Preserving the Margins: Supporting Creativity and Resistance on Digital Participatory Platforms

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Online participatory platforms like Wikipedia and Zooniverse are designed to welcome contributions from anyone, however, to contend with a high volume of contributions, a range of constraints are deployed that align opportunities for participation toward ends defined by the experts and leaders of such platforms. In this paper I draw on extensive ethnographic work to describe how users encounter and negotiate opportunities for participation on two participatory platforms. I demonstrate how platforms can exhibit distinct spaces and opportunities for participation, in some cases heavily enforcing standards of practice defined by experts and leaders, while also leaving room for emergent and even divergent and deviant behavior. In describing this tension between conditions of normative and deviant participation, I highlight the importance of supporting opportunities for deviant and emergent participation to occur, emphasizing that design that uniquely supports narrow modes of participation can prevent opportunities for more inclusionary practice and evolving objectives.

CCS Concepts: • *Human-centered computing~Computer supported cooperative work*

KEYWORDS

Peer Production; Crowdsourcing; Participation; Design; Inclusion; Agency

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1 INTRODUCTION

Online participatory platforms like Wikipedia and Zooniverse are designed to welcome contributions from anyone. However, through intentional sociotechnical designs the experience of learning and contribution by participants is constrained and enabled towards various ends defined by the experts and leaders of such platforms. As a growing number of scholars suggest, participation on open digital platforms is not a universal concept. Instead, scholars recognize that the conditions of participation vary across different contexts [4, 30, 31]. Scholars exploring the question of participation in contexts ranging from the Occupy movement to Wikipedia suggest that the perception of openness in volunteer movements belies the need for and real presence of distinct boundaries, suggesting that openness is not a laissez-faire phenomenon but is instead a very deliberate production [44, 48].

As I argue in this paper, varying textures of participation can be observed by contrasting the center and margins of digital participatory platforms, with each position defining varying degrees of sociotechnical constraints on the agency of a contributor. The center, I will propose, provides a limited range of options for participation that align with key objectives of the platform while the margins afford greater degrees of freedom, allowing emergent and potentially deviant contributions to occur.

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In describing this tension between conditions for normative and deviant participation, I contribute to a growing literature that explores the varying conditions of digital participation. By focusing on these different opportunities for participation, I explore the ways in which digital platforms preserve opportunities for marginal practice by creating spaces and opportunities where norms and standards are not actively enforced, where divergent and creative practice can be performed, which in turn challenges and expands on the original intentions and objectives for participation. As I will point out, the argument for attending to opportunities for marginal practice is not meant to oppose or critique the presence of tightly constrained modes of participation; Rather, marginal practice offers a counter-balance, ensuring that fixed and enforced modes of participation do not crowd out new, unforeseen, and overlooked possibilities of participation.

2 ~~OPEN~~ OPPORTUNITIES TO PARTICIPATE

The late-2000's saw the height of excitement around the idea of participatory culture, a concept that highlights the blurring dichotomy between producers and consumers of knowledge and culture [5, 28, 29, 35]. At the heart of this excitement was the explosion of web 2.0 technologies that dramatically reduced the cost of publishing and distributing content to nearly zero [5, 43]. Examples like Wikipedia and YouTube sparked the imagination of scholars who were fascinated by the idea that anyone with an internet connection could contribute to the definition of encyclopedic knowledge or distribute their latest attempt at becoming a famous Hollywood director.

All of these examples were framed as contributing to a shift in power away from the traditional gatekeepers that controlled what information and cultural content the public consumed. The institutions that once held a monopoly on the production, curation, and editing of cultural content and scientific knowledge now had to contend with everyone else who had access to the internet [49]. In bypassing the traditional publication infrastructure, people could also bypass the credentials needed to participate in the production of knowledge and culture. People are no longer required to possess degrees or certifications from educational institutions to participate in aspects of scientific research, the development of software, or the writing of encyclopedic articles. The phenomenon of low barriers to participation reflected changes in the social barriers to participation as much as the shifts in technical barriers that people once faced.

Despite the excitement about the low barriers of participatory platforms, the past several years have seen a growth in research that pits the rhetoric of openness against its reality, reassessing what openness and participation means in the context of participatory platforms. For example, Kelty and Erickson [31] find that, while many platforms may place a high value on participation rhetorically, it is not structurally guaranteed, as some platforms offer opportunities to shape the direction of the project while others constrain participation to the boundaries defined by the platform leaders and experts. In the context of social media platforms like Facebook and YouTube, new media scholars like Tarleton Gillespie have examined this endeavor in the way the platforms intervene in the experience of the user [19]. Scrutinizing the rhetoric of open participation, Gillespie notes that all platforms have edges that encourage participation but also define the conditions under which this takes place. Such conditions are "practical, technical, economic and legal, and they stray far from the hands-off neutrality suggested by the 'platform' rhetoric" [19]P. 358.

The rhetoric of openness has also been scrutinized by drawing sharp distinctions between peer production and crowdsourced models of digital participation, most noticeably in the context of CSCW. Whereas peer production projects reflect a form of participatory production in which volunteers contribute both to the production of the product and the social and technical means of production (e.g., Wikipedia or Linux), the crowdsourcing model is defined by a top-down approach to task coordination whereby the tasks are predetermined by a small group of experts and the volunteers are engaged in work that does not require any collaboration [6, 14]. Despite their distinction from crowdsourcing platforms, peer production platforms like Wikipedia and free and open source software projects like Linux have gone down the inevitable path of evolving from bottom-up nonhierarchical models of organization to more routinized, hierarchical, and bureaucratized models of coordination [7, 30, 42].

The shifts in governance models described above have amounted to an increase in what can be described as forms of gatekeeping. The ongoing work to uphold the standards of participation of Wikipedia has made it harder to participate [20, 27], with some describing this effort as boundary work, where volunteers focus on determining what content is allowed to stay and what must be rejected [13]. Others have described "regimes of socialization"

[17] or "sociotechnical gatekeeping" [20], where bots patrol the activities of new users, correcting work or sending messages to editors that ask them to align their contributions with standards of participation [9, 17, 21, 36].

The growing conversation about the conditions of participation on digital platforms, and the political endeavors of openness should not be viewed purely through a critical lens. Literature on participation suggests that radical inclusivity and openness without bounds will only lead to counterproductive outcomes as some ideology for making decisions on what constitutes action must be established [44]. As such, the attention to the growing institutionalization of Wikipedia or the narrow opportunities for contribution on click-work themed citizen science projects should focus on the extent to which the political endeavor for stability and predictability of participation may challenge opportunities for inclusive and emergent practice.

2.1 Values, Stability, and Bias in Sociotechnical Systems

There is a rich history of concern about the reaches of stability in sociotechnical systems in Human-Computer Interaction (HCI) research and beyond. In the context of philosophical discourse, Heidegger's *The Question Concerning Technology* points to the theory of enframement, or the imposition of technology on nature as a way to call forth specific possibilities [22]. For example, Heidegger describes how a hydro-electric damn circumscribes and calls forth the potential of electricity from the river. The enframement of the river by the damn creates and actualizes the specific potentiality of electricity. While the efficiency of the damn is useful, he outlines concerns with the role of technology in society to enframe, or define and call forth a limited range of possibilities in nature and human behavior. By circumscribing and defining the possibilities of nature and human behavior, technology can also crowd out the possibility for what Heidegger describes as the poetic, or creative and unforeseen possibilities.

HCI scholarship has focused on the role of technology in the stabilization of practice. Practice as an object of study comes from practice theory, which examines durable models of social interaction and the shared sets of norms and rules that are interpreted and modified by people in varying contexts [39, 40].

When looking at how practice is stabilized, HCI scholars may attend to how, for example, the creation of civic technology embodies a shared set of values and biases that privilege the practice of one user demographic over another [32]. The attention given to stabilized practice, the privileging of values, and the resultant biases reflects the presence of critical theory in HCI. This critical lens has been used to explore approaches that can encourage designers and users to reflect on and challenge assumptions that may promote systemic bias in sociotechnical systems. Focusing on the design process, Value Sensitive Design (VSD) proposes techniques that help designers and engineers surface the values that drive the design process of new systems [15]. Similarly, Critical Technical Practice encourages such reflection on dominant and marginalized values and metaphors driving design while also encouraging an inversion of values, moving the marginalized values and metaphors to the center as a way to inspire new technology [1]. Looking to the experience of users of sociotechnical systems, contestational design practices encourage the creation of features that both reveal and reconfigure power relationships in sociotechnical settings [10, 24]. For example, in order to give click-workers on Mechanical Turk more agency to organize and find work that respects their labor, Turkopticon was created as a space outside of Mechanical Turk that gives workers the opportunity to report and rate employers, a feature not available on the Mechanical Turk platform [25]. As an example of contestational design, Turkopticon reveals and reconfigures power relationships on Mechanical Turk by giving workers a space to identify and work around the presence of unfair labor practice. At the heart of HCI scholarship that uses a critical lens is an awareness that sociotechnical systems reflect a standardization of work that, while offering features of efficiency, bias and privileges certain perspectives and values while marginalizing others.

The narrowing and privileging of possible actions and perspectives in sociotechnical systems is an inevitable outcome. However, the following cases that I present in the findings reveal how digital participatory platforms balance out the narrowing of possibilities to support the stability of practice, while also carving out space where unforeseen and unanticipated possibilities of participation might emerge. In striking the balance, these cases demonstrate how the possibility that the poetic will not be crowded out in favor of efficiency can be preserved.

By paying attention to the conditions of participation that enframe and to the conditions that support the poetic, I build on the previously articulated need by Barney et al. [4] to bring more nuanced definition to what Tkacz describes as the complex endeavor of open participation in digital settings [48], accounting for the ways expertise, openness, and institutions interrelate ([4], P.7).

3 THEORY

The importance of investigating how opportunities to participate are made available to people is rooted in a growing conversation described in the previous section that scrutinizes and investigates what participation means in the broader phenomenon of digital participatory culture. To discuss the question of the "participatory condition" implies that to participate is not a given, rather participation is a question of becoming inscribed into a social order, responding and adapting to an existing set of "social bonds, communities, systems of knowledge, and organizations, as well as politics and culture" ([4],P. viii). How we negotiate and situate ourselves in different participatory conditions describes how we become subject to the ideologies of that setting, and defines the varying constraints and possibilities of individual agency.

I turn to Estrid Sørensen's Actor Network Theory [33, 34] inspired ethnographic investigation of a blended learning environment [45, 46] to examine the confluence of forces and how people negotiate them in different digital participatory settings. In this work, Sørensen unpacks the different characteristics of relationships amongst humans and non-humans, and how the configuration of these relationships reflects different constructions of opportunities for learning, or different constraints on the agency of the learner. Based on her observations, Sørensen derives three different forms of presence, or how students are present in a particular setting, based on the varying constraints on their agency that define their opportunities for learning.

3.1 Authority-Subject Presence

Sørensen describes a classroom setting with two distinct regions of participation, one occupied by the teacher and another by the students. In her description of students singing an alphabet song, Sørensen describes how the students are all sitting in their seats with their attention converging on the teacher at the front of the class, who is writing the letters down on the blackboard as the students recite them. This focal point of attention is where authority exists because the students are orienting and matching their behavior to the commands that emerge at the location of the blackboard and teacher. With the teacher at the front of the classroom, guiding and defining the activities of the students, two distinct regions of participation in the classroom are shown, each associated with established, approved, and homogeneous sets of activities, events, and objects. One region is occupied by the teacher who stands at the front of the classroom in control of the chalkboard, opposite the other region occupied by the students, sitting at desks oriented toward the front of the classroom where the teacher and the blackboard reside. The restriction of activity in the performance of authority-subject presence is also achieved in the way that the teacher allies herself with the textbooks and other classroom material to create conditions for a homogeneous environment of participation. By giving students the same assignments from identical textbooks, she can follow and track the activity and progress of the student with a great degree of certainty and predict what they are doing and learning in the classroom.

3.2 Collective Presence

Sørensen draws on Johan Asplund's [2] definition of a collective, which comes from his description of medieval peasant society where participants in a collective were directed toward each other and not toward something apart from them in either space or time. In a collective "there was no clear boundary between the one and the collective and hence no individual stood out from the crowd" ([46]P.143). In Sørensen's observation of students singing a song together, learning is a matter of everyone converging around a common way of doing a task, with knowledge being produced when everyone is in sync, achieving consensus, singing the same words, and humming the same tune together. For collective presence, the attention of the learner is directed to other learners such that the relationship between actors does not produce any single individual who acts as an authority determining the direction of any other actor. The power dynamics in collective presence are entangled in the act

of everyone working toward the same goals and, similarly, with constraints on participation being defined by collective consensus.

3.3 Agent-Centered Presence

Agent-centered presence is associated with fluid relations compared to the stable structures found in authority–subject and collective forms of presence. There is no central focal point drawing people's attention in agent-centered presence. For example, in addition to regular classroom activities centered around the teacher standing next to the blackboard, students in Sørensen's study also took part in an online virtual world where they could create buildings and form communities of virtual participants. In this online space, students were not given any guidance or structure over how to create buildings and their avatars, which involved copying and pasting URLs and images from the web into the virtual world environment; rather, their actions in this space were dictated by their respective interests. The teacher would at times try to direct the activities of the students however, because of the immense size of the virtual world, it was often only possible to be in contact with a few students at a time. Because the teacher had a limited ability to oversee what the students were doing at any given moment the teacher was never able to get an overview of what all the children were doing and therefore was unable to control and constrain the activity of the students.

From an empirical standpoint, the study of agency using Sørensen's forms of presence, focuses the attention of the researcher on the configuration of relationships between human and nonhuman actors, the characteristics of these relationships, the effects of agency based on the relationships, and how these relationships and effects change across different contexts of participation. In the context of this research, drawing on the three forms of presence reveals moments when volunteers oscillate between participating on a platform on their own terms and moments where they find their participation constrained and aligned with the authority of platform leaders and experts.

4 METHODS

Data collection consisted of 18 months of participant observation and 36 interviews with experts, newcomers, and project leaders from the crowdsourced citizen science platform, Planet Hunters, and the peer produced encyclopedia, Wikipedia.

While there were a few instances of being physically co-located with research subjects, the majority of the research relied on using techniques of virtual ethnography, observing available textual traces of participation and interviewing site participants [23]. In particular, observations relied on a technique known as trace ethnography [16], a form of observation tailored to online environments where observation of participants is performed by recreating an experience through histories of a user's participation as they exist in server logs. More traditional forms of ethnographic data collection were conducted using field notes that captured my experience as a participant in both projects. In the context of Zooniverse, I reflected on my own experience as a newcomer making sense of the work and platform environment more broadly. In the case of Wikipedia, I reflected on my participation as a grant funded design researcher, supporting the development of newcomer support features.

Interviews were conducted using a combination of trace data with traditional semi-structured interviewing techniques. This technique reflects an evolving method where researchers use trace data to inform the design of interview protocols. For example, some researchers draw on traces of activities as they appear on hand written documents to illustrate specific practices in their questions [37], while others look to the historical evolution of documents as a way to target specific aspects of behavior in the protocol [38, 50]. Another approach more closely aligned with the research design of this paper is that of trace interviewing [11] where researchers develop visualizations of a user's activity history and present it to their interview subjects during the interview process, allowing the subjects to interrogate and expand on the data in the visualizations. In the various forms of combining trace data with traditional qualitative methods, researchers experiment with different moments where trace data and traditional qualitative approaches intersect.

In this study, trace data was used to write up a timeline summary of the user history that emphasizes what work they were doing, the tools they used, and the people they interacted with. With this reconstruction, an initial interview was conducted with the trace data, applying the interview protocol to trace data reconstruction of the newcomer experience to answer questions as best possible, which then generated follow-up questions related to the protocol used during the interview, probing for clarity around context and detail regarding the participants practice. By prompting the interview subject with examples from their past activities, the combination of trace data and interviews helped to address validity issues related to interviewing methods like memory recall and self-bias reporting.

Throughout the data collection process, data were analyzed using a grounded theory approach sensitized to Sørensen's three forms of presence. Constant comparison of data points was conducted throughout analysis as a means to identify emergent concepts, shape theoretical sampling, and determine eventual theoretical saturation [8].

4.1 Site Description

Planet Hunters is a crowdsourced citizen science project hosted at Zooniverse.org. On Planet Hunters, volunteers analyze data from the Kepler space telescope for the presence of transiting planets. In doing this work, volunteers work with an interface that repeatedly prompts them to engage in a discrete set of tasks for each piece of data from Kepler. Volunteers are also provided with a set of tools calibrated by scientists that inform how volunteers view and do the work of analyzing data from Kepler. Data objects that receive a high consensus score from volunteers regarding the presence of a transiting planet are forwarded along to project scientists for further analysis. The classification interface is a central piece to the project where volunteers have successfully participated in helping scientists sort through tens of millions of data points and discover several planets. Planet Hunters also provides a Talk and Discussion feature, where volunteers can share their observations about the data and collaborate with other volunteers around conducting further analysis for the presence of planets.

Wikipedia is described as the encyclopedia that anyone can edit. Volunteers have combined to produce over 41 million articles on Wikipedia across 294 languages. Among the many tasks that editors take on, some include starting new articles, copyediting content, adding references to existing articles, adding images and videos, and combatting vandalism. Despite concerns over the quality of an encyclopedia that anyone can edit, Wikipedia rivals the quality of Encyclopedia Britannica [18]. With its growth in both volunteer and article size, Wikipedia has taken on an authoritative position as a source for knowledge on the web. As Heather Ford points out, this growing authority is evidenced in the way Google not only features Wikipedia as top search results but also summarizes Wikipedia articles related to a query on the right hand side of the Google search interface [13], suggesting that Google treats Wikipedia as a knowledge authority by emphasizing its content as a feature of the website. The growing authority of Wikipedia is also reflected in the way academics and government officials perceive it to be an important space for the representation of their ideas, findings, and positions [13, 47]. This growing role as an authority for knowledge on the web makes it an important site of struggle for how knowledge is represented, making what was once hailed as a disruptor of the traditional gatekeepers of knowledge [49] a gatekeeper in its own right [13].

5 FINDINGS

The following themes highlight how volunteers negotiate and situate themselves within the varying affordances and constraints of the platforms, defining their sense of purpose as well as commitment and relationship to project goals.

5.1 Evading Authority on Wikipedia

Brianne is a new editor on Wikipedia. She is a lawyer by training and a volunteer transcriber of historical texts for a major global historical institution. As a transcriber for the historical institution, Brianne is given many projects about women in the early 1900s. Fascinated by the text she transcribes, Brianne likes to visit Wikipedia to learn more about the topics of the text she is working on. Often, she finds that many of the noteworthy women whose

stories she transcribes have no representation on Wikipedia. Annoyed at what is a broadly acknowledged systemic bias on Wikipedia that produces a gender representation gap in articles [26], Brianne has taken matters into her own hands and creates articles on Wikipedia about the women she reads about in her transcription work.

When she decided to create her first article, Brianne came upon the Articles for Creation (AfC) space, a project on Wikipedia where users can submit drafts of their article for review by other Wikipedians. Like Brianne, many of the new Wikipedians looking to create a new article that I interviewed come to AfC after successfully completing the article creation wizard, a decision tree feature that asks a series of questions about the characteristics of the proposed article to determine if it fits within the standards of new article creation. For Brianne and others I interviewed, stumbling upon the AfC space seemed like part of the official process of article creation.

Interviews with contributors that went through the AfC process suggest that the primary measure of an article for AfC reviewers is one that meets the notability criteria, or an article that has a sufficient number of citations from reputable sources. The heavy bias toward notability has led some to describe AfC as lacking nuance and, as one long time editor and administrator described to me, being a bastion of "petty bureaucrats drunk on power."

> "With regards to women scientists you have volunteer petty bureaucrats who are reviewing these articles and they see themselves as the gate keepers and the protectors that are drunk off the power they have been allotted and this just reinforces this systemic bias." (Interview with Kelly, September 11th 2015)

It is this focus on the notability policy that made Brianne's initial foray into article writing difficult. The first article that Brianne decided to work on was of a female botanist who had three plants named after her. When Brianne first submitted the article, she only had a few citations and as a result, the article was denied publication in the article space of Wikipedia. Brianne described to me that working on articles about early women scientists is very frustrating because there are few citations for her to draw on. Indeed, research shows that due to overwhelming systemic obstacles, women publish far less than their male counterparts in science [12]. Given the limited amount of published work and the notability policy for articles on Wikipedia, AfC performs a systemic bias against the representation of women in science on Wikipedia, one that Brianne experienced firsthand. Reflecting on her experience with AfC, Brianne realizes that her article topic was incompatible.

> "But I chose the wrong subject for that particular process because the person I chose is very obscure...I mean classic 1900's notable woman, who's circumstances are against her and still manages to contribute to society and science...[I] feel like I can't back up the notability side of things in the traditional way because there's references, but there's not a whole heap of them." (Interview with Brianne, February 17th 2015)

It was not until Brianne attended a workshop on editing Wikipedia articles that she learned she was not beholden to the AfC process. At the workshop, she expressed her frustration to the workshop facilitator who explained how she could create an article outside of the AfC review process. Now Brianne works on her articles outside of the AfC process, avoiding the reviewers that uphold a narrow understanding of notability. Brianne's work outside of AfC involves writing as much of the article as she can on paper and then transferring the article to her sandbox, a feature on Wikipedia tied to a user's account that is recognized by wikipedians as a space where a user can make any edit they wish without input from another user.

> "The way I use the Sandbox is I tend to do the research and sort of get a general idea of what I want it to actually look like on a piece of paper with bits floating around everywhere and I go to my Sandbox and I get it organized in my Sandbox so it looks 100% correct and check everything, make sure I've got references, make sure it's all linked to as much as I can and then when it's right, that's finished and then put it immediately into Wikipedia, I do not go through people who review it." (Interview with Brianne, February 17th 2015)

By writing and researching offline, developing the article in the sandbox, and avoiding the AfC review process altogether, Brianne evades the authoritative gaze of experts, positioning herself away from the spaces of the

project where standards of practice are heavily enforced. By positioning herself on the margins of Wikipedia, outside of spaces where standards are enforced with a high degree of predictability, Brianne develops and strengthens her article so that it can eventually defend itself against the challenges that will emerge once the gaze of experts inevitably lands on her work.

5.1.1 From Authority-Subject to Agent-Centered Presence. The act of having her work rejected by the reviewer performs authority-subject presence. Here, we see Brianne receive a message indicating that her work has not been accepted by the reviewers, whose task it is to uphold article standards in accordance to stated policy on Wikipedia. In the rejection of her work, a distinct and homogeneous region of practice is established, with Brianne's work standing out as an exception to this homogeneity of practice. This region is performed by reviewers who draw on immutable objects like the notability policy to perpetuate predictable editing activity. As Sørensen describes in her definition of regions, "If one is inside a region and does not fit the definition of the regional identity, then one is performed as an exception, or as belonging to the sub-region of deviance" ([46],P. 98). Indeed, by being rejected, she is cast out of the region of practice enforced by AfC reviewers.

When Brianne decides to work on her article outside of AfC, we see her move to, as Sørensen describes in the latter part of the previous quote, a "sub-region of deviance." This sub-region of deviance is what we can describe as the margin of practice where, like the students in Sørensen's classroom that participate in the online virtual world unencumbered by and out of sight of the teacher's authoritative gaze, Brianