched, leading to literature that is of minimal use to legal professionals who would likely rely, in-part, on well-researched and validated empirical legal scholarship.

We agree with our academic colleagues that design patent litigation lacks decisional consistency and is in a state of rapid change. However, we disagree as to the source of the problems, and most importantly, we disagree entirely on the appropriate solutions. At the heart of the disagreement are differences in expertise, perspective, and vision. Our academic colleagues would have us look backward to conceptual frameworks that were never successful to begin with. We propose looking forward and adopting changes to design patent law based on modern neuroscience and empirical research.

We challenge our academic colleagues to abandon their quasi-strict constitutionalism and adopt scholarship informed by empirical process, modern neuroscience and neuroaesthetics. Robust empirical methods can address the issue of "monopoly power" and, at the same time, ensure those who have obtained valid design patent rights can protect them with confidence. In this context, we firmly believe that science will lift all boats. A move to science-based design patent legal frameworks will benefit both the plaintiff and the defendant in important and measurable ways.

As technology moves into the age of quantum computing, our academic colleagues call for reversion to the age of vacuum tubes. This is not going to happen. Science will remake design patent protections and other IP regimes as well. It is not a matter of if, but when.