Supporting Distributed Critique through Interpretation and Sense-Making in an Online Creative Community

YUBO KOU and COLIN M. GRAY, Purdue University

Critique is an important component of creative work in design education and practice, through which individuals can solicit advice and obtain feedback on their work. Face-to-face critique in offline settings such as design studios has been well-documented and theorized. However, little is known about unstructured distributed critique in online creative communities where people share and critique each other's work, and how these practices might resemble or differ from studio critique. In this paper, we use mixed-methods to examine distributed critique practices in a UX-focused online creative community on Reddit. We found that distributed critique resembles studio critique categorically, but differs qualitatively. While studio critique often focuses on depth, distributed critique often revolved around collective sensemaking, through which creative workers engaged in iteratively interpreting, defining, and refining the artifact and their process. We discuss the relationship between distributed critique and socio-technical systems and identify implications for future research.

CCS Concepts: • **Human-centered computing → Human computer interaction (HCI)**; *Empirical studies in HCI*

KEYWORDS

Distributed critique, user experience design, online creative community, practice-led research, research-practice gap

ACM Reference format:

Yubo Kou and Colin M. Gray. 2017. Supporting Distributed Critique through Interpretation and Sense-Making in an Online Creative Community. *PACMHCI*, 1, 2, Article 60, (November 2017), 19 pages.
https://doi.org/10.1145/3134695

1 INTRODUCTION

Critique, "a dialogue in which the interjection of a reasoned opinion about a product or action triggers further reflection on or changes to the artifact being designed" [21], is central to the creation and improvement of creative work. Beyond the direct benefit of improving a design artifact under critique, these discussions also enable designers to extend their domain knowledge [6], allowing them to acquire and utilize appropriate design methods [19]. Critique is also a reflective and strategic learning process for critics, improving their skill [15] and ultimately, their repertoire of design knowledge [51].

Critique has historically been studied primarily in physical studio settings where student designers and critics, including mentors and peers, are collocated [2,4,7,16,52]. Physical collocation yields unique advantages such as opportunities for structured and spontaneous communication [5,34], efficient exchange

Author's addresses: Y. Kou and C. M. Gray, Purdue University, West Lafayette, IN, USA; email: kou2@purdue.edu and gray42@purdue.edu.

of information [29], formation of social relationships [8,34], and unique cultural experiences [45,57]. A surging body of research has also begun to address the study and creation of online platforms that may complement and extend studio pedagogy by supporting online critique between students and critics who already know each other offline [11,18,24,50]. Another research strand has examined the design of crowdsourcing system to solicit *structured* design feedback from a *non-expert* crowd [63,64]. Here "structured" means that the system asks for specific types of feedback such as impressions and goals as perceived by a crowd worker.

However, little attention has been paid to critique *in the wild*, such as in online communities that enthusiasts form around a particular type of creative work, such as photography [48], graphic design [42], and portfolio design [10]. In such communities, critique is one among many activities that support creative activity, encouraging dialogue around artifacts and socialization in the community. In this paper, we refer to this form of critique as *distributed critique*: a set of critique practices whereby geographically distributed creators engage in the critique of design artifacts and processes. Distributed critique often takes place through free form dialogue, where critics write text to describe their assessment of the design work; this type of critique exists in contrast to structured feedback from crowd feedback systems [63]. We posit that distributed critique is worthy of close investigation for several reasons. First, quality distributed critique supports the improvement of creative work, which holds important implications for the professionalization of creative work and diversity of economic entry points [47]. Second, the proliferation of online creative communities on different platforms indicates that distributed critique, rather than structured design feedback, is the primary form of critique in these communities. Third, the proliferation of online creative communities has already attracted much academic attention in understanding various social issues related to creative work, such as leadership and collaboration [40], but distributed critique has received less attention.

In this paper, we examine distributed critique in an online creative community, and compare it with studio critique, the classic form of critique [16]. We employ a mixed-methods approach in this paper to investigate critique practices in an online creative community focused on user experience: the '/r/userexperience/' subreddit. The three research questions that structure this paper are: 1) What design artifacts do community members offer for critique?; 2) How does distributed critique content differ from studio critique?; and 3) How do discourse practices enable critique and advice-giving to occur in this online community?

These research questions lead to two primary contributions to the CSCW literature. First, an increased understanding of how creators build and refine their work through the strength of online creative community fosters a heightened sense of the complexity and sociality of online creative collaboration. Second, documentation of discourse practices common in distributed critique, particularly as compared to traditional studio critique, allows greater understanding of how sociotechnical systems may extend or allow the reimagination of traditionally collocated interactions.

2 RELATED WORK

In this section, we describe and synthesize previous work on studio critique, including common patterns of collocated critique, a typology of critique relevant to the present study, and recent research that has identified how online platforms may support distributed critique.

2.1 Studio Critique and its Typology

Studio pedagogy is the dominant means of training professionals in a wide range of design and art disciplines, with historical roots reaching back to 19th century France [14,56,58]. In studio pedagogy, critique is a central practice, defining patterns of professional communication through discussion and evaluation of design processes and artifacts [9,44]. While the object of critique varies across design disciplines, its implementation as a pedagogical function is relatively consistent. Design educators use studio critique as a formative and summative form of evaluation [2], a means of design discourse [60], and a critical form of

education that teaches students about professional communication and their future professional practice [15].

Hokanson proposes four categories of critique [31] that typically occur within studio pedagogy: formal, seminar/group, desk, and peer critique. **Formal critique** has the highest level of formality where the audience consists of students, professors, and/or outside jury members who provide high stakes evaluation of completed work. In **seminar and group critique**, students and professors practice design within a classroom environment, engaging in a formative assessment of their work that is completed or in progress. **Group critiques** can be led by instructor or student in various ways, but the presence of instructors might limit the communicative power of students [4]. **Desk critique** takes place between a single student and an instructor usually in a classroom environment where the instructor provides formative assessment of work in progress. **Peer critique** describes informal, context-specific interactions among students.

Building on the study of critique practices in a range of design studios, Dannels and Martin have proposed a typology of critique in studio pedagogy [16]. The typology includes nine genres of feedback. Definitions for each genre of critique are adapted from [16]:

Judgment: an assessment of quality from the perspective of the critic

Process-Oriented: statement or question regarding the design approach or processes that led to a design artifact

Brainstorming: statement or question about imagined possibilities or next steps, such as "what-if" questions

Interpretation: critic telling what they see and how they make sense of the design artifact

Direct Recommendation: providing specific, targeted advice to improve a specific aspect of design

Investigation: non-rhetorical questions about the design or its processes

Free Association: critic's initial reactions to a design, such as "it looks like…" statements

Comparison: comparison or contrast with an external artifact, concept, or idea

Identity Invoking: reference to student' identity as a designer in relation to a future professional community

The above typology is, to our best knowledge, the most influential and comprehensive categorization of discursive actions in the context of studio critique. It serves as an important basis for the analysis of distributed critique that appears in text form in the online community under study.

2.2 Crowdsourcing in Design Feedback

HCI researchers and practitioners have historically relied upon crowdsourcing to facilitate the provision of quality critique in online environments. One important concept that differentiates studio critique and crowd feedback is the latter's "structuredness." Drawing from empirical findings such as photographers hoping to receive critique from "multiple technical perspectives, such as composition, color, and depth-of-field" [62], Xu et al. designed a crowdsourcing platform that asked an online crowd to provide critique for a provided design artifact [63]. A critique task was structured using five forms of feedback, including: elements, first notice, impressions, goals, and guidelines. These criteria were intended to instruct crowd workers to provide consistent and useful critiques. The study's user evaluation found that designers valued the crowd feedback, and considered the feedback on impressions and goals to be most helpful. However, a later study of the system showed that such crowd feedback should be considered as "a supplement to expert evaluation rather than a replacement," because the range and depth of expert feedback could not be matched by crowd feedback [64].

