Designing Interface Aesthetics:
A Methodology Promoting Inspiration, Community, and Recontextualization

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Designing effective aesthetics is an important task of an interface designer. Interface aesthetics addresses indicators of functionality, influences attitudes and decisions subconsciously, communicates information, and promotes user enjoyment. A methodology based on multi-disciplinary research helps designers of interface aesthetics solve challenges without committing them to a process that is irrelevant or a hindrance to creativity. While reviewing a potential methodology, three foundational principles are examined: inspiration, community, and recontextualization. Inspiration allows established influences to combine into new ideas. Community brings diverse perspectives together to redefine problems and recognize new solutions. Recontextualization synthesizes the design input from inspiration and community into new ideas. Current design practices and an experimental online tool are referenced to illustrate the application of these principles on the design of interface aesthetics. Research suggests practices for the effective implementation of these principles.

1 Introduction

> "Genius. Invention. Talent. And, of course, creativity. These words describe the highest levels of human performance."
> (Sawyer, Explaining Creativity)

Behind celebratory praise for new ideas lies the often intimidating task of achieving creativity. Advertising executive Hal Riney laments, "The frightening and most difficult thing about being... a creative person is that you have absolutely no idea where any of your thoughts come from and… no idea where they'll come from tomorrow" (Pray). Given the elusive qualities of innovation and ideation, creative endeavors often follow an abstract process. Designing interface aesthetics is no exception. During a sticking point some have called the "empty canvas nightmare" (Boag), a designer lacks the catalyst to translate project requirements into effective aesthetics.

Interface aesthetic ideation can begin by implementing three principles: inspiration, community, and recontextualization. Inspiration gathers relevant observations to combine into new solutions. As designers survey the design landscape, they can recognize opportunities to explore. Likewise, access to a community of designers offers a greater collective perspective on how design challenges can be solved. A diverse network of people provides at outlet for designers to share and complete ideas with one another. Recontextualization brings together the input gathered from inspiration and the community and applies it to the problem at hand. Previously unrelated ideas are processed and assembled to create an appropriate aesthetic solution.

Designers participate in inspiration, community, and recontextualization through various activities and resources. Specialized design galleries and online resources offer inspiration. Communities of designers connect through social media, events, and tools promoting

collaboration. Recontextualization is utilized in techniques such as mood boards, user-generated collections of design elements, and other means of collecting ideas and inspiration. Activities such as these offer environments for design ideas to germinate organically or serendipitously. An in-depth examination of the inspiration, community, and recontextualization is offered by the *Gestalt Board* project. Members share and collect the basic design elements that make up the aesthetics for a new design project. Although these principles and practices do not dictate a rigid design process, they provide a foundational methodology for interface aesthetic idea generation.

2 A Focus on Interface Aesthetics

While other user experience and interface design principles are available for review, interface aesthetics is the primary focus of the following discussion. Visual aesthetics has a unique place among the functional interface design considerations. To address functional concerns, user-centric design builds the interface from user goals of accomplishing tasks and finding content (Wodtke and Govella 155). When interface elements succeed at serving a useful purpose, they often go unnoticed. Cognitive psychologist and usability expert Donald Norman explains, "Good design is actually a lot harder to notice than poor design, in part because good designs fit our needs so well that the design is invisible, serving us without drawing attention to itself. Bad design, on the other hand, screams out its inadequacies, making itself very noticeable" (Norman, The Design xi). An interface is "invisible" when it does not draw attention away from users' goal. When users are not exhausting their mental resources to solve a puzzling navigation system or to reflect on a unique visual experience, they can focus on completing a task or finding information. The interface itself holds little value if it does not honor the user's needs.

"Invisible" design is celebrated for satisfying user needs, but designers should recognize when an interface becomes visible to the user's awareness. An interface is the result of

connecting the possible action users can perform on a system ("affordances") to the cues used to recognize the affordances ("signifiers") (Norman, Signifiers, not affordances). Invisible design aims to achieve transparency between the interface and the operations performed by the computer or device. Professor of New Media Design Jay David Bolter warns designers a strategy of transparency is an oversimplification of a complex reality (49). Bolter explains, "[T]he strategy of transparency is never sufficient to dictate the design of a whole interface or artifact…[T]here is a conflict between simplicity (or transparency) and functionality. As they add functionality, designers often undermine the transparency of their design" (49). The interface becomes visible as a complex set of affordances leads to a complex display of signifiers requiring interpretation.

There are situations when an assumption of invisible design causes problems. For invisible design to occur, users must trust enough in the interface's transparency to take it for granted. This becomes problematic when there are shortcomings in the interface's transparency. Problems ranging from user frustration to catastrophic system failure occur when the interface masks the operations of the system (Bolter and Gromala 56). Without appropriate feedback from the interface, the user may not understand the state of the system or the operations performed.

As users learn complex designs and troubleshoot misleading transparency, their attention is turned to available signifiers, and the interface becomes visible. This awareness of the interface may lead to a consideration of the interface's designer. Lecturer in Engineering Design Nathan Crilly urges designers to respect this potential user behavior. He explains, "[F]ully respecting users' sophistication means acknowledging that they have the capacity to recognize that designed systems have been designed" (16). Users may apply their conclusions about the interface's designer to their predictions about how the system will work. Acknowledging when

an interface becomes visible is not simply a value judgment on the effectiveness of serving user needs; it is also a realistic consideration of user behavior.

Beyond addressing the presence of a visible interface, aesthetics plays a valuable role in user experience design. Aesthetic impressions happen in less than a second and affect the viewer's attitude towards the interactive system (Tractinsky). Psychologist, author, and usability expert, Susan Weinschenk explains subconscious influences play a major role in decision making, "We like to think we make decisions based on careful thought, but most of our decisions and actions come from our unconscious" (Weinschenk, Neuro Web Design 13). Even if an "invisible" interface succeeds at keeping the users' attention focused on their goal, the subconscious awareness of the aesthetics may affect their attitude and decision-making. If interface aesthetics leaves a bad first impression, users may question the content's credibility or decide not to use its services.

However, subconscious realizations are not the only information passed to the user through aesthetics. The human brain is wired to process, remember, and translate information into pictures, making it appropriate to communicate through imagery (Weinschenk, Neuro Web Design 115-116). Computer Science Professor Paul Fishwick claims aesthetic computing promotes communication and learning through the "embodied nature of cognition." He explains, "The purpose of aesthetic computing is to deliver knowledge and practice of formal languages using aesthetic products as a vehicle" (Fishwick). Aesthetics communicates and teaches when embodiment creates a sense of self for users to explore the information and environment provided by the interface.

Another valuable influence interface aesthetics provides is the capacity to delight users. HCI Professor Noam Tractinsky explains, "Whereas task-related criteria are often based on

extrinsic motivation, aesthetics, through pleasure and engagement, primarily contributes to intrinsic motivation." Interface aesthetics promotes user engagement by fostering a more enjoyable experience. Norman claims attractive things work better because happy users are more open-minded to solving problems (Norman, Emotional Design 19). Conditions that may otherwise frustrate users are tolerated, and memories of problems are overshadowed by the memories of enjoyment (Adaptive Path).

Although aesthetics plays an important role in interface and user experience design, this does not mean a user-centric, task-oriented, and content-first approach is inappropriate. If a designer focuses solely on creating a clever and revolutionary visual experience, it is likely the functionality of the system will hold little value for the user. While "invisible" design underscores the importance of an interface not to distract from user goals, it is realistic to expect the interface to enter the user's awareness and become visible (Bolter and Gromala 49). This may occur as users learn complex interface functionality or troubleshoot misleading transparency between the actions they perform and the operations the system performs (Bolter and Gromala 56). Aesthetics is also valuable in user experience design because they influence attitudes and decisions subconsciously (Weinschenk, Neuro Web Design 13), communicate information (Fishwick), and promote user enjoyment (Norman, Emotional Design). The special role of aesthetics makes a compelling case for a viable interface aesthetic design methodology. While other functionality-oriented interface design principles are important and warrant a separate investigative review, the following discussion aims to build a design process that culminates in a successful use of aesthetics.

3 In Search of a Viable Design Methodology for Interface Aesthetics

A grand epiphany about new interface aesthetics may elude hopeful designers. Although designers are sometimes celebrated for their originality, fresh and creative ideas rarely happen in a vacuum. After his rigorous study on creativity, author and psychology professor Mihaly Csikszentmihalyi observed, "Occasionally it is possible to arrive at a creative discovery without any preparation... But usually insights tend to come to prepared minds, that is, to those who have thought long and hard about a given set of problematic issues" (83). Idea generation takes work, and the effort required of a designer may be strenuous (Csikszentmihalyi 80, 104, 116). Nevertheless, recognizing the work involved is an important step to approaching the design of new interface aesthetics. As designers become more aware of their influences, they can begin to understand how to fuel their creativity and streamline their workflow.

To better illustrate how designers work with influences, an analogy of "gestalt building" describes the process of designing interface aesthetics. Gestalt theory was introduced in the early twentieth century as a psychological explanation of how independent elements appear related (J. Johnson 11). These theories soon gained popularity in the fields of fine art and graphic design (Moszkowicz 58). The psychological view of Gestalt theory has changed over time as cognitive psychologist Jeff Johnson explains, "Today's perceptual and cognitive psychologists regard the Gestalt theory of perception as more of a *descriptive* framework than an *explanatory* and *predictive* theory" (11). While principles such as proximity, similarity, continuity, closure, area, symmetry, and common fate do not explain human perception, they continue to describe how separate elements appear related. Because a new idea and form is perceived from the arrangement and relationship of independent elements, the word gestalt can imply the whole is greater than the sum of its parts. This metaphor can be applied to the design of interface

aesthetics. Design elements such as color, texture, graphical style, and others combine to form a unique visual experience. The *Gestalt Board* project illustrates how this process unfolds. Ultimately, new interface aesthetics results from the synthesis of previously unrelated components.

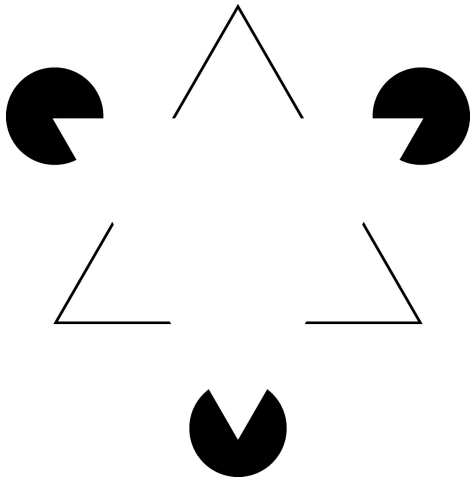


Fig. 3.1. The Kanizsa triangle represents the gestalt principles of continuity and closure. The shapes are interpreted as triangles that are not actually drawn. (Weinschenk 2)

A viable methodology for designing interface aesthetics implements a flexible framework to reconcile the practical advantages of a formal process with the various ways designers approach problems. A formal process is intended to guide a designer towards completing a goal. In some regards, formal methods are unavoidable in interface design. HCI author and professor Alan J. Dix explains, "However much we design devices and products to meet users' needs or enrich their experiences of life, still the software inside is driven by the soulless, precise, and largely deterministic logic of code. If you work with computers, you necessarily work with formalism." A formal process provides designers a concrete starting point and addresses the formal functions of computing.

Ultimately, many rigid formal processes break down in practice. For example, the ADDIE model is a typical process defined by the steps: Analysis, Design, Develop, Implement,

and Evaluate. Instructional Design author George Piskurich explains the model implies a linear or a cyclical process (4-5). In execution, the participants may move across the steps in any order in what Piskurich calls the spiderweb model (5). The order of the steps is arbitrary. Thus, the activity is better described as a framework than a process.

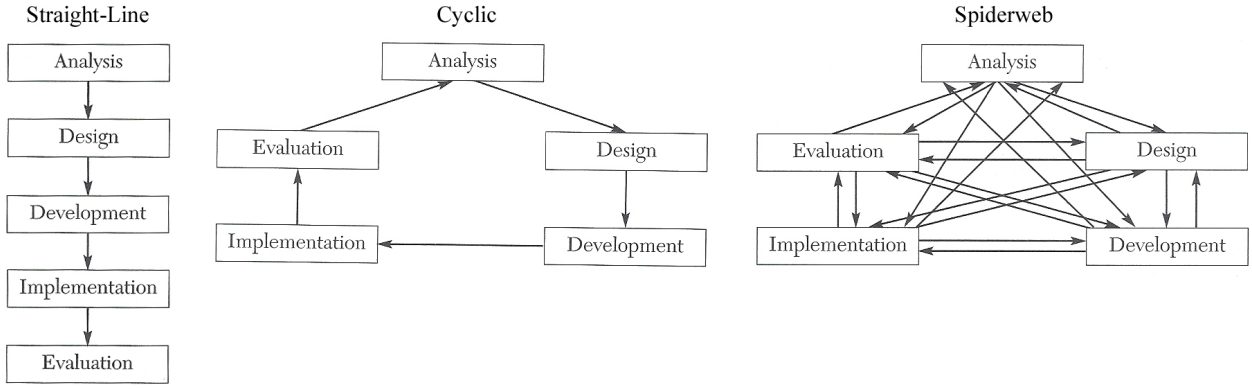


Fig. 3.2. While ADDIE implies a linear or cyclical flow, the order of steps is arbitrary. (Piskurich 4-5)

Many designers embrace implementing a flexible design framework. Founder and CEO of design studio Big Spaceship Michael Lebowitz explains, "[Our] process is kept very loose and elastic because we do so many different kinds of projects... [W]hat we have isn't so much a process per se... [but] a framework... [I]t allows us to be able to very quickly, and with great agility, move between these types of projects" (Lynda). Designers of interface aesthetics can benefit from a flexible framework that accommodates their approach and the project at hand.

Prescribing a flexible design framework is not meant to downplay the effectiveness of the steps in a process such as the ADDIE model. In fact, ADDIE translates into a perception/reaction feedback loop beneficial to designers. The Analysis and Evaluate steps make up the perception stage, and the Design, Develop, Implement steps make up the reaction stage. Regardless of whether teams use ADDIE from the project's initial requirements gathering to its launch or when rapid-prototyping interface design ideas in an agile process, the feedback loop created is valuable to the project's success.

Psychologists have observed the power of a feedback loop. From his research on self-efficacy, Stanford University psychologist Albert Bandura found, “The validity and functional value of one’s thoughts are evaluated by comparing how well thoughts match some indicant of reality...Unless people believe that they can produce desired effects and forestall undesired ones by their actions, they have little incentive to act. Efficacy beliefs influence...the accomplishments [people] realize” (96-97). As a designer works towards his or her goal of creating a new interface, a repetitive cycle of creation and reflection drives progress. A flexible design framework incorporating feedback loops provides a go-to set of activities and a concrete starting place for designing interface aesthetics.

One way to explain a viable design methodology is to describe its theory-based foundational principles. Defining a design process by its theory offers insight into why a process was successful and allows for a customizable solution. Although describing the design process as a framework allows flexibility in the chronological order of events, it only describes what events occur rather than why they were successful. A poorly-constructed design framework may include tasks that are counterproductive to the designer’s goal. Business professors Herminia Ibarra and Morten T. Hansen report poor processes can hurt the potential of a capable team of individuals. They explain, “[M]any companies spend inordinate amounts of time, money, and energy attracting talented employees only to subject them to homogenizing processes that kill creativity” (Ibarra and Hansen 71). A process based on a sound theory should not include irrelevant activities that are detrimental to the success of a project. Furthermore, as designers replace a chronological to-do list with a check-list of tasks, they continue to approach problems as though there is a guaranteed formula for success. Focusing on principles verses activities allows designers to build a creative environment without locking them into a formula that produces

repetitive results. The activities in the design process framework manifest themselves organically from these foundational principles.

Another way to explain a viable design methodology is to describe the specific activities involved in the process. While theory-based processes eventually translate into activities, activity-based processes are designed to target the task at hand. Rutgers business professor Deborah Dougherty suggests an activity-based perspective creates a more stable understanding of innovation. She continues, "Focusing on the activities of product innovation limits the generalizability of the implications, but it allows a more thorough treatment of the particular processes, dynamics, and events underlying this kind of innovation" (Dougherty 174-175). Although a theory-based process offers customizability, its loose definition is further removed from solving a specific problem. Describing the activities of a process focuses the efforts of a designer.

An investigative review of interface aesthetics and innovation suggests inspiration, community, and recontextualization provide a set of principles for a viable design methodology. Each of these overlapping concepts influences how the design of the interface aesthetics is accomplished. Examining these theory-based principles independently offers three tracks for discussing the activity-based processes targeting interface aesthetics. Designers incorporating these principles enjoy a means to solving their design challenges without committing to a process that is irrelevant or a hindrance to creativity. Accordingly, applying the goal of designing interface aesthetics to these principles yields a concrete set of activities for designers to utilize.

4 Inspiration

Why Inspiration

Despite the romanticized perception that creative genius is derived from inexplicable epiphanies of original design, many designers find the synthesis of established ideas to be an effective means of innovating design aesthetics. Even people considered the most original thinkers in recent history have recognized this pattern in ideation. Steve Jobs of Apple said, "Creativity is just connecting things. When you ask creative people how they did something, they feel a little guilty because they didn't really *do* it, they just *saw* something. It seemed obvious to them after a while. That's because they were able to connect experiences they've had and synthesize new things" (Wolf). Artist, author, and speaker Austin Kleon urges interface designers to embrace inspiration (Cordell). In his book *Steal Like An Artist,* Kleon quotes famous artists, authors, athletes, business leaders, and other professionals recognizing the influence previous ideas had on work hailed for its originality (Kleon). Before outputting a new set of interface aesthetics, a designer benefits from input recognizable as inspiration.

Understanding Inspiration

Industry practitioners find various ways inspiration helps generate new ideas. Naturally, the further an idea is removed from its origin, the more original it appears. Ideas for new interface aesthetics do not need to come from other interfaces. Software designer Bill Buxton explained this conclusion in a *Wired* magazine article appropriately titled *The Breakthrough Myth*. The article reports, "Big ideas poke their noses into the world very slowly, easing gradually into view...If you want to spot the next thing, Buxton argues, you just need to go 'prospecting and mining'—looking for concepts that are already successful in one field so you

can bring them to another." (Thompson) Buxton traces breakthroughs in interface design to a lineage of inspiration.

Another consideration is the number of ideas used to create the new idea. If an interface designer simply updates an existing template with new content or a new color palette, the new interface is hardly an original design. However, if a designer uses inspiration gathering as research that informs the new design aesthetics, a variety of considerations cross-pollinate to create a new experience for the end user. Kleon suggests emulating a variety of personal heroes to begin this process. Emulation melds admired qualities into personal values and objectives. According to Kleon, "A wonderful flaw about human beings is that we're incapable of making perfect copies. Our failure to copy our heroes is where we discover where our own thing lives. That is how we evolve" (41). Reflecting on the work of others helps designers form their personal design technique and philosophy.

Fig. 4.1. Kleon's Guidelines for using inspiration involve honoring, studying, and crediting various sources of inspiration to transform and remix previous ideas into new ones. (Kleon 39)

While Buxton and Kleon illustrate how practitioners in creative fields find inspiration helpful, experts in the fields of neuroscience and psychology have studied the cognitive mechanics of idea creation from inspiration. As a designer experiences inspiration, the perceptual stimulus causes a pattern of neural activity (J. Johnson 81). The active neural patterns from this conscious, focused attention are considered the working memory (J. Johnson 82). Long-term memories are formed when changes to neurons make it easier to reactivate a specific pattern of neural activity (J. Johnson 80; Weinschenk, 100 Things 51; Berns). The resulting neural structure can be used as a framework for the creation of new memories. The brain makes memory creation easier by associating new information with the neurons and schema of previously learned information (J. Johnson 89; Weinschenk, 100 Things 51). Ideas and information begin to meld when the information about the inspiration is categorized and assigned to schemas.

During imagination and problem solving, the same neural structures, schemas, and memories created from experience are accessed (Berns). Various patterns of neural activity bring new information into the formation of a solution. Psychology professor and researcher on the neurocognitive mechanisms of creativity Arne Dietrich explains, “The more knowledge is readily available, the more relevant items can be ‘juggled’ in working memory... [I]f relevant information is not stored in memory, it cannot...be included in the computation of creative solutions” (9-10). Because problem solving and imagination use the same neural pathways created by experience, new experiences can generate new creative insights. Emory University neuroscientist Gregory Berns explains, “In order to think creatively, you must develop new neural pathways and break out of the cycle of experience-dependent categorization… Fortunately, the networks that govern both perception and imagination can be reprogrammed. By deploying your attention differently, the frontal cortex, which contains rules for decision making,

can reconfigure neural networks so that you can see things that you didn't see before" (Berns). Information gathered from inspiration and stored into memory can be accessed to form new interface aesthetic design solutions.

Where Designers Find Inspiration

Interface designers find inspiration from a variety of sources. Any artwork, object, or experience can influence a designer's philosophy or a project's execution. Two common sources of inspiration are online galleries and blogs. Galleries such as *Favourite Website Awards (FWA)* and *Awwwards* feature web site designs judged on various criteria. Other galleries such as *Behance* (Adobe Systems Incorporated) and *Dribbble* feature user-generated content for a diverse collection of designs. Design blogs like *Abduzeedo* have a series of daily or weekly posts featuring a collection of inspirational images. Some blogs exclusively post examples of one design element. For example, *BittBox* and *Subtle Patterns* (Mo) feature texture, *Abode Kuler* (Adobe Systems Incorporated) features color, and *Ui Parade* (Cazoobi) features user interface components. *Gestalt Board* aims to blend these various strategies. Galleries are user-generated for diversity while content can be sorted to feature user favorites. In addition to an interface gallery, separate galleries focus on design elements such as color, texture, and graphics.

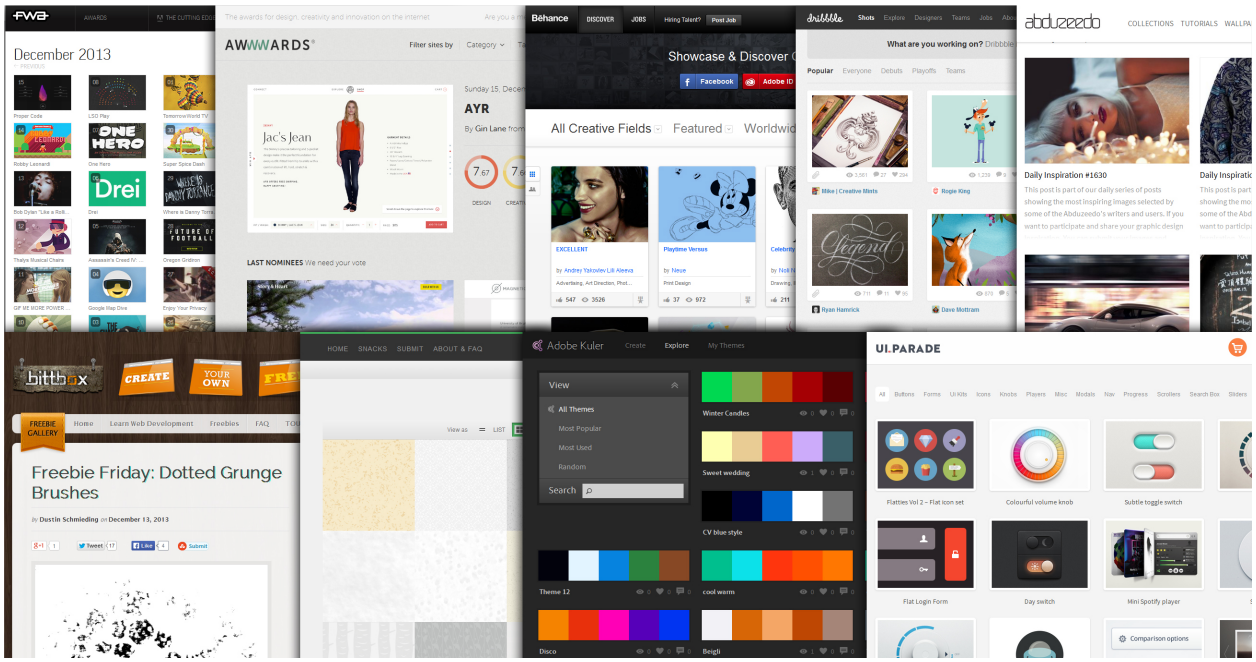


Fig. 4.2. Online Design Resources. Left to right and top to bottom: *Favourite Website Awards, Awwwards, Behance, Dribbble, Abduzeedo, Bit Box, Subtle Patterns*, *Abode Kuler*, and *Ui Parade*.

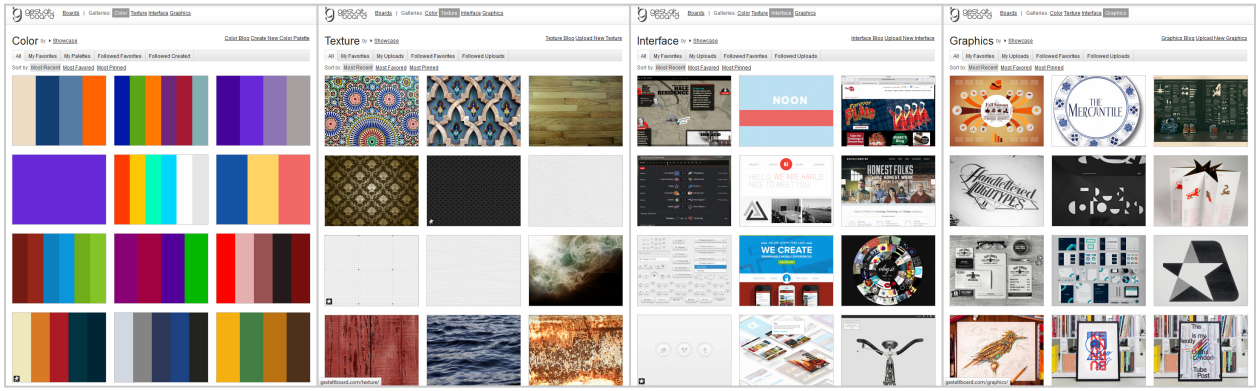


Fig. 4.3. *Gestalt Board* user-generated galleries: Color, Texture, Interface, and Graphics.

Design Galleries in Practice

Effective galleries avoid promoting design plagiarism by implementing meaningful navigation that embraces the gestalt building process mentioned above. Various sorting options from gallery content meta data allow users to derive new interpretations of the content. Galleries from *Design Shack* and *The Web Designer's Idea App* (McNeil) are organized by features such as color, structure, design trend, interface content, device, and more. Similarly, *Gestalt Board* sorts the Interface, Color, Texture, and Graphics galleries in a variety of ways. A viewer of the

Interface gallery may note how the use of a particular color or the influence of an interface's industry may affect design decisions. The viewer can easily recognize the inner workings of the overall aesthetic experience rather than a particular execution in a specific design. This recognition and reflection provides the opportunity to follow Kleon's advice, "Don't just steal the style, steal the thinking behind the style" (36). Cataloging various components of the aesthetics helps the viewer consider the influence of each component and how they can be assembled for a new project. This mimics the process of combining ideas into new ideas described above. Author and speaker on innovation Steven Johnson elaborates, "Certain environments enhance the brain's natural capacity to make new links of association" (47). A gallery linked by relevant design considerations helps viewers make the associations for their personal project.

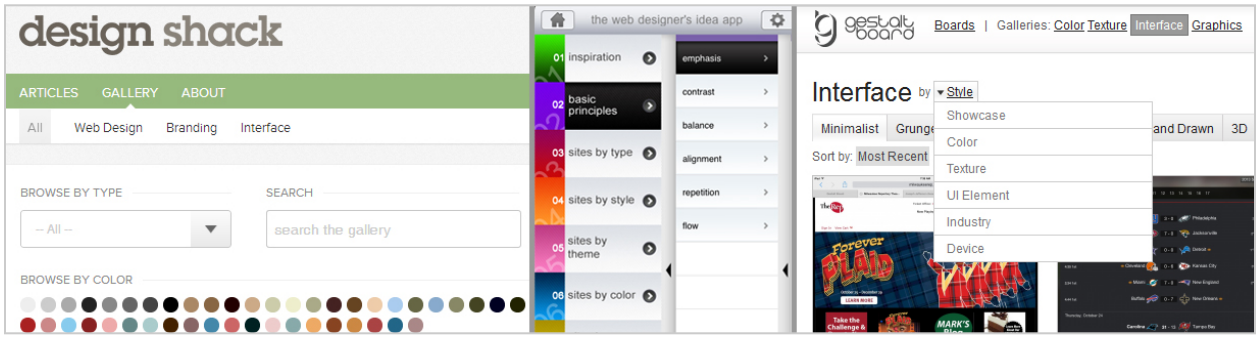


Fig. 4.4. Meaningful gallery navigation helps designers understand content. Left to right: *Design Shack, The Web Designer's Idea App, Gestalt Board*

Galleries have the capacity to inspire new ideas in interface design; however, some critics claim galleries focus solely on the visual aspects of design and neglect other important considerations such as usability, user-centered design, information architecture, interaction design, etc. To these critics, galleries are all form, no function. Usability blogger Dmitry Fadeyev wrote, "[Galleries] misleadingly shift the focus of web design from the underlying

product design and problem solving, to style and decoration." Some find a gallery's celebration of aesthetics to be short-sighted in the grand scheme of interface design.

As mentioned above, the functional aspects of interface design are important. The aesthetics of an interface is not the only thing to consider; however, viewing galleries during aesthetic research does not blind a designer to the functional requirements. Visual considerations happen in tandem with functional considerations. Design professional and author Terry Lee Stone wrote, "Design at its best uses all the artistic and aesthetic tools possible to do the job it was intended to do...Aesthetics can communicate function and the idea of usability" (162). Galleries are a supplement to aesthetic research that informs design decisions including how aesthetics complement functional requirements. For example, the *Gestalt Board* Interface gallery allows users to sort by "UI Element," so designers can view functional design solutions such as navigation, toolbars, buttons, and selectors. While tools such as diagram builders, wireframe creators, and user testing software also support the functional design of a website, gallery tools embrace the important role of aesthetics in interface and user experience design.

5 Community

Why Community

By recognizing new interface aesthetics is largely the combination of established ideas and observations, it is apparent the exchange of ideas among people fuels innovation. In his conference talk colorfully titled "When Ideas Have Sex," author and biologist Matthew Ridley explained the "meeting and mating" of ideas births new ideas that trace their innovative lineage from their diverse origins. Ideally, the moderate advantages of the original, separate ideas combine to form a superior solution. Seemingly incompatible perspectives may intertwine to produce creative results. This means connection to a diverse community is beneficial when

creating new solutions. A Harvard Business Review article spotlighting collaboration reported, "Research has consistently shown that diverse teams produce better results" (Ibarra and Hansen 70). Contribution from a diverse group offers new perspectives to solve creative challenges such as interface aesthetics.

Understanding Community

Later in his conference speech, Ridley suggests a collaborative network creates a "collective brain" with the ability to go "beyond the capacity of the human mind." Here Ridley recognizes the benefit of breaking a challenge into smaller problems to delegate to team members. This does not mean creativity depends on teams of designers meeting face-to-face to collectively design the same interface aesthetics. In fact, Steven Johnson warns readers not to believe collective thinking will "magically create some higher-level group consciousness" because a herd mentality rarely produces creativity and innovation (58). He summarizes, "It's not that the network itself is smart; it's that the individuals get smarter because they're connected to the network" (S. Johnson 58). R. Keith Sawyer, a psychologist and professor at the University of North Carolina, made a similar observation, "[D]ecades of research have consistently shown that brainstorming groups think of far fewer ideas than the same number of people who work alone and later pool their ideas" (Group Genius 60). Group brainstorming is not the ideal way to achieve creativity when designing interface aesthetics.

According to Susan Cain, an author and speaker on the topic of introversion, psychologists blame the ineffectiveness of face-to-face brainstorming on noncontributing participants, the limitation of one person speaking at a time, and the fear of embarrassment (89). She goes on to reference the surprising results of research conducted by Emory University neuroscientist Gregory Berns. His brain scan research suggests peer pressure can change a

person's perception of a problem to fit the group consensus. Furthermore, when a person recognizes a fault in the group's conclusion, measured activity in the brain's amygdala suggests a fear of rejection or what Berns calls "the pain of independence" (Cain 92). If the views of an individual are not changed to match the group, he or she may be too afraid to speak up and contribute a potentially better solution.

As designers seek to share and combine ideas into new solutions, they should be conscious of these negative effects of face-to-face brainstorming. Pooling ideas and individual reflection must be balanced to provide both a sufficient exchange of ideas and a sufficient amount of uninterrupted and in-depth problem solving. A team of skilled designers meeting face-to-face may not deliver a successful aesthetic solution, but an individual designer is more likely to deliver a successful solution if he or she is connected to the other designers.

It should be stated that this cyclical process of designers meeting and breaking away is not dependent on predefined roles and a formal strategy. MIT research scientist, consultant, and author Peter A. Gloor relates the seemingly erratic behavior of collaborative innovation network team members to the swarm intelligence of social insects. He explains, "Swarm intelligence offers an alternative way of designing 'intelligent' systems in which autonomy, emergence, and the ability to distribute tasks replace control, preprogramming, and centralization" (Gloor 21). This self-organizing approach offers agility, flexibility, a diminished fear of error and failure, a common vision from a support system with a shared code of ethics, and an exponential increase in creative output through the open sharing of ideas (Gloor 21-23). A self-organizing network of designers can achieve new levels of creativity that may not have been possible if the designers chose to work independently, with no contact to one another.

Where Designers Find Community

It is not surprising designers take advantage of technology to exchange ideas. The social quality of online applications is a reflection of human nature. Weinschenk explains people are "social animals" (Neuro Web Design 121) and "look to others to decide what they should do" (Neuro Web Design 17). She concludes, "History shows us that whatever technology there is, we will find a way to use it to communicate —to make it social" (Weinschenk, Neuro Web Design 122). Designers use popular social networks like *Twitter* to communicate and share links to design resources. Likewise, design blogs from freelancers, studios, and professional bloggers encourage commenting on articles, creating a discussion forum for a community of commentators.

Beyond these common social networking venues, custom applications have been developed specifically for the design process. *Dribbble* is designed to be a "show and tell for designers" by allowing users to share designs, comment, and assign designs to collections. *MoodShare* also documents design research in sharable format with commenting and privacy settings. Users can view and edit the same boards pinned with inspirational content (Mooooodle Limited). To embrace community, *Gestalt Board* incorporates several features. Diversity is promoted through the user-generated gallery content and the public critique via user comments. Features such as following other *Gestalt Board* members and the message system allow members to form stronger ties to fellow members. Following someone creates a feed of *Gestalt Board* content the followed designer created or marked as favorite. The message system includes an inbox of messages containing links to *Gestalt Board* content. A variety of online tools facilitate community building among designers.

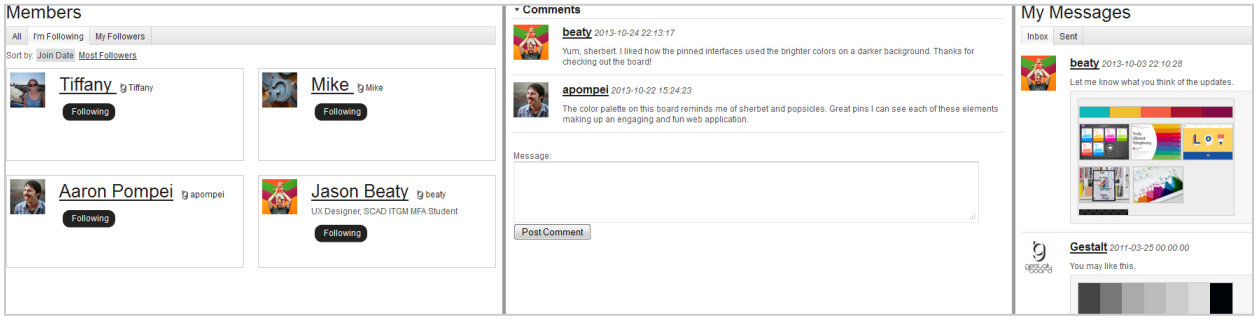


Fig. 5.1. *Gestalt Board* community features. Left to Right: Members I'm Following, Comments, and Message Inbox.

Online Design Communities in Practice

An online community of designers provides the advantage of both the serendipitous creation of new ideas and the structured approach of a formal collaborative design process. Steven Johnson embraces the power of serendipity as a means of bringing together the hunches of different people. This means a person may only have half of an idea that needs to combine with another half of an idea from a different person (S. Johnson 126). Designers having no intention of collaborating may find themselves uncovering new solutions to advance the industry. However, idea generation is not limited to this accidental collision of half-ideas. Designers wishing to take advantage of the create-and-reflect feedback loop mentioned above can also connect online.

Using *Gestalt Board* to create a board of inspiration for a specific project provides a concrete display of the interface aesthetic design research to facilitate conversations with clients and other team members. For example, some designers find sharing examples of inspiration cuts design time by facilitating a smoother client buy-in (Wagner). This collective review of design decisions is not an excuse to fall into the herd mentality mentioned above; it is an opportunity for meaningful design critique. In fact, research by University of California at Berkeley psychology professor Charlan Nemeth suggests debate and criticism stimulate more ideas. Debate and conflict caused by dissent provides more information that can be "confronted and explored"

(373). Giving permission and instruction to debate in groups may also stimulate idea generation by making criticism "task related rather than personal" and promoting a feeling of liberation by encouraging something that is typically forbidden (Nemeth 372). While a diverse community offers the serendipitous creation of new interface aesthetics, the criticism of inspirational content allows teams and clients to effectively collaborate on their unique problem.

6 Recontextualization

Why Recontextualization

While inspiration and community provide an environment for ideas to accumulate and exchange, it is the designer's responsibility to combine the established ideas into appropriate interface aesthetics. The observations and perspectives gathered from resources and collaborators must be processed and synthesized into a meaningful solution. Designers recontextualize ideas, moving them from their original context to solve a unique design challenge. While inspiration and community fuel the generation of new ideas, recontextualization is the actual work creating the ideas.

Having acknowledged the challenging moments in idea generation and the shortcomings of face-to-face problem solving, it is clear designers should seek opportunities for in-depth, individual reflection on how different ideas can be recontextualized. This period of intense concentration and work may have the challenging and rewarding characteristics of a state of mind Csikszentmihalyi calls "flow." Csikszentmihalyi studied people that found enjoyment and motivation in activities that did not reward money or fame (110). He explains the origins of term flow, "[M]any of the respondents described the feeling when things were going well as an almost automatic, effortless, yet highly focused state of consciousness" (Csikszentmihalyi 110). For Csikszentmihalyi, a key attribute of creative people is that they are engaged in something they

find intrinsically rewarding (107-108). Designers of interface aesthetics can find the period of recontextualization both challenging and rewarding.

Understanding Recontextualization

The success of interface aesthetics is often dependent on how well the designer merges appropriate ideas into a new solution. Sociologist John Law described a similar process of association as heterogeneous engineering. He summarized, "[T]he stability and form of artifacts should be seen as a function of the interaction of heterogeneous elements as these are shaped and assimilated into a network" (Law 113). Here Law explains how various conditions affect whether an innovation is effective. The same situation exists when designing interface aesthetics. A variety of influences such as color, texture, graphics, layout, typography, etc. are assimilated into a network contributing to the overall aesthetic experience. Designers consider the "stability and form" of the interface when harmoniously combining the heterogeneous elements.

Research in the field of cognitive neuroscience explains how creative solutions emerge during the recontextualization process. When characterizing creativity as novel and appropriate, Dietrich assigned unique patterns of neural activity to four types of creative insights (1,8). As described in the table below, these types come from the cross-section of a knowledge domain dimension of cognitive and emotional structures by a processing mode dimension of deliberate and spontaneous. When a designer is consciously and systematically applying his or her design knowledge and skills to a specific problem, his or her creativity is deliberate and cognitive. Conversely, when a designer is not consciously working on a design but finds inspiration from the emotion of a random event, the creativity is spontaneous and emotional.

Although creative insights are identified across this spectrum, Dietrich emphasizes creativity is ultimately a combination of all four types (8). This means spontaneous and

emotional creativity may be filtered, analyzed, and articulated through the deliberate and cognitive creative mechanisms. Spontaneous insights may be desirable because they are not limited to "preconceived mental paradigms" and working memory's "capacity limit" (Dietrich 7). Neuroscientists Christoff et al. suggest associative thinking during defocused attention facilitates other benefits of spontaneous insights, "Although it may undermine our immediate goals, mind wandering may enable the parallel operation of diverse brain areas in the service of distal goals that extend beyond the current task" (Christoff, Gordon and Smallwood). While there are some advantages to spontaneous insights, designers benefit from deliberate attempts of mastering their skills, expanding their knowledge, and exposing themselves to inspiration. As explained in the above discussion on inspiration, increasing knowledge makes more information accessible to the working memory and available when forming a creative solution (Dietrich 9-10). Furthermore, if a creative insight emerges spontaneously, expertise and knowledge are required to express the idea (Dietrich 10-11). While there is no way for a designer to force a spontaneous creative insight, knowledge better prepares the brain for connecting and executing ideas. Understanding Dietrich's four types of creativity can help designers participate in and prepare for the creation of novel and appropriate interface aesthetic solutions.

		Knowledge Domain Structures	
		Cognitive Expression requires knowledge and mastery of its mechanics (10-11)	**Emotional** Insights do not require domain-specific knowledge (10)
Processing Mode	**Deliberate** Conscious, working memory; Limited mental resources (7)	Methodical/Systematic (9) Designer is thinking about a problem and uses knowledge and formal technique to create a solution.	Emotion-dependent; Likely to conform to person's norms and values (9) Designer is thinking about a problem, and emotional insights create a solution.
	Spontaneous Subconscious, stored memory; Not limited to preconceived mental paradigms or working memory's capacity limit (7)	Defocused attention/Incubation (9) Designer is no longer thinking about a problem when a random event causes a solution to emerge from the subconscious.	"Revelation" or "Epiphany" (10) Designer has not been working on a specific problem but emotion causes idea to emerge from the subconscious.

Table 6.1. Dietrich's four types of creative insights come from a cross-section of processing mode and knowledge domain structures. Chart adapted from Dietrich 8. Numbers in parenthesis represent page number citations.

Where Designers Find Recontextualization

Practices and tools facilitating a designer's time of independent reflection and recontextualization often follow a process of assembling a collection of ideas. The ideas from inspirational resources and the design community can be gathered in a reviewable format. To arrive at new interface aesthetics, this collection is then used in the gestalt building process mentioned above. Designers recognize various design elements and ideas in the collection, and they unite the desired elements into the new solution.

Various methods have been employed to carry out the task of reviewing a collection of design ideas. HCI researchers Dhaval Vyas and Anton Nijholt conducted an ethnographic study on designers using physical spaces and "artful surfaces" as part of their process. They report, "[S]tudio surfaces such as designers' desks, office walls, notice boards, clipboards and drawing boards are full of informative, inspirational and creative art[i]facts such as, sketches, drawings, posters, story-boards and Post-it notes. Studio surfaces are not just the carriers of information but

importantly they are sites of methodic design practices, i.e. they indicate, to an extent, how design is being carried out." (Vyas and Nijholt 176). Vyas and Nijholt recognize how collecting and reviewing various resources can affect a designer's process.

Fig. 6.1. Designers use physical surfaces to collect and display resources (Vyas and Nijholt 177).

Collecting inspiration for interface aesthetics may also happen digitally. Some designers create "morgue files" by simply saving inspirational samples to a folder on their computer (Beaird). Similarly, mood boards are a common way to present inspirational content. Various swatches, images, and examples are laid out in a document (Wagner). A popular alternative to a mood board is a style tile. Rather than presenting the inspirational content, style tiles present design elements such as swatches, fonts, icons, interface elements, and other visuals that the designer plans to use in the final interface design (Warren). These various techniques collect design ideas in a reviewable format before the actual production of the interface itself.

Fig. 6.2. Left to right: morgue file (Beaird), mood board (Wagner), style tile (Warren).

Software tools are also available for the recontextualization process. While sites like the social pin board creator *Pinterest* and the collaborative mural builder *Mural.ly* (Tactivos Inc.) serve a wide audience, other tools target designers. *MoodShare* is a mood board building tool that collects resources from across the web into a collage-style layout (Mooooodle Limited). *Dribbble* allows users to gather design samples into either buckets or projects (Dribbble LLC). *Moodstream* displays a rotating carousel of photographs while playing music (Getty Images, Inc.). Users set parameters of the desired mood and energy to populate the carousel and bookmark photos and music into a collection. *Quince* by Infragistics has libraries of user interface patterns users can collect into simple thumbnail displays called Corkboards, repositories with filterable navigation called Design Libraries, and displays customizable with text and shapes called Design Boards (Infragistics, Inc.). Each software solution allows users to gather various ideas to apply to a new design challenge.

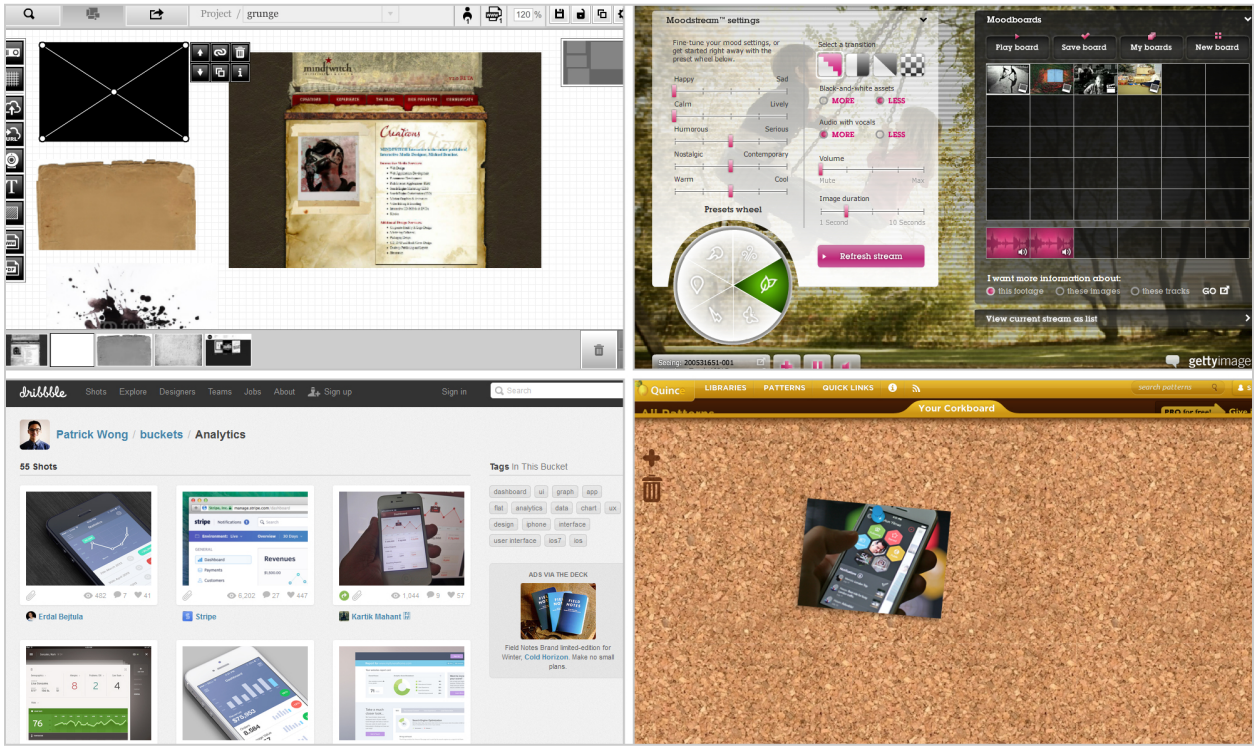


Fig. 6.3. Left to right and top to bottom: *MoodShare* Project, *MoodStream* with mood board, *Dribbble* Bucket, *Quince* Corkboard

Building on the concept of collecting relevant interface aesthetic inspiration, *Gestalt Board* documents inspirational research by collecting interface design examples, color palettes, texture swatches, and graphics into a "gestalt board." Arranging the various gestalt board items in close proximity allows the user to better perceive how each element contributes to the overall aesthetic experience of a new interface design. As the user reflects on the samples assigned to the board, the board may be adjusted and refined to better articulate a coherent vision or design direction. Samples may be added, removed, reordered, and labeled to better present and communicate the interface aesthetics the user is designing.

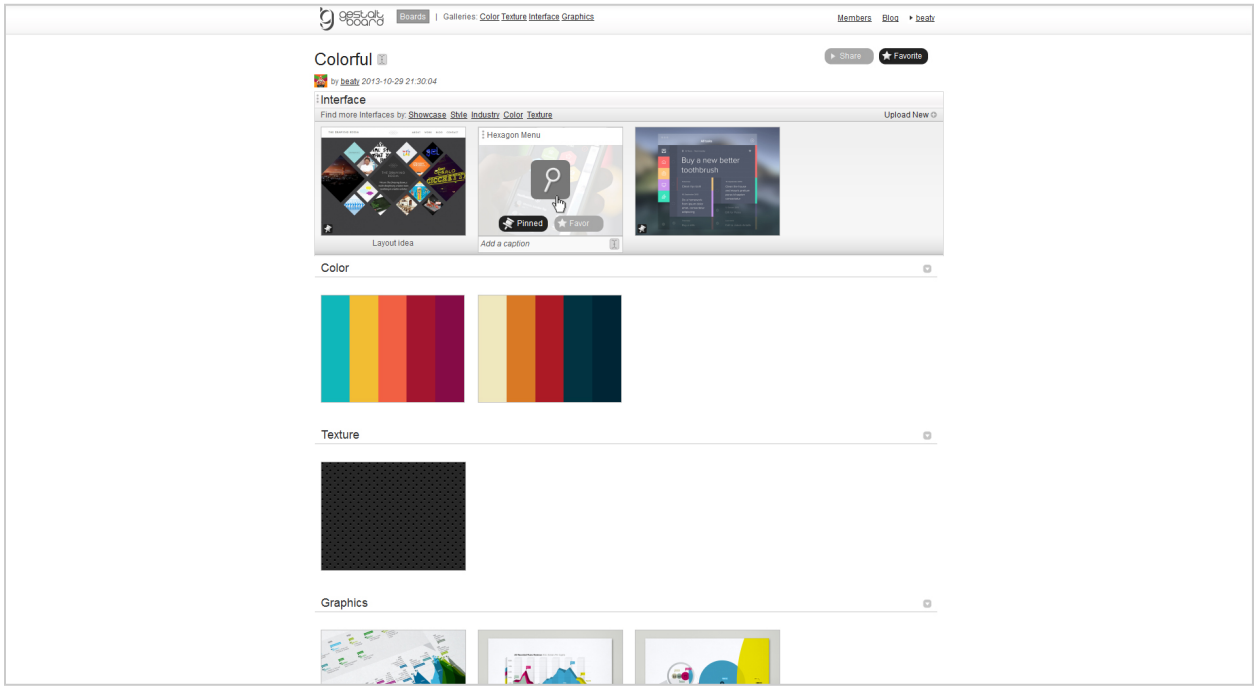


Fig. 6.4. Customizable Gestalt Board

Design Recontextualization in Practice

The difficult work of recontextualizing design elements into unique interface aesthetics involves skills that can be honed with practice. Professors Dyer, Gregersen, and Christensen spent six years studying 25 innovative entrepreneurs and surveying over 3,000 executives and 500 inventors or founders of innovative companies (62). They determined creativity mostly comes from the learned and practiced "discovery skills" of associating, questioning, observing, experimenting, and networking (Dyer, Gregersen and Christensen 62-63). With practice, designers can improve their discovery skills and expand their creativity. Preparing for the work of recontextualizing ideas will help facilitate the design of interface aesthetics.

These learned skills of creativity can be applied to the various needs of creative endeavors. Recognizing the dichotomy of creativity as both novel and appropriate makes the role of the designer twofold. First, designers should seek out unique design solutions. Branding consultant and author Marty Neumeier urges companies to be radically different to set

themselves apart from the competition. He warns, “If ANYBODY’S doing it, you’d be crazy to do it yourself. You can’t be a leader by following the leader” (Neumeier 34). The unique quality of a product, service, or company should be incorporated into the related interface aesthetics. Second, designers and clients seeking a grandiose revolution in interface aesthetics have to balance this ambition with a practical sense of what is appropriate. Unconventional design ideas run the risk of being ineffective and ill received. Stone provides advice for managing creative risk-taking, “Recontextualize the client’s business category by considering their customers’ total lifestyle... Associate your design choices with the client’s goals and objectives” (117, 125). When designing the aesthetics of an interface, non-visual considerations from the audience’s lifestyle can provide new and unique considerations while keeping decisions relevant to the overall goal. A storytelling approach to interface design addresses these considerations by developing character traits of a user persona and a narrative about the person’s needs, motivations, and use of the interface (Quesenbery and Brooks 5). Designers should consider how the success of the interface aesthetics is measured both in terms of business objectives and user satisfaction. Creativity in interface aesthetics is both novel and appropriate when a client’s uniqueness is represented.

7 A Useful Tool for Crafting Interface Aesthetics

Not surprisingly, the *Gestalt Board* tool does not come with a guarantee to automate idea generation for interface aesthetics. Any tool boasting its ability to increase creativity can easily over-promise and under-deliver. Woven into the above discussion on creative ideation is a theme of flexibility and customizability. Designers such as Buxton find ideas from several sources (Thompson), making it implausible to account for all potential inspirational sources in a single application. By definition, the serendipitous discoveries from collaboration described by Steven

Johnson (126) are not intended or predictable. Furthermore, it is unlikely a tool or process can force the creation of a creative insight Dietrich classifies as spontaneous and emotional (Weinschenk, 100 Things 90). These various human forces cannot be accounted for in a single design tool.

Gestalt Board's value lies in its capacity to facilitate interface aesthetic design activities based on the research-backed principles of inspiration, community, and recontextualization. Galleries of various design elements are organized by relevant categories to inspire an original blending of ideas. User-generated content, commenting, messaging, sharing, and following bring together a community of designers. Collecting inspirational content in a reviewable format helps designers recontextualize ideas while building interface aesthetics. The success of *Gestalt Board* hinges on its foundational principles of inspiration, community, and recontextualization.

To gain insight into the efficacy of *Gestalt Board*, user feedback was collected via an online survey. (See appendix for complete survey results.) The main portion of the survey asked users to rate how helpful various *Gestalt Board* features were "when designing the look and feel of a new project." For the results not answered as "N/A," all but one feature had more responses as "Very Helpful" and "Somewhat Helpful" than "Unhelpful." The features "Viewing Galleries, Viewing Boards, Pinning to Boards," and "Arranging Board Content" did not have a single response of "Unhelpful." In the open comments portion of the survey, most criticisms were usability concerns or ideas for future development. The concept behind the tool was generally praised with accolades such as, "a great tool to help designers get inspiration and brainstorm palettes and ideas." A few users shared screenshots of design projects that corresponded to boards they created with *Gestalt Board*. Similar visual aesthetics are found on both the boards

and the screenshots. Overall, the user feedback suggested the *Gestalt Board* tool held promise in promoting the design of interface aesthetics.

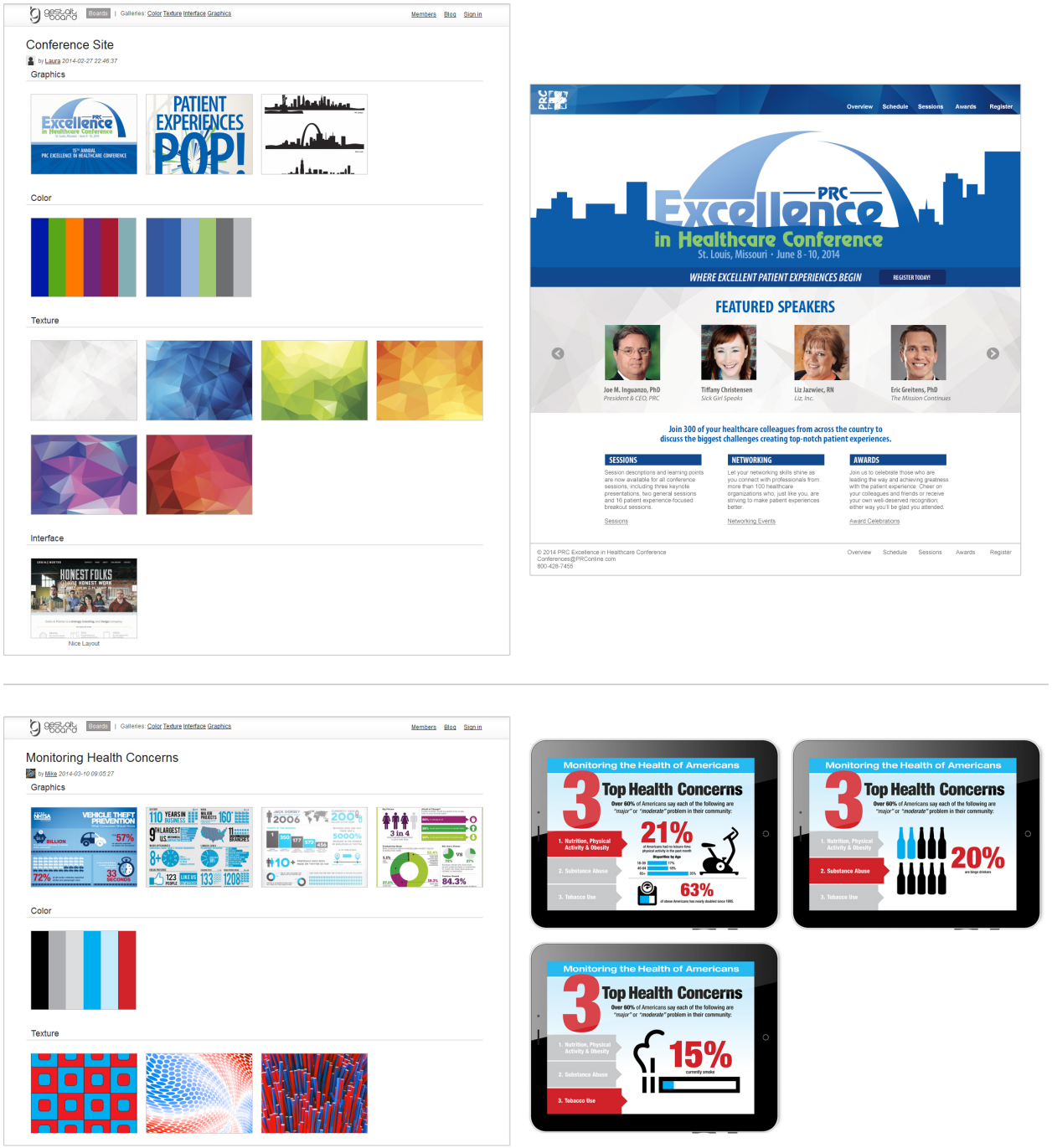


Fig. 7.1. User boards and their corresponding interface designs.

8 Conclusion

Because aesthetics plays an important role in signifying interface functionality, influencing the subconscious, communicating information, and promoting user enjoyment, a viable aesthetic design methodology is valuable to interface designers. Treating the design process as a framework adds flexibility in the order of events, the types of projects, and the designer's preferred way of working. While a process based on theoretical principles offers customizability and insight into why the process was successful, a process based on actual activity targets the specific task of designing the interface's aesthetics. A viable design process emerges when interface aesthetic design activities are based on principles backed by multidisciplinary research.

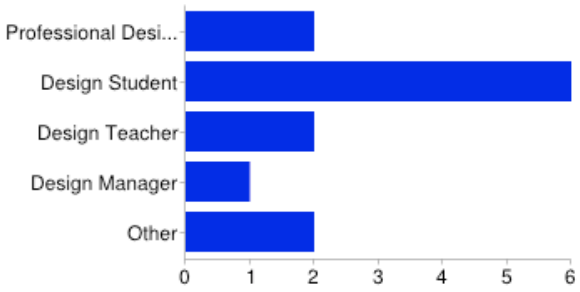
Inspiration, community, and recontextualization provide a foundation for building a viable design methodology for interface aesthetics. A careful method of inspirational research allows established influences to combine into new ideas by distancing ideas from several diverse sources and recognizing styles and philosophies over execution. Online design galleries with meaningful navigation allow designers to recognize the individual elements that contribute to the overall aesthetic experience. Community brings diverse perspectives together to redefine problems and recognize new solutions by utilizing effective criticism with serendipity and self-organizing collaboration with times of individual reflection. Online designer communities are found on social networks, user-generated galleries, forums, and collaborative tools. Recontextualization synthesizes the various aesthetic elements from inspiration and community into a functional, harmonious whole by using a variety of cognitive creative insights and creating solutions that are both novel and appropriate. Designers can recontextualize new ideas as they collect aesthetic elements into a reviewable format.

Because the above discussion was restricted to interface aesthetics, further development of the suggested methodology is possible. The research used to support inspiration, community, and recontextualization can be applied to other design principles and industries. Functionality-oriented interface design principles such as usability, information architecture, gesture-based navigation, etc. are available for exploration. Likewise, design fields such as motion graphics, industrial, interior, etc. may be included in future investigation. A methodology incorporating inspiration, community, and recontextualization can be studied without the current focus on interface aesthetics.

As designers create new interface aesthetics, they are simultaneously creating a new design process. Variety in interface aesthetics results from the various ways in which they were created. Embracing the principles of inspiration, community, and recontextualization stimulates and sustains progress towards the successful melding of ideas into an original and compelling solution.

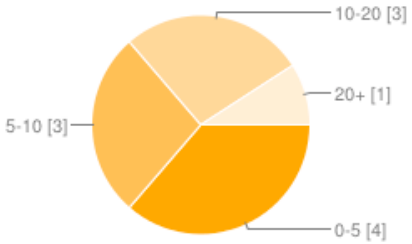
Appendix: *Gestalt Board* Test Results

Which of these describe you?



Professional Designer	2	15%
Design Student	6	46%
Design Teacher	2	14%
Design Manager	1	8%
Other	2	15%

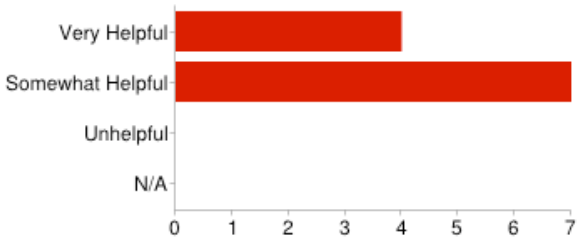
How many years of design experience do you have?



0-5	4	36%
5-10	3	27%
10-20	3	27%
20+	1	9%

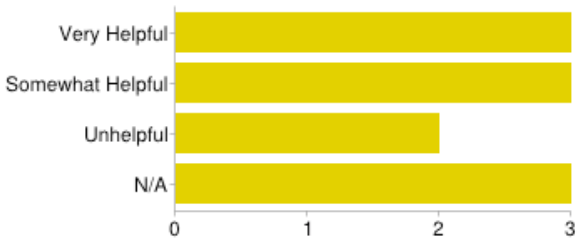
When designing the look and feel of a new project, how helpful did you find the following Gestalt Board features?

Viewing Galleries



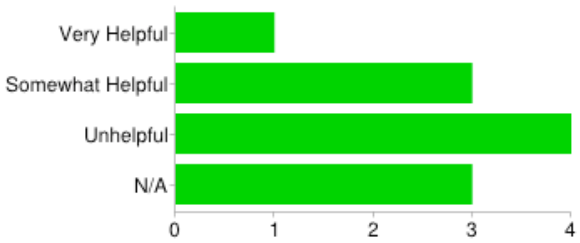
Very Helpful	4	36%
Somewhat Helpful	7	64%
Unhelpful	0	0%
N/A	0	0%

Creating Gallery Content



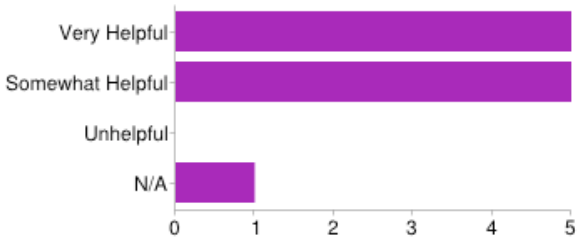
Very Helpful	3	27%
Somewhat Helpful	3	27%
Unhelpful	2	18%
N/A	3	27%

Commenting on Gallery Content



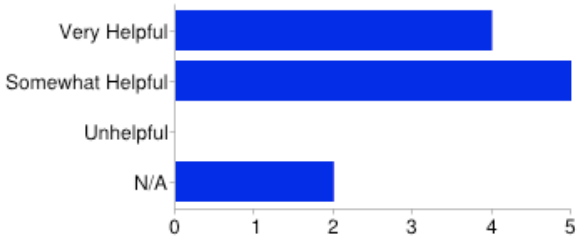
Very Helpful	1	9%
Somewhat Helpful	3	27%
Unhelpful	4	36%
N/A	3	27%

Viewing Boards



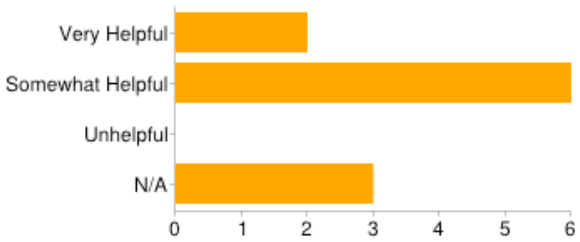
Very Helpful	5	45%
Somewhat Helpful	5	45%
Unhelpful	0	0%
N/A	1	9%

Pinning to Boards



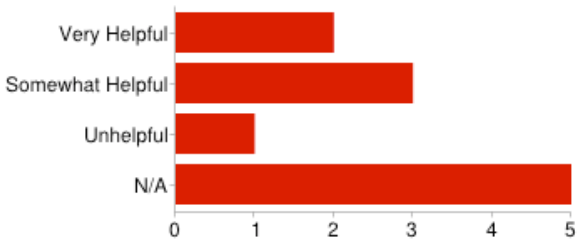
Very Helpful	4	36%
Somewhat Helpful	5	45%
Unhelpful	0	0%
N/A	2	18%

Arranging Board Content



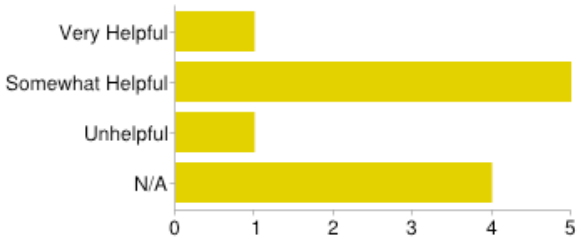
Very Helpful	2	18%
Somewhat Helpful	6	55%
Unhelpful	0	0%
N/A	3	27%

Commenting on Boards



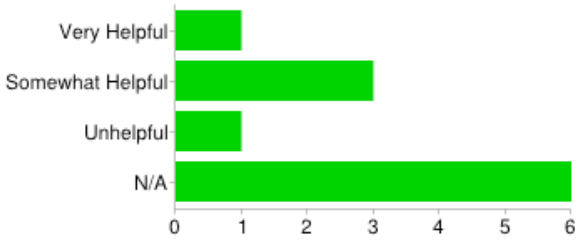
Very Helpful	2	18%
Somewhat Helpful	3	27%
Unhelpful	1	9%
N/A	5	45%

Following Other Members



Very Helpful	1	9%
Somewhat Helpful	5	45%
Unhelpful	1	9%
N/A	4	36%

Sharing and Messaging



Very Helpful	1	9%
Somewhat Helpful	3	27%
Unhelpful	1	9%
N/A	6	55%

Provide Any Additional Comments or Criticisms on Gestalt Board

All in all, this has progressed nicely. It would have been nice to have it “pre-populated” with more examples ... but I understand you’re beta testing. Good luck.

I had problems adding content by URL, I had to download and then upload the images. I would like the option of uploading directly to a board instead of always uploading and then pinning. You may want to consider having a freeform textbox for users to add their own keywords and tags for images in addition to the standard check boxes that you currently have. Users may also come up with additional categories of images they would like to upload that don’t fit into the existing structure. I think this is a great idea and I’m sure it will grow and change as more people adopt it. Good luck!

I like the concept and I think it is very promising providing there is enough information to guide through and tell you the objective of the application in more detail ... Overall I think when developed more it can be a great tool to help designers get inspiration and brainstorm palettes and ideas.

I’m going to reply to your email with my free-form thoughts.

Jason - So far great work. Why “favor” and not “favorite”? I’ll keep submitting these as I work through the site.

When uploading new graphics to a board (and using the “Upload New” action from within a board) it was confusing that a pinning action was still required to persist the graphic to the board. It would be nice to have the option of adding custom tags to uploaded imagery instead of only having the default options (under type, geometry, content, media). No option to delete a board? Expected “Share” to include social network sharing. Not sure what the “Followed...” terminology refers to. Ahh, figured it out. Follow: person. Favor: boards, graphics, etc. This took some figuring out. Once a user is in the application the GB logo should go to the boards landing page? ...instead of the coming soon page. When looking at the tiles/thumbnails of different items (boards, textures, graphics, etc.) I found myself wanting a couple things. 1) to see the name of the item without hovering. 2) to be able to click anywhere on the thumbnail to go to its detail view. Obviously “pin” and “favor” would retain their own hit areas. Final comment: The more I use the product the more I see what it’s trying to do. And I think what it’s trying to do is a good thing and it’s a product that, in large part, is missing from the options available to designers.

I first got on the site via link, but then when I accidentally closed and opened it again the site would not work. I tried several different search engines as well as internet browsers. Other then that, I enjoyed looking through the website.

Had issues with the site loading (very slowly) I'm interested in the concept, but I find navigating the site a little difficult. I enjoyed the video in the beginning and I think that was a nice touch to help describe the purpose of Gestalt board. The layout is simple and clean, but I feel it needs a little more visual interest to draw the viewer in and want to spend time using the site.

Gestalt Board is like an interior designer board, but for artists. It is such a good idea.

Bibliography

Abduzeedo. *Abduzeedo Design Inspiration*. 2013 15-December. Web. 2013 15-December. <http://abduzeedo.com/>.

Adaptive Path. "UX Week 2008 | Don Norman | Peter Merholz Speaks with Don Norman." 2008. *Vimeo.* Video. 2014 26-January.

Adobe Systems Incorporated. *Adobe Kuler*. 2013 15-December. Web. 2013 15-December. <https://kuler.adobe.com/>.

—. *Online Portfolios on Behance*. 2013 15-December. Web. 2013 15-December. <http://behance.net/>.

Art & Copy. Dir. Doug Pray. Perf. Hal Riney. PBS. 2009. DVD.

Awwwards. *Awwwards - Website Awards - Best Web Design Trends*. 2013 15-December. Web. 2013 15-December. <http://awwwards.com/>.

Bandura, Albert. "Social Cognitive Theory of Mass Communication." Bryant, Jennings and Mary Beth Oliver. *Media Effects: Advances in Theory and Research, 3rd Edition*. New York: Routledge, 2009. 94-124. Print.

Beaird, Jason. *Bread-and-butter Layouts and Inspiration*. 2011 9-August. Web. 2013 15-October. <http://www.sitepoint.com/bread-and-butter-layouts-and-inspiration/>.

Berns, Gregory. "Rewiring The Creative Mind." *Fast Company* 2008: 51-56. Print.

BittBox. *BittBox*. 2013 15-December. Web. 2013 15-December. <http://www.bittbox.com/>.

Boag, Paul. "Case study in best practice: The big decisions about design and how to make them." 2011 10-August. *Boagworld.* Web. 2011 20-August. <http://boagworld.com/season/2/episode/s2e5/>.

Bolter, Jay David and Diane Gromala. *Windows and Mirrors : Interaction Design, Digital Art, and the Myth of Transparency*. Cambridge: MIT Press Books, 2005. Print.

Cain, Susan. *QUIET: The Power of Introverts in a World That Can't Stop Talking*. New York: Random House, Inc., 2013. Print.

Cazoobi. *Ui Parade - User Interface Design Inspiration*. n.d. Web. 2014 2014-February.

Christoff, Kalina, et al. "Experience sampling during fMRI reveals default network and executive system contributions to mind wandering." *PNAS* 2009 26-May: 8719–8724. Print.

Cordell, Maria. “My UX Week 2012 Mixtape.” 2012 17-December. *Adaptive Path.* Web. 2014 12-Febraury. <http://www.adaptivepath.com/ideas/my-ux-week-2012-mixtape/>.

Crilly, Nathan. “The Design Stance in User-System Interaction.” *DesignIssues* (2011): 16-29. Print.

Csikszentmihalyi, Mihaly. *Creativity: Flow and the Psychology of Discovery and Invention*. New York: Harper Perennial, 1996. Print.

Design Shack. *CSS & Design Gallery*. 2013 15-December. Web. 2013 15-December. <http://designshack.net/gallery>.

Dietrich, Arne. “The cognitive neuroscience of creativity.” *Psychonomic Bulletin & Review*. Madison, 2004 November. Web.

Dix, Alan J. “Formal Methods.” 2013. *The Encyclopedia of Human-Computer Interaction, 2nd Ed.* Ed. Mads Soegaard and Rikke Friis Dam. Web. 2013 8-January. <http://www.interaction-design.org/encyclopedia/formal_methods.html>.

Dougherty, Deborah. “Organizing for Innovation.” Clegg, Stewart R, Cynthia Hardy and Walter R Nord. *Managing Organizations: Current Issues*. London: SAGE Publications, 1996. 174-188. Print.

Dribbble LLC. *Dribbble - Popular*. 2013 15-December. Web. 2013 15-December. <http://dribbble.com/>.

Dyer, Jeffrey H, Hal B Gregersen and Clayton M Christensen. “The Innovator's DNA.” *Harvard business review* 2009 01-December: 61-67. Print.

Fadeyev, Dmitry. “On CSS Galleries.” 2011 23-April. *UsabilityPost.* Web. 2013 19-10. <http://www.usabilitypost.com/2011/04/23/on-css-galleries/>.

Favourite Website Awards. *The FWA*. 2013 15-December. Web. 2013 15-December. <http://thefwa.com/>.

Fishwick, Paul A. “Aesthetic Computing.” 2013. *The Encyclopedia of Human-Computer Interaction, 2nd Ed.* Ed. Mads Soegaard and Rikke Friis Dam. Web. 2013 8-January. <http://www.interaction-design.org/encyclopedia/aesthetic_computing.html>.

Getty Images, Inc. *Moodstream*. 2013 15-December. Web. 2013 15-December. <http://moodstream.gettyimages.com/>.

Gloor, Peter A. *Swarm Creativity: Competitive Advantage through Collaborative Innovation Networks*. Oxford: Oxford University Press, Inc., 2006. Print.

Ibarra, Herminia and Morten T. Hansen. “Are You a Collaborative Leader?” *Havard Business Review* 2011 July-August: 69-74. Print.

Infragistics, Inc. *Quince*. 2013 15-December. Web. 2013 15-December. <http://quince.infragistics.com/>.

Johnson, Jeff. *Designing with the Mind in Mind: Simple Guide to Understanding User Interface Design Rules*. Burlington: Morgan Kaufmann Publishers, 2010. Print.

Johnson, Steven. *Where Good Ideas Come From The Natual History of Innovation*. New York: Penguin Group, 2010. Print.

Kleon, Austin. *Steal Like an Artist: 10 Things Nobody Told You About Being Creative*. New York: Workman Publishing Company, Inc., 2012. Print.

Law, John. “Technology and Heterogeneous Engineering: The Case of Portuguese Expansion.” Bijker, Wiebe E, Thomas P Hughes and Trevor Pinch. *The Social Construction of Technological Systems: New Directions in the Sociology and History of Technology*. Cambridge: Massachusetts Institute of Technology, 1987. 111-134. Print.

Lynda. “Workflow Process from the Course Big Spaceship, Digital Creative Agency with Big Spaceship.” 2008 1-August. *Lynda.com.* Video. 2013 8-December.

McNeil, Patrick. *The Web Designer's Idea App*. 2013 15-December. Web. 2013 15-December. <http://thewebdesignersideabook.com/idea-app/>.

Mo, Atle. *Subtle Patterns | Free textures for your next web project.* 2013 15-December. Web. 2013 15-December. <http://subtlepatterns.com/>.

Mooooodle Limited. *MoodShare*. 2013 15-December. Web. 2013 15-December. <http://moodshare.co/>.

Moszkowicz, Julia. “Gestalt and Graphic Design: An Exploration of the Humanistic and Therapeutic Effects of Visual Organization.” *DesignIssues* 2011: 56-67. Print.

Nemeth, Charlan J. “The liberating role of conflict in group creativity: A study in two countries.” *European Journal of Social Psychology* 34 (2004): 365-374. Print.

Neumeier, Marty. *Zag: The Number One Strategy of High-Performance Brands*. Berkeley: New Riders, 2007. Print.

Norman, Donald. *Emotional Design: Why We Love (or Hate) Everyday Things*. New York: Basic Books, 2004. Print.

—. “Signifiers, not affordances.” n.d. *jnd.org.* Web. 2014 26-January. <http://jnd.org/dn.mss/signifiers_not_affordances.html>.

—. *The Design of Everyday Things: Revised and Expanded Edition*. New York: Basic Books, 2013. Print.

Pinterest. *Pinterest*. 2014 19-February. Web. 2014 19-February. <https://www.pinterest.com/>.

Piskurich, George M. *Rapid Instructional Design: Learning ID Fast and Right, 2nd Edition*. San Francisco: Pfeiffer, 2006. Print.

Quesenbery, Whitney and Kevin Brooks. *Storytelling for User Experience: Crafting Stories for Better Design*. Brooklyn: Rosenfeld Media, LLC, 2010. Print.

Ridley, Matt. “Matt Ridley: When ideas have sex.” 2010 July. *TED.* Video. 2011 22-July. <http://www.ted.com/talks/lang/eng/matt_ridley_when_ideas_have_sex.html>.

Sawyer, R. Keith. *Explaining Creativity: The Science of Human Innovation (2nd Edition)*. New York: Oxford University Press, 2011. Print.

—. *Group Genius: The Creative Power of Collaboration*. New York: Basic Books, 2007. Print.

Stone, Terry Lee. *Managing the Design Process-Concept Development: An Essential Manual for the Working Designer*. Beverly: Rockport Publishers, 2010. Print.

Tactivos Inc. *Mural.ly*. 2014 19-February. Web. 2014 19-February. <https://mural.ly/>.

Thompson, Clive. “The Breakthrough Myth.” *Wired* 2011 August: 44. Print.

Tractinsky, Noam. “Visual Aesthetics.” 2013. *The Encyclopedia of Human-Computer Interaction, 2nd Ed.* Ed. Mads Soegaard and Rikke Friis Dam. Web. 2013 8-January. <http://www.interaction-design.org/encyclopedia/visual_aesthetics.html>.

Twitter, Inc. *Twitter*. 2013 15-December. Web. 2013 15-December. <https://twitter.com/>.

Vyas, Dhaval and Anton Nijholt. “Artful surfaces: an ethnographic study exploring the use of space in design studios.” *Digital Creativity* 2012 17-August: 176-195. Print.

Wagner, Mindy. “Why Mood Boards Matter.” 2008 30-December. *WebdesignerDepot.com.* Web. 2013 19-October. <http://www.webdesignerdepot.com/2008/12/why-mood-boards-matter/>.

Warren, Samantha. *Style Tiles*. 2013 15-December. Web. 2013 15-December. <http://styletil.es/>.

Weinschenk, Susan. *100 Things Every Designer Needs to Know About People*. Berkeley: New Riders, 2011. Print.

—. *Neuro Web Design*. Berkeley: New Riders, 2009. Print.

Wodtke, Christina and Austin Govella. *Information Architecture: Blueprints for the Web, Second Edition*. Berkeley: New Riders, 2009. Print.

Wolf, Gary. "Steve Jobs: The Next Insanely Great Thing." 1996 February. *Wired.com.* Print. 2014 12-February. <http://www.wired.com/wired/archive/4.02/jobs_pr.html>.