Inspired by the use of scaffolding as suggested by constructivist learning theory, recent purpose-built crowdsourced critique platforms have relied upon highly-structured crowd tasks to provide more guidance for crowd critics. These approaches to scaffolding could be characterized as "hard" scaffolds, whereas many scaffolds are more situational and dynamic, or "soft" [55]. Greenberg et al. [27] demonstrated that crowd workers' critique can be improved by providing more guidance and examples of high-quality critiquing criteria. Luther et al. designed a crowdsourcing system in which each task was highly structured with 70 pre-authored critique statements that crowd workers could use to measure and respond to a design artifact

[41]. Their study found that the feedback from an online crowd with limited design experience had comparable internal consistency with expert critiques and trended towards approximating expert critiques. Designers who received crowd feedback considered it to be valuable, claiming to have made substantial changes to their work; however, third-party ratings found few differences between designers' initial work and revised work.

Crowd feedback is an efficient way to generate structured feedback from a potentially large, non-expert crowd. However, existing crowdsourcing systems have focused primarily on visual design [41,63]. Visual design can benefit from a crowd feedback system for several reasons. For example, the design work (an image or a poster) can be easily presented to crowd workers. In addition, perhaps even non-experts can describe their perceptions and impressions of an image that contain valuable insights. However, other design disciplines such as architecture, and user experience design in this study, rely upon much expert knowledge and experience, and may not be easily integrated into a crowd feedback system. Therefore, practitioners from many other design disciplines still need general-purpose online forums to present their work and engage with expert practitioners.

Moreover, compared to visual design, UX design includes a more complex temporal and dynamic array of elements, comprising various elements, contexts, and user interactions [28,33,36]. UX is an emerging, multi-disciplinary field with no coherent body of knowledge [53], and no consensus exists regarding the "gold standard" for critiquing UX design artifacts. Frequently, critics rely upon contextual cues and conventional wisdom to understand the design goal of a particular UX design to provide appropriate feedback. Given the complexity of UX designs—spanning visual, temporal, and interactive outputs—the notion of presenting only the final product of UX design and soliciting structured feedback from a non-expert crowd is perhaps less applicable or useful in this domain of creative work.

2.3 Distributed Critique in Online Creative Community

There is increasing attention to design work that is traditionally viewed at the margin where hobbyists, amateurs, and professionals engage in collaborative creation, such as hackerspaces [3] and online creative communities [54]. Various types of online creative work have been examined, such as digital photography [62], graphic design [42], software customization [12], handicraft [47], and fan creation [20,46]. This represents a departure from historic research on studio pedagogy where design work is produced, critiqued, and improved primarily through formal educational training.

Researchers have shown that distributed critique in online creative communities functions as a *social practice*, yielding many benefits beyond the improvement of design work. For instance, Marlow and Dabbish's study of users from Dribbble, a graphic design community, reported that graphic designers sought feedback on their work-in-progress for two purposes: the improvement of specific aspects of their work, or an overall sense of the community's perception of their work [42]. Xu and Bailey's study of an online critique community in the domain of digital photography [62] shows that, compared to studio critique, the unique benefits of distributed critique include the ability to network with other photographers, build their own professional reputation, and advertising their professional services.

While existing work describing online creative communities has demonstrated the value of distributed critique, little attention has been paid to the concrete circumstances and means by which people seek critique or otherwise center attention on critique practices. In addition, physical design studios and online creative communities share commonalities in providing a stable social environment. Given the extensive literature and well-developed theories on studio critique and the scarcity of work on distributed critique in online creative communities, a comparison between studio critique and distributed critique forms an essential foundation for connecting to previous work and theorizing distributed critique.

3 ONLINE CREATIVE COMMUNITY FOCUS

In this paper, we focus on creative communities formed and sustained on Reddit. We chose Reddit for several reasons. First, Reddit is a popular online venue, guaranteeing a substantial user base. Reddit was ranked the 4th most visited website in the United States and 15th in the world by the time of writing this

paper [1]. Second, designed as a social news site, Reddit has 1,064,941 subreddits [49], supporting the formation, maintenance, and development of online communities of various purposes [30,43], of which creative communities is one. Third, we chose to focus on a general-purpose creative community, rather than an online platform designed specifically for critique, because we wanted to understand distributed critique practice "in the wild" with minimal design intervention inscribed with system designers' values. We posit that such understanding of creators' naturalistic critique practices can provide insights for future critique-oriented systems.

Through extended observation of a sample of online communities, we identified multiple communities with relevance to user experience (UX) on Reddit that were both substantial and accessible through a public API for data collection and analysis. After choosing to focus on Reddit, we used keyword searches and snowball sampling to identify subreddits (sub-communities on Reddit that have their own set of followers, posting rules, and social practices) that had a primary or secondary focus on UX. Keywords included "design," "usability," "user experience," and "user research." We identified 14 subreddits that had direct relevance to UX practice. After initial analysis of these subreddits using descriptive statistics, we selected the /r/userexperience subreddit for focused analysis in this study.

The /r/userexperience subreddit is a vibrant, growing UX community. In the eight months of activity captured by our data collection, the subreddit had accumulated more threads than all the other UX-related subreddits combined. Additionally, the community members showed high level of engagement, indicated by the number of authors and comments. The subreddit also had the largest average number of comments per post as well as the largest number of distinct authors as compared to similar UX subreddits.

This subreddit supports a vibrant UX community where students, junior designers, and senior designers socialize and discuss a range of UX-related topics, one of which is distributed critique of others' UX work, including software interfaces and websites. Figure 1 shows an example of the critique practices we have identified. We have paraphrased the conversation to anonymize the design presenter and the critic on the subreddit.

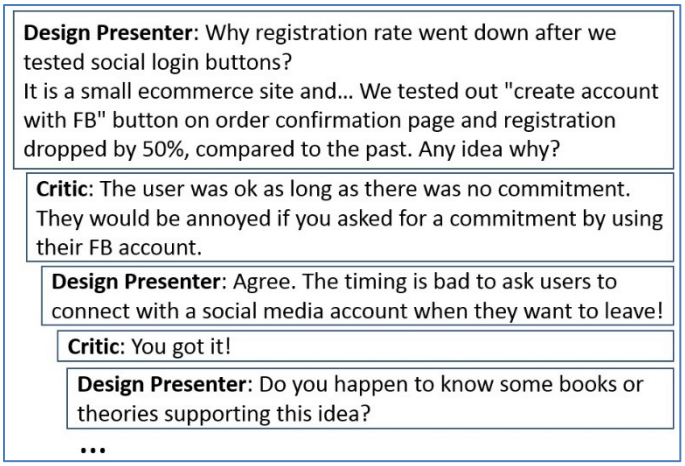

Fig. 1. Example of distributed critique on Reddit.

In this example, the critic and the design presenter engaged in a conversation about the latter interlocutor's design artifact, an ecommerce website. The dialogue between the two interlocutors is supported by Reddit's hierarchical structure for threaded discussions. It is important to note that Reddit is not designed explicitly for online critique, compared to previously studied communities for which critique was their central mission and design goal [11,41,62]. However, it is clear that these critique practices take place with significant regularity in this community, and that the threaded structure enables certain kinds of

critique behavior to occur that may have been impossible in purpose-built systems, where previous research on crowdsourced critique has been focused.

4 METHOD

4.1 Data Collection

We used PHP and the Reddit API to collect post and comment data from the '/r/userexperience' subreddit, storing the data in a MySQL database for further analysis. The Reddit API provides several criteria for retrieving posts (i.e., new, hot, controversial, rising, top), and allows the retrieval of a maximum number of 1000 items under each listing[1]. We employed all of these criteria to obtain posts and combined them into one dataset. The resulting dataset included all the 970 posts and their 6958 associated comments from January 19, 2016 to August 24, 2016. The criteria of the Reddit API suggest that we have retrieved all the posts created during this period. The metadata of each post and comment was also captured. For each post, we recorded the title, author, timestamp, content, shared URL (if applicable), number of comments, and score. For each comment, we recorded its content, author, timestamp, upvote number, and score. A score is calculated based on the number of upvotes and downvotes, moderated by anti-spam algorithms [39]. Links between posts and comments were maintained through a relational key. Within the dataset, we identified 1967 distinct users who had either made a post or a comment; among these people, 610 made at least one post, while 1743 commented at least once. Post and comment volume was roughly consistent from month to month, with a slight rise during the last two months of the dataset, indicating steady or seasonal growth.

4.2 Data Analysis

We first performed a content analysis [35] to locate threads where designers shared their work and solicited critique. Two coders worked on this binary coding process to determine whether a thread was about critique seeking with acceptable inter-rater reliability (Krippendorff's alpha = 0.81). The two coders then discussed to resolve disagreements, resulting in a final set of 94 threads with 864 comments. Among these 94 threads, 4 were special as they were created by the subreddit's moderators inviting all the community members to share portfolio for critique. Different from the remaining 90 threads, these four threads did not focus on one UX designer's one design artifact, but rather captured the requests of many designers as they shared their portfolio for critique. These threads thus had substantively different social dynamics and critique styles compared to the remaining 90 critique-seeking threads, where one designer presented a design artifact (commonly their own work) and requested critique. In addition, these four threads were not necessarily centered on a critique of UX design, but rather a critique of portfolio artifacts. Because of the differing nature of these groups of posts, in this paper, we focus only on analyzing the 90 threads, inclusive of 569 comments (number of comments per thread: avg = 6.32; min = 0; max = 32; std = 5.21). Of these 90 threads, five did not receive any comments.

4.2.1 RQ1: What design artifacts do community members offer for critique? Two coders first read through these 90 threads to obtain an initial impression of the dataset. This initial impression suggested that oftentimes designers did not present their final product for critique, compared to what Xu and Bailey found in the photograph critique community, where participants presented a photo for critique [62]. Rather, they could present a sketchy UX idea and solicit feedback from the community. This resonates with the complexity of UX and the variety of acceptable forms of representation spanning low to high fidelity. This initial understanding inspired us to consider stages of UX design as the most distinct characteristics across all the presented design artifacts. With this initial understanding, we performed open coding to analyze artifacts based on what stage of the design lifecycle they represented. The initial inter-rater reliability was satisfactory (Krippendorff's alpha = 0.75). We then consolidated our codes to develop a codebook [13], using both inductive and deductive approaches, to resolve disagreements and consolidate codes into four stages with distinct characteristics.

[1] https://www.reddit.com/dev/api/

4.2.2 RQ2: How does distributed critique content differ from studio critique? To answer this question, two coders performed a thematic analysis of the 569 comments using Dannels and Martin's typology of critique [16] as an a priori set of codes. Because all the comments were oriented towards assessing a presented design artifact, we were able to assign a code from the typology in an overwhelming majority of cases. However, we did identify one new code not already present in the typology, "phatic communication," to denote occasions where designers expressed agreement or appreciation that was primarily social in nature (e.g., "thank you for the feedback."). It is important to note that a comment might contain multiple statements, each belonging to a different critique genre. In situations such as this, we assigned multiple codes, rather than selecting a dominant one, to the comment. Two coders independently coded all the comments. The inter-rater reliability was acceptable (Krippendorff's alpha=0.65), We discussed all the comments one by one to fully resolve all disagreements. We present descriptive statistics regarding frequencies of forms of critique in the next section.

4.2.3 RQ3: How do discourse practices enable critique and advice-giving? To answer this question, we further considered the dialogic nature of critique practice, where multiple critiques from multiple critics interspersed to collectively generate feedback on a design artifact. We explored how one critique type lead to another in the discourse context. We performed discourse analysis [17] to understand how dialogic critiques took place in the online creative community.

5 FINDINGS

In this section, we first describe designers' expectations when they requested critique. We then introduce our coding of distributed critiques. Finally, we discuss how discourse practices enable critique and advice giving in the online UX community.

5.1 What Design Artifacts are Presented for Critique?

We found that requests for critique were not constrained to only final design artifacts. Rather, critique requests happened across the design lifecycle, from early idea to deployed final work. We identified four stages within which critique requests were distributed: preparation (11 threads, 5.72 comments/thread), ideation (20 threads, 5.75 comments/thread), work in progress (46 threads, 6.13 comments/thread), and final work (13 threads, 8.38 comments/thread). Notably, designers often talked about their self-perceived creative skill while requesting critique.

Preparation denotes the situation where a designer was interested in the UX characteristics of their project, but lacked relevant expertise and skills to move forward. These participants came to the forum to seek general advice and critique on how they should proceed. They asked technical questions such as the following example:

> ***Post title:*** *Do you need separate designs for every Android phone on the market?*
> ***Post content****: Maybe a dumb question, but if i'm making an app for android do I need a different iteration for every android phone on the market? Or is there a way to design responsively? Sorry if dumb question, but I've only done responsive web up till now.*

In this example, the creator wanted to understand basic ideas of design for Android phones. The novice creator admitted their lack of knowledge of UX using language such as "dumb question," as well as an explanation of what they have or have not done in the past. Creators also sought feedback on the process of UX design:

> ***Post title****: When is the 'best' time to update your UX?*
> ***Post content****: I've been building a site myself... would it be best to engage someone now and work with them to help fix the current site AND make suggestions on my new features, or would it be best for me to crack on and finish the first version and then give them free range to change any aspect of the UX design all at once?*

***Critic**: ASAP always, UX is a process not a tick box. It occurs throughout the whole product lifecycle. Get a UX guy now and keep them!*
***Poster**: Thanks. ...I'm utterly incompetent when it comes to designing one myself.*

In this example, the poster asked about the timing and coordination of creative collaboration on the UX of their website. The poster later said that they were "utterly incompetent" in design.

Ideation includes situations where designers sought inspiration for a specific project that was already underway. We found two general types of questions regarding ideation. First, a large portion came from students who wanted to launch a career in UX but lacked the essential knowledge to determine how to start. They thus came to the forum to seek inspiration for a proper project that suited their nascent UX capacity. An example question is: "*I'm currently searching for a topic for my bachelor thesis. What do you guys [think] would be interesting to write about?*" Another type of ideation question came from UX professionals who wanted to resolve a specific problem, and were seeking concrete suggestions or examples of how they might proceed. Here is an example:

***Post title**: Ecommerce Inspiration help :)*
***Post content**: I'm right now doing some minor research on ecommerce homepages with... Examples here are Amazon or Ikea and so on... Maybe you guys have some good examples to inspire me?*

Work in progress refers to instances where UX creators, often professionals working in commercial companies, encountered an issue with a specific feature or element in an in-progress artifact. They visited the forum to seek ideas or advice in order to better understand the problem and find a proper solution. Here is an example:

***Post title**: Why did (ecommerce) registration rate go down at checkout when we tested social login buttons?*
***Post content**: I work for a small ecommerce site and a bit ago we tested social login buttons for account creation... we did a test where we had a "create with Facebook" buttons on the page above that password box... At the end of the test period we saw dramatic increases in the registration rates on our "add to wish list" user flow, but on the confirmation page we saw a big drop off in registration... Why are people clicking the "login" or "create with facebook" on the wish list flow but on the order confirmation page it's making less people register.*

In this example, the UX professional encountered a tricky problem in their work. They asked the community for insights on the possible causes of this problem.

Final work includes instances where creators presented final artifacts to be critiqued. These instances were often created by designers looking for general feedback on the overall user experience of their design. An example is "*Beginner: Can someone give me their opinions about my web design? I want to make it more user friendly.*" The designer shared a link to their website, requesting a UX-focused critique of an existing technical artifact.

5.1.1 Summary. The four stages have distinct characteristics when compared with one another. In the preparation category, all the design presenters exhibited little to no UX knowledge when describing their design context, and sought general recommendations about UX knowledge, tools, or methods from the community. In the ideation category, design presenters exhibited understandings of UX and sought for feedback upon a specific idea. In the work-in-progress category, the design artifacts were incomplete but could benefit from distributed critique. The final work category refers to situations where design artifacts were complete.

5.2 What is the Content of Distributed Critique?

We coded all 569 comments from artifact-focused critique threads into nine "genres" of critique indicated by the Dannels and Martin typology (see Table 1).

Table 1. Categorization of distributed critique, informed by the typology by Dannels and Martin (Combined percentages might be larger than 100% because one comment could contain multiple types of critique, such as judgment + interpretation + brainstorming.).

Type	Sub-types and examples
Judgment 16%	Expressing initial feelings: I love your initial 'Stages, goals and conversion events' image Commenting on one detail: I found the organization of your document confusing Expressing agreement with others: I see. I tend to agree with a lot of /u/jlmainguy's feedback
Process 26%	Listing steps: For my master thesis I tried to find ways to design for positive emotions (confidence, excitement, pride, ...) in mobile apps. I did some interviews, built an app, design workshop to brainstorm ideas, evaluation interviews and so on. Stressing the importance of user testing: But the only way to know for sure is to test it out!
Brainstorming 14%	Design change: Crazy idea: use the scan as a bg and transparent text overtop to allow find, copy etc. Would be a pain to align though. New UX concept: Also NUX... as a term, so you might consider that instead of First Time User Experience.
Interpretation 41%	User-related: Customers can be generally happy with inconsistency across parts of a product. Design-related: It may be selected by an algorithm but it makes the selection seem more meaningful Creator-related: The reason why you can't tell which color to use is because you haven't figured out the correct task to solve.
Direct Rec. 21%	Suggesting specific design: Heat map might work, dark where there are no point, red where the point are tightly packed. Criticizing specific design: Standard UX best practice is to NEVER use a drop down for something with only 2 options.
Investigation 17%	User-related: What do you mean the blind user will have to navigate all the way back to it to check out? Creator-related: OP, Can you give us a little more details? Are you a/the programmer? Design-related: Can you post a pic of the problem scatter plots? Tool-related: Which design/template are you using?
Free Assoc. 4%	Design feature: yeah exactly! They look like nav buttons until u click on them and get confused 😊 Popular product: So, indeed, it does seem like Google is just turning shit on its head for the sake of exploration. Tool: Google material design is almost always in a state of flux and it'll be interesting if this stylistic change sticks.
Comparison 19%	Creative knowledge: I think you might need a [skip link](http://webaim.org/techniques/skipnav). Similar product: MailChimp does an even better job of this on mobile](https://login.mailchimp.com/signup). Creator: A friend of mine worked on a play with a human actor and a robot arm.
Identity Invoking (5%)	Self-disclosure: I am a designer first, a "light" developer after, not a programmer at all but… Sense of relatedness to the community: That's no problem, it's about the practice and the community.
Phatic (4%)	Holy shit! Thanks dude, what a great response!

Table 1 also shows frequencies for each type of distributed critique in the community. While the typology of distributed critique generally resembles that of studio critique, the distribution of each critique type is strikingly different. For example, the largest portion (41%) of distributed critique concerns interpretation, which concerns how critics attempted to make sense of a design artifact. In studio critique [16], interpretation, together with brainstorming, investigation, and process-oriented, were also among the

most frequent categories in upper-level studios. However, the percentage of interpretation (12.4%) was still significantly lower than in distributed critique. Dannels and Martin noted that these four categories indicate a more collaborative relationship between design presenters and critics, and that the design presenter acts as a more active agent and independent thinker [16]. In this regard, our findings about the strong presence of interpretation indicates that the online community supported a more equal, collaborative, and interactive critique environment that allowed design presenters to develop their own thoughts about their design, compared to studios where power disparity between student designers and critics are often present [2]. In addition, in the online community, design presenters and critics were unfamiliar with each other's expertise and knowledge, compared to the relationship between students and teachers in studios. Therefore, design presenters and critics both needed to put more effort in collectively developing a sound interpretation of the presented design.

We further use a bar chart to show the distribution of critiques across the four stages (see Figure 2).

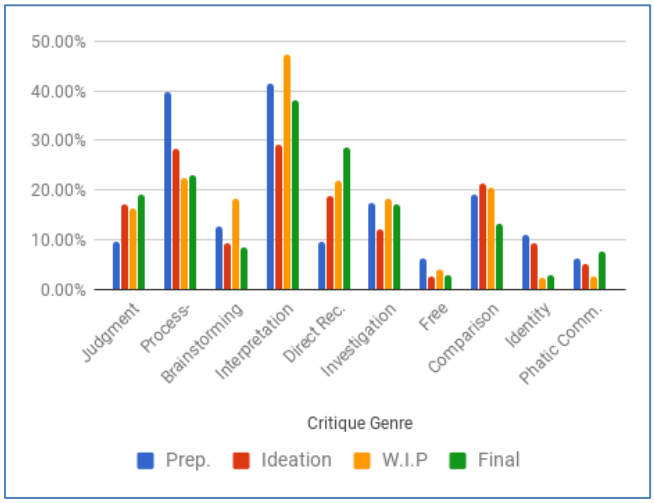

Fig.2. Distribution of Critique Genres across Four Stages.

We combined observation of the bar chart, content analysis of critiques, as well as statistical tests to discuss the relationship between distributed critique and the maturity of the creative work being critiqued. To give a "**judgment**" critique, the critic needed to witness the design idea or artifact. The percentage of judgement was the lowest (9.52%) in preparation, possibly because during this earliest stage, design presenters only showed their design intentions, containing little unique quality that can be assessed. However, in the latter three stages, the percentage of judgment increased over 16%, suggesting that the community found it easier to evaluate a more concrete object, judging its quality and providing targeted advice. The negative correlation between judgment percentage per stage and an expected distribution that assumes an even distribution across all the critique genres supports this observation (Pearson correlation coefficient of r = -0.60). **Process-oriented** critique appeared more often (39.68%) in preparation, and became less frequent (<30%) across the rest three types of expectations, as laypersons and junior UX practitioners often had little UX expertise and sought general feedback on the procedures of conducting UX design. Such distribution of process-oriented is weakly correlated with expectation (r = 0.28). In a similar vein, **direct recommendation** was the lowest (9.52%) in the preparation stage, since critics were unlikely to be able to provide concrete suggestions when design presenters only had a vague idea about their design. Such distribution of process-oriented is weakly correlated with expectation (r = -0.37). **Brainstorming** was most frequent (18.18%) in critique of work in progress, because the presentation of work in progress often

indicates situations where the design presenters encountered specific design issues or challenges. They needed other community members to help brainstorm possible explanations and next steps.

Importantly, **interpretation** was a dominant critique type across all the four categories of critique requests, with 41.27% in preparation, 29.06% in ideation, 47.27% in work-in-progress, and 38.1% in final product. The strong presence of interpretation across all stages indicates that the online community enabled both design presenters and critics to actively interpret the presented work. Both brainstorming and interpretation are strongly correlated with the expected distribution (r = 0.79, r=0.93). **Comparison** dropped to (13.33%) at the stage of final work, possibly because final work is more specific than artifacts at the other three stages, and critics might find more difficult to draw comparison between a more specific artifact with an external concept or artifact (r = 0.06). Percentages of **identity invoking** behavior dropped sharply from above 10% to below 3%. We suggest that this is because the first two types of critique requests (preparation and ideation) were generally raised by student designers and people from non-UX disciplines, such as an Android developer asking for advice on UX improvement. These individuals were peripheral members of the online community, yet the community welcomed them by frequently referring to their shared identity as a UX designer and a shared sense of community, resulting in more identity invoking type of critique. Interestingly, while this type of critique was proposed by Dannels and Martin in the initial typology, the rate of use in this community is double what was documented in a design classroom environment (2.5% in the original study v. 5% in this study). This is likely due to the broad participation evident in this online community, where a more homogenous group would be typical in a design studio course. We do not further discuss the distribution of **investigation**, **free association**, and **phatic communication** because their distributions did not show substantial variance across the four stages.

We performed further analysis of the sequential relationship between different critique types. For each conversation between a creator and a critic, they engaged in a dialogue with each other to produce critiques. Figure 3 shows the distribution of critique across all the replies. The number over each column is the total of all types of critiques at a time of reply. Notably, the majority of replies took place in the first five times (546 out of the 560, or 97.5%).

We found that the total amount of critiques given by critics decreased from the first time to the ninth time. The majority of critiques (n=474) took place during the first reply where a critic replied to a post. This is different from studio critique where conversations between students, or between students and instructors, are generally long in duration and could contain tens of replies [23]. This is possibly due to the nature of asynchronous communication on online platforms, where people are less likely to follow up on a conversation.

As Figure 3 shows, all types of critiques dropped sharply in the first few times of replies. However, the point where the frequency began to drop differed across different types. Keep in mind that the first reply usually came from a critic while the second was generally the response from the design presenter. Several types of critiques dropped much more sharply than halving immediately after the first reply, including process-oriented (82→30), brainstorming (50→12), direct recommendation (80→14), free association (13→4), and comparison (66→18). We suggest that this is possibly because these critiques represented either statements from creators who were more senior and provided rich advice, or opinions that critics directly derived from their first impression. The creators themselves were less likely to make these types of critique in relation to their own artifacts. Judgment only started to drop after the second turn, indicating that the design presenter might make judgments towards their design immediately after reading the first critique. Phatic communication only appeared in the second turn, which was reasonable as the design presenter expressed appreciation to the first critic.

Interestingly, interpretation and investigation had the most occurrences during these early replies. Both the design presenters and the critics frequently inquired about and communicated their own understandings of the design artifact. This suggests that even the presenter may not fully understand all aspects of their artifact when presenting it. Rather, the presenter and critics engaged in collective sense-making [61] to develop new or more complete understandings of the design artifact being critiqued.

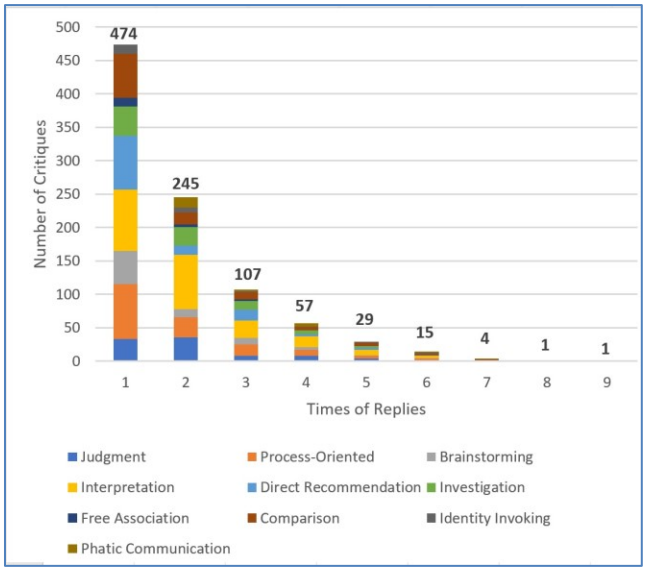

Fig. 3. Distribution of critiques by type and replies.

5.3 How Did Discourse Practices Enable Critique?

In this subsection, we further describe how dialogic critique took place in the community. Our discourse analysis of all critique conversations suggested that, in each conversation, a creator and a critic took turns to speak, and each interlocutor spoke to address the last statement or question raised by previous interlocutors. We posit that it is meaningful to examine how one type of critique from one person invoked another type of critique from another person. Why is distributed critique in this community focused so much on interpretation? We explored the discourse practices using two examples that cover the most frequent patterns of critique development (investigation → interpretation, interpretation → interpretation, direct recommendation → interpretation, and process-oriented → interpretation).

5.3.1 Example 1: Investigation -> Interpretation -> Interpretation. This example contains a conversation between one creator and one critic. The critique dialogue spanned three turns to investigate the creative work in question.

> ***Post title**: How to accommodate e-commerce for blind users? Specifically the checkout button...*
> ***Post content**: I'm facing a design challenge right now – the checkout button on a site is a shopping cart icon located in the header. A user that is using a screen reader would have to navigate all the way back to it – in order to checkout. Aside from putting checkout buttons everywhere (which cannibalize the shopping cart icon in the header, and also just comes across as tacky/pushy) how can we ensure blind users have a quick path to checkout? Any ideas or resources would be appreciated!*
> ***Critic**: What do you mean the blind user will have to navigate all the way back to it to check out?*
> ***Poster**: Since the checkout icon is in the header – and the item they've added is in the body, theyd have to navigate (using an audio interface) back to the header, in order to locate the checkout button - which is actually inside an overlay/fly out/drawer - that opens when you select the shopping cart icon (think amazon).*

> ***Critic**: Do users check out from a list view (i.e. Add a bunch of items at once, and check out) Or from a product page (I.e. Add one item at a time)? I imagine it's the latter. Why can't you have a "proceed to checkout" button on the product pages?*

In this example, the creator described a challenge they faced in designing the checkout button on an e-commerce website. Clearly, the critic found that the creator did not give sufficient information about the work, and used user-related *investigation* to seek more information from the creator. The question pushed the creator to perform more *interpretation* of their design goal, detailing the steps that a user would take to locate the checkout button. Such *interpretation* propelled the critic to perform more *interpretation* of the interface where users checked out on. The utterance, "I imagine it's the latter," indicates that such *interpretation* allowed the critic to finally understand the problem the creator attempted to solve. The critic then proceeded to give a design suggestion.

5.3.2 Example 2: Interpretation + Direct Recommendation + Process-oriented -> Interpretation. The conversation took place between a creator and a critic. They used various types of critique to exchange information and ideas about users' reading patterns.

> ***Post title**:* Get users to read | signup form @ physical location
> ***Post content**: Hey! We run a VR lounge in Vienna. So basically a bar where you can use virtual reality equipment…. This is displayed on two giant tablets at a part of the bar… when the signup button is pressed, this screen appears… the problems: - people dont figure out that they have to scroll (the fold is somewhere in the warning text, so its obvious that it continues)…*
> *I mean, I though it was quite simple and with short easy to understand descriptions... Your take on this? Plz halp.*
> ***Critic**: A couple of things:*
> ** As /u/vcarl said, people don't read. So you'll need to...*
> ** Put things in steps. Make them each exactly one screen tall and one screen wide.*
> ** We have a term we use, among coding friends: "whack-a-mole buttons". Make buttons so big, you could use a rubber mallet on the touch-screen, and it'd be accurate enough to actuate the button.*
> ** If at all possible, don't make them log in after they sign up. Many use cases will require a log-in action, but if at all possible, try to do away with the create account -> validate account -> log into the account I just created and validated loop. That last step is just silly and extraneous.*
> *Would love to be able to head to Vienna to see it in person.*
> ***Poster**: thank you for your reply. * My first version was based on steps, which resulted in four individual screens with giant "NEXT" buttons. But somehow people didnt know what to do… * I dont know if it is visible in the screenshot, but the smallest button (mr/mrs) is as big as the thumb * I dont think I understand what you mean. After "create account" the user is done. What do you mean with validate and log in? Jeah, come visit if you can :)*

In this example, the creator described a specific difficulty with users. The critic employed a variety of critique types to help the poster. The critic used *interpretation* to explain people's common behavior (i.e., "they don't read"), *direct recommendation* to suggest the appropriate size of the tablets, and *process-oriented* critique to highlight the processes that users might take to use the artifact. The creator thanked the critic, and also responded with their own *interpretation* of their design thoughts. The creator additionally employed *investigation* to get more information from the critic.

It is also notable that the critic and the poster both ended their comment with a friendly tone. Such an ending note was common in many of the creator-critic conversations.

6 DISCUSSION

We have reported a study of distributed critique in an online creative community. From our analysis, it appears that the community is open to creators with diverse backgrounds and expertise, with responses to critique requests at all stages of the design lifecycle. Creators seemed rather unconstrained in admitting their inexperience and sought feedback in a variety of ways. This creative community on Reddit is quite different from some other online creative communities, such as Dribbble where graphic designers once considered the Dribbble membership a demonstration of their high-level professional skill [42], and thus valued the exclusion of novice designers or otherwise constrained participation.

We found both commonalities and differences between distributed critique and studio critique. We showed that the typology of critique in this online creative community *could* resemble that of studio critique, building a conversation between research on distributed critique enabled by digital technologies and extensive scholarship on studio critique in face-to-face settings. However, distributed critique also differs from studio critique qualitatively. In distributed critique [16], the critic often already had a good understanding of the creator's background, expertise, and design and could quickly move to brainstorming and process-oriented genres, which Dannels and Martin considered higher-level, higher-quality forms of critique. However, we have shown from multiple angles how interpretation became the dominant genre of distributed critique in the community. Another difference between studio critique and distributed critique is the limited contextual information that creators provided when seeking critique, such as what the artifact was meant to achieve and the targeted users. Often, creators later provided such information to amend critics' interpretation, as the two examples in the third finding section shows. This lack of context is different from many design studios, where students and critics would likely already share an understanding of the design task.

Unlike critique-focused online creative communities or crowd feedback platforms [41,62] that tend to structure critique requests and the provision of feedback, this community was not explicitly designed for critique, and people raised critique requests in free-form ways that were not highly differentiated from other types of discussions. A UX designer could write a simple sentence about their goal to improve the UX of a product, and thereby solicit feedback. They could also use many texts and links to their product websites to give as much information as possible as a means of seeking expert critique. Reddit's interface thus supported various forms of critique requests that would be difficult to accommodate in a crowd feedback system. In addition, the subreddit community included both non-expert UX practitioners as well as senior UX designers that claimed decades of experiences in the industry. The latter's feedback drew from their high expertise and deep understanding of the field, which a crowd feedback system would be unlikely to provide. Given the diversity of design disciplines, we argue that distributed critique in their relevant creative communities will remain a popular form of critique worthy of investigation.

Newcomers to the community might be inexperienced in efficiently seeking help. If a design presenter provided insufficient information, the critics needed to dialogue with the creator to unearth more information to contextualize the original post. Without knowing much about the creator's expertise, background, and design, the critics substantively engaged in making sense of the creative work, as well as the creator themself. In the meantime, design presenters did not passively receive critique from critics. They needed to exert creativity and agency in distributed critique too, by asking critics questions, interpreting critics' opinions, and developing deeper understandings of their own design. Therefore, interpretation and sensemaking were core activities for both design presenters and critics.

Drawing from organizational studies, Karl Weick defined sensemaking as "placement of items into frameworks, comprehending, redressing surprise, constructing meaning, interacting in pursuit of mutual understanding, and patterning" [61]. The perspective of collective sensemaking is highly relevant here to understanding the nature of distributed critique. Interpretation is the behavior that critics used to work through all the available information about the design artifact and its meaning, and develop their own interpretation. Investigation is a direct form of information seeking and often led to further interpretation. Through multiple rounds of social interactions, design presenters and critics accumulated information about the presented design and established mutual understanding of the design. Different from previous work's focus on providing "good feedback," our study draws from the lens of collective sensemaking to show that

distributed critique is a social process through which design presenters and critics worked together to develop feedback and possible solutions.

6.1 Distributed Critique as Dialogue

Previous work on critique in online spaces has frequently examined critique practices as a one-time effort where a presenter offered a design artifact for evaluation and critics gave feedback on it [41], stressing the role disparity between design presenters and critics. While this structure is relevant for certain types of evaluation, it is substantively different from the socially-intertwined critique common in physical studio environments, and fails to account for social motivations for critique involvement in online communities. Our study suggests that designers who offered their work for evaluation in the community did not merely passively receive feedback from critics, nor did they only use phatic communication that conveyed little meaning and added little new content to the conversation. Instead, critique instigators also utilized all the types of critique such as asking critics questions, judging the quality of and interpreting their artifacts for others, brainstorming alternative scenarios, comparing the artifacts to other existing products and concepts, and invoking their identity as a member of the creative community. A conversation was able to be sustained because both sides not only contributed new content, but also showed passion and engagement for the topic.

Each critique statement did not exist in isolation, but was rather highly contextual, building on a developing and mutual understanding between design presenters and critics, as well as their collectively formed interpretation of the artifact throughout the thread. For instance, a critique occurring at the ninth reply within a thread would make little sense as the first reply. A critique statement was based on not only the design artifact presented in the initial thread, but also all of the preceding critiques.

We stress the importance of viewing distributed critique as developing dialogue in which design presenters and critics have an equal role in making sense of a design artifact. In this view, a design artifact can be as abstract and vague as a preliminary intention of improving the UX of a product, or as concrete as the completed interface for a mobile application. As dialogues developed, the design artifact could change as well. For example, if the design presenter began with by thinking of a new product feature, this thought might be refined or even replaced with an entirely new idea. By viewing distributed critique as a socially-situated dialogue, we are able to see the dynamic, evolving nature of designerly conversations.

6.2 Distributed Critique as Social Learning

We also observed distributed critique as a site of social learning, where creative knowledge was shared about the specific design artifact. For example, designers shared new UX concepts and tools (e.g., “Look up lean startup machine. Companies want to see validation and research somewhere, the methods used in lean are worth checking out.”), pointed to important books (e.g., “If you don't know the UX process and methodology yet, I highly recommend reading the following books”), and cited widely accepted design principles (e.g., “You are violating the UX principle of utility”). This finding resonates with prior research in other disciplinary contexts that suggests that oral communication activities are not simply performative, but actually intimately connected to disciplinary knowledge construction and the sustainment of expertise [15].

In the field of UX where there is a gap between research and practice [22,25,53] and there is an acknowledged lack of a coherent body of disciplinary knowledge [59], designers appear to rely heavily on interactions with other designers to learn new concepts and concretize others [26]. Online communities aid the formation of communities of practice where UX designers, both junior and senior, engage in design practices. We observed that distributed critique is one such critical practice through which rich UX knowledge is shared and learned by designers. However, more research is needed to understand how these communities of practices form and function in sustaining disciplinary knowledge and professional identity.

6.3 Designing Socio-technical Systems to Support Distributed Critique

We studied an online community that was not explicitly designed for online critique, but yet distributed critique naturally emerged as an important and valued practice. Hence, our findings are different from previous studies of online critique practices that were artifact-bound or largely transactional in nature. Perhaps

paradoxically, the critique practices that emerged in this online subreddit community exhibited more similarity with physical critique environments than other systems that had been purpose-built to support specific types of critique practices (e.g., evaluation of final artifacts) [41,63]. While these purposely-built systems address critique in a highly structured, evaluative framing, what is often lost is the socializing and dialogic characteristics of critique which appear to be the essence of design communication. This tension highlights the importance of deeply understanding collocated practices, ensuring that systems are built not only with outcomes in mind, but also the space for situated social practices that foster these outcomes and reflect the richness of collocated interactions.

The social dimension of interaction has been long considered as an important motivator to online participation [37,38]. In this study, we found that two types of critique, namely identity invoking and phatic communication, supported identity construction and expression of gratitude that are potentially helpful for the formation of social bonding between design presenters and critics. In contrast, the classic crowdsourcing approach relied upon in previous work, while likely relevant for certain use cases such as visual design, has been criticized for instrumentalizing crowd workers and rendering their work invisible [32]. To account for such critical perspectives of online activity, we point to the importance of prioritizing the construction and sustainment of social interactions in creative communities, and understanding not only the technical mechanisms that encourage quality outputs to occur, but also the sociality that enables such interactions to be broached and sustained.

In keeping with the previous research that has noted the weaknesses of online communities focused on critique that do not account for social dimensions of use (e.g., Conanan and Pinkard's identification of rigid dialogue structure [11]), we call for more attention to the dialogic nature of distributed critique, creating more opportunities for interlocutors to engage in deep conversations that have relevance to the development of design artifacts, while also enabling the consolidation of disciplinary knowledge.

7 CONCLUSION

In this paper, we have described an exploratory study of distributed critique in a vibrant online creative community using a mixed-methods approach. We have revealed the complex interplay between presented design artifacts and the community's response. We identified both commonalities and differences between studio critique and distributed critique. We discuss how these critique practices illustrate the value of collective sense-making and social learning, and provide deeper understanding of how socio-technical systems may better support distributed critique. Using a mixed-methods approach, the study contributes to a fuller theorization of distributed critique in online design communities, while also deepening our understanding of the complexity of online creative practice.

ACKNOWLEDGMENTS

We are grateful to the anonymous reviewers for their insightful and valuable feedback.

REFERENCES

[1] Alexa. 2017. How popular is reddit.com? *Alexa*. Retrieved from http://www.alexa.com/siteinfo/reddit.com

[2] Kathryn H. Anthony. 1991. *Design juries on trial: the renaissance of the design studio*. Van Nostrand Reinhold.

[3] Jeffrey Bardzell, Shaowen Bardzell, and Austin Toombs. 2014. "now that's definitely a proper hack": self-made tools in hackerspaces. In *Proceedings of the 32nd annual ACM conference on Human factors in computing systems - CHI '14*, 473–476. DOI:https://doi.org/10.1145/2556288.2557221

[4] Terry Barrett. 1988. A Comparison of The Goals of Studio Professors Conducting Critiques and Art Education Goals for Teaching Criticism. *Stud. Art Educ.* 30, 1 (1988), 22–27. DOI:https://doi.org/10.2307/1320648

[5] Victoria Bellotti and Sara Bly. 1996. Walking away from the desktop computer: distributed collaboration and mobility in a product design team. In *Proceedings of the 1996 ACM conference on Computer supported cooperative work - CSCW '96*, 209–218. DOI:https://doi.org/10.1145/240080.240256

[6] Bernadette Blair. 2006. Perception interpretation impact;an examination of the learning value of formative feedback to students through the design studio critique. University of London.

[7] Elizabeth Boling and Kennon M. Smith. 2010. Intensive studio experience in a non-studio masters program: Student activities and thinking across levels of design. In *Design Research Society International Conference*.

[8] Erin Bradner and Gloria Mark. 2002. Why distance matters: effects on cooperation, persuasion and deception. In (CSCW '02), 226–235. DOI:https://doi.org/10.1145/587078.587110

[9] John Seely Brown. 2002. The Social Life of Learning: How Can Continuing Education Be Reconfigured in the Future? *Contin. High. Educ. Rev.* 66, (2002), 50–69.

[10] Thomas Cochrane and Laurent Antonczak. 2015. Developing Students' Professional Digital Identity. *Int. Assoc. Dev. Inf. Soc.* (2015).

[11] Denise Conanan and Nichole Pinkard. 2001. Students' Perceptions of Giving and Receiving Design Critiques in an Online Learning Environment. In *Euro-CSCL*.

[12] Eric Cook, Stephanie D. Teasley, and Mark S. Ackerman. 2009. Contribution, commercialization & audience: understanding participation in an online creative community. In *Proceedings of the ACM 2009 international conference on Supporting group work - GROUP '09*, 41–50. DOI:https://doi.org/10.1145/1531674.1531681

[13] Juliet Corbin and Anselm Strauss. 2007. *Basics of Qualitative Research: Techniques and Procedures for Developing Grounded Theory*. SAGE Publications.

[14] Dana Cuff. 1992. *Architecture: the story of practice*. MIT Press.

[15] Deanna Dannels, Amy Gaffney, and Kelly Martin. 2008. Beyond Content, Deeper than Delivery: What Critique Feedback Reveals about Communication Expectations in Design Education. *Int. J. Scholarsh. Teach. Learn.* 2, 2 (January 2008). DOI:https://doi.org/10.20429/ijsotl.2008.020212

[16] Deanna P. Dannels and Kelly Norris Martin. 2008. Critiquing critiques: a genre analysis of feedback across novice to expert design studios. *J. Bus. Tech. Commun.* 22, 2 (2008), 135–159.

[17] Teun A. van Dijk. 1993. Principles of Critical Discourse Analysis. *Discourse Soc.* 4, 2 (April 1993), 249–283. DOI:https://doi.org/10.1177/0957926593004002006

[18] Matthew W. Easterday, Daniel Rees Lewis, Colin Fitzpatrick, and Elizabeth M. Gerber. 2014. Computer supported novice group critique. In *Proceedings of the 2014 conference on Designing interactive systems - DIS '14*, 405–414. DOI:https://doi.org/10.1145/2598510.2600889

[19] Mukaddes Fasli and Badiossadat Hassanpour. 2016. Rotational critique system as a method of culture change in an architecture design studio: urban design studio as case study. *Innov. Educ. Teach. Int.* (April 2016), 1–12. DOI:https://doi.org/10.1080/14703297.2016.1174142

[20] Casey Fiesler and Amy S. Bruckman. 2014. Remixers' understandings of fair use online. In *Proceedings of the 17th ACM conference on Computer supported cooperative work & social computing - CSCW '14*, 1023–1032. DOI:https://doi.org/10.1145/2531602.2531695

[21] Gerhard Fischer, Kumiyo Nakakoji, Jonathan Ostwald, Gerry Stahl, and Tamara Sumner. 1993. Embedding critics in design environments. *Knowl. Eng. Rev.* 8, 4 (December 1993), 285–307. DOI:https://doi.org/10.1017/S026988890000031X

[22] Elizabeth Goodman, Erik Stolterman, and Ron Wakkary. 2011. Understanding interaction design practices. In *Proceedings of the 2011 annual conference on Human factors in computing systems - CHI '11*, 1061–1070. DOI:https://doi.org/10.1145/1978942.1979100

[23] Colin Gray. 2013. Discursive Structures of Informal Critique in an HCI Design Studio. In *Nordic Design Research Conference*.

[24] Colin M. Gray and Craig D. Howard. 2014. Designerly Talk in Non-Pedagogical Social Spaces. *J. Learn. Des.* 7, 1 (March 2014), 40–58. DOI:https://doi.org/10.5204/jld.v7i1.153

[25] Colin M. Gray, Erik Stolterman, and Martin A. Siegel. 2014. Reprioritizing the relationship between HCI research and practice: bubble-up and trickle-down. In *Proceedings of the 2014 conference on Designing interactive systems - DIS '14*, 725–734. DOI:https://doi.org/10.1145/2598510.2598595

[26] Colin M. Gray, Austin L. Toombs, and Shad Gross. 2015. Flow of Competence in UX Design Practice. In *Proceedings of the 33rd Annual ACM Conference on Human Factors in Computing Systems - CHI '15*, 3285–3294. DOI:https://doi.org/10.1145/2702123.2702579

[27] Michael D. Greenberg, Matthew W. Easterday, and Elizabeth M. Gerber. 2015. Critiki: A Scaffolded Approach to Gathering Design Feedback from Paid Crowdworkers. In *Proceedings of the 2015 ACM SIGCHI Conference on Creativity and Cognition - C&C '15*, 235–244. DOI:https://doi.org/10.1145/2757226.2757249

[28] Marc Hassenzahl and Noam Tractinsky. 2006. User experience - a research agenda. *Behav. Inf. Technol.* 25, 2 (March 2006), 91–97. DOI:https://doi.org/10.1080/01449290500330331

[29] Christian Heath and Paul Luff. 1991. Collaborative activity and technological design: task coordination in London underground control rooms. In *ECSCW'91 Proceedings of the second conference on European Conference on Computer-Supported Cooperative Work*, 65–80. Retrieved March 12, 2015 from http://dl.acm.org/citation.cfm?id=1241910.1241915

[30] Jack Hessel, Chenhao Tan, and Lillian Lee. 2016. Science, AskScience, and BadScience: On the Coexistence of Highly Related Communities. In *ICWSM*. Retrieved April 22, 2017 from http://arxiv.org/abs/1612.07487

[31] Brad Hokanson. 2012. The Design Critique as a Model for Distributed Learning. In *The next generation of distance education: Unconstrained learning*. 71–83.

[32] Lilly C. Irani and M. Six Silberman. 2013. Turkopticon: Interrupting Worker Invisibility in Amazon Mechanical Turk. In *Proceedings of the SIGCHI Conference on Human Factors in Computing Systems* (CHI '13), 611–620. DOI:https://doi.org/10.1145/2470654.2470742

[33] Evangelos Karapanos, John Zimmerman, Jodi Forlizzi, and Jean-Bernard Martens. 2009. User experience over time: an initial framework. In *Proceedings of the 27th international conference on Human factors in computing systems - CHI 09*, 729–738. DOI:https://doi.org/10.1145/1518701.1518814

[34] Sara Kiesler and Cummings Jonathon. 2002. What Do We Know about Proximity and Distance in Work Groups? A Legacy of Research. In *Distributed Work*, Pamela Hinds and Sara Kiesler (eds.). The MIT Press.

[35] Klaus Krippendorff. 1980. *Content analysis: an introduction to its methodology*. Retrieved June 22, 2017 from https://books.google.com/books?id=q657o3M3C8cC&dq=Content+Analysis:+An+Introduction+to+Its+++++Methodology&lr=&source=gbs_navlinks_s

[36] Carine Lallemand, Guillaume Gronier, and Vincent Koenig. 2015. User experience: A concept without consensus? Exploring practitioners' perspectives through an international survey. *Comput. Human Behav.* 43, (2015), 35–48.

[37] Cliff Lampe and Erik Johnston. 2005. Follow the (slash) dot: effects of feedback on new members in an online community. In *Proceedings of the 2005 international ACM SIGGROUP conference on Supporting group work - GROUP '05*, 11–20. DOI:https://doi.org/10.1145/1099203.1099206

[38] Cliff Lampe, Rick Wash, Alcides Velasquez, and Elif Ozkaya. 2010. Motivations to participate in online communities. In *Proceedings of the 28th international conference on Human factors in computing systems - CHI '10*, 1927–1936. DOI:https://doi.org/10.1145/1753326.1753616

[39] Alexander C. Leavitt. 2016. Upvoting the news: breaking news aggregation, crowd collaboration, and algorithm-driven attention on reddit.com. University of Southern California.

[40] Kurt Luther, Casey Fiesler, and Amy Bruckman. 2013. Redistributing leadership in online creative collaboration. In *Proceedings of the 2013 conference on Computer supported cooperative work - CSCW '13*, 1007–1022. DOI:https://doi.org/10.1145/2441776.2441891

[41] Kurt Luther, Jari-Lee Tolentino, Wei Wu, Amy Pavel, Brian P. Bailey, Maneesh Agrawala, Björn Hartmann, and Steven P. Dow. 2015. Structuring, Aggregating, and Evaluating Crowdsourced Design Critique. In *Proceedings of the 18th ACM Conference on Computer Supported Cooperative Work & Social Computing - CSCW '15*, 473–485. DOI:https://doi.org/10.1145/2675133.2675283

[42] Jennifer Marlow and Laura Dabbish. 2014. From rookie to all-star: professional development in a graphic design social networking site. In *Proceedings of the 17th ACM conference on Computer supported cooperative work & social computing - CSCW '14*, 922–933. DOI:https://doi.org/10.1145/2531602.2531651

[43] Richard A. Mills and Richard A. 2015. Reddit.com: A census of subreddits. In *Proceedings of the ACM Web Science Conference on ZZZ - WebSci '15*, 1–2. DOI:https://doi.org/10.1145/2786451.2786491

[44] Yeonjoo Oh, Suguru Ishizaki, Mark D. Gross, and Ellen Yi-Luen Do. 2013. A theoretical framework of design critiquing in architecture studios. *Des. Stud.* 34, 3 (2013), 302–325. DOI:https://doi.org/10.1016/j.destud.2012.08.004

[45] Gary Olson and Judith Olson. 2000. Distance Matters. *Human-Computer Interact.* 15, 2 (September 2000), 139–178. DOI:https://doi.org/10.1207/S15327051HCI1523_4

[46] Tyler Pace, Jeffrey Bardzell, and Shaowen Bardzell. 2011. Collective creativity: the emergence of World of Warcraft machinima. *Proceedings of the 25th BCS Conference on Human-Computer Interaction*, 378–384. Retrieved March 30, 2017 from http://dl.acm.org/citation.cfm?id=2305380

[47] Tyler Pace, Katie O'Donnell, Natalie DeWitt, Shaowen Bardzell, and Jeffrey Bardzell. 2013. From organizational to community creativity: paragon leadership & creativity stories at etsy. In *Proceedings of the 2013 conference on Computer supported cooperative work - CSCW '13*, 1023–1034. DOI:https://doi.org/10.1145/2441776.2441892

[48] Joseph Reagle. 2014. Revenge Rating and Tweak Critique at Photo.net. In *Online Evaluation of Creativity and the Arts*, Hiesun Cecilia Suhr (ed.). Routledge.

[49] Reddit. 2017. New subreddits by date. *redditmetrics*. Retrieved from http://redditmetrics.com/history

[50] Daniel Rees Lewis, Emily Harburg, Elizabeth Gerber, and Matthew Easterday. 2015. Building Support Tools to Connect Novice Designers with Professional Coaches. In *Proceedings of the 2015 ACM SIGCHI Conference on Creativity and Cognition - C&C '15*, 43–52. DOI:https://doi.org/10.1145/2757226.2757248

[51] Ken Reily, Pam Ludford Finnerty, and Loren Terveen. 2009. Two peers are better than one: aggregating peer reviews for computing assignments is surprisingly accurate. In *Proceedinfs of the ACM 2009 international conference on Supporting group work - GROUP '09*, 115–124. DOI:https://doi.org/10.1145/1531674.1531692

[52] Howard Risatti. 1987. Art Criticism in Discipline-Based Art Education. *J. Aesthetic Educ.* 21, 2 (1987), 217–225. DOI:https://doi.org/10.2307/3332751

[53] Yvonne Rogers. 2005. New theoretical approaches for human-computer interaction. *Annu. Rev. Inf. Sci. Technol.* 38, 1 (September 2005), 87–143. DOI:https://doi.org/10.1002/aris.1440380103

[54] Ricarose Roque, Natalie Rusk, and Amos Blanton. 2013. Youth Roles and Leadership in an Online Creative Community. In *Computer Supported Collaborative Learning Conference Proceedings*.

[55] John W. Saye and Thomas Brush. 2002. Scaffolding critical reasoning about history and social issues in multimedia-supported learning environments. *Educ. Technol. Res. Dev.* 50, 3 (September 2002), 77–96. DOI:https://doi.org/10.1007/BF02505026

[56] Donald A. Schön. 1985. *The design studio: an exploration of its traditions and potentials*. RIBA Publications for RIBA Building Industry Trust.

[57] Leslie D. Setlock, Susan R. Fussell, and Christine Neuwirth. 2004. Taking it out of context: collaborating within and across cultures in face-to-face settings and via instant messaging. In *Proceedings of the 2004 ACM conference on Computer supported cooperative work - CSCW '04*, 604–613. DOI:https://doi.org/10.1145/1031607.1031712

[58] Lee S. Shulman. 2005. Signature Pedagogies in the Professions. *Daedaluus* 134, 3 (2005), 52–59. Retrieved December 29, 2016 from https://www.jstor.org/stable/20027998?seq=1#page_scan_tab_contents

[59] Erik Stolterman. 2008. The Nature of Design Practice and Implications for Interaction Design Research. *Int. J. Des.* 2, 1 (2008), 55–65.

[60] Dhaval Vyas, Gerrit van der Veer, and Anton Nijholt. 2013. Creative practices in the design studio culture: collaboration and communication. *Cogn. Technol. Work* 15, 4 (November 2013), 415–443. DOI:https://doi.org/10.1007/s10111-012-0232-9

[61] Karl E. Weick. 1995. *Sensemaking in organizations*. Sage Publications. Retrieved April 6, 2017 from https://books.google.com/books?id=nz1RT-xskeoC&dq=weick+sensemaking&lr=&source=gbs_navlinks_s

[62] Anbang Xu and Brian Bailey. 2012. What do you think?: a case study of benefit, expectation, and interaction in a large online critique community. In *Proceedings of the ACM 2012 conference on Computer Supported Cooperative Work - CSCW '12*, 295–304. DOI:https://doi.org/10.1145/2145204.2145252

[63] Anbang Xu, Shih-Wen Huang, and Brian Bailey. 2014. Voyant: Generating Structured Feedback on Visual Designs Using a Crowd of Non-experts. In *Proceedings of the 17th ACM conference on Computer supported cooperative work & social computing* (CSCW '14), 1433–1444. DOI:https://doi.org/10.1145/2531602.2531604

[64] Anbang Xu, Huaming Rao, Steven P. Dow, and Brian P. Bailey. 2015. A Classroom Study of Using Crowd Feedback in the Iterative Design Process. In *Proceedings of the 18th ACM Conference on Computer Supported Cooperative Work & Social Computing - CSCW '15*, 1637–1648. DOI:https://doi.org/10.1145/2675133.2675140

Received April 2017; revised July 2017; accepted November 2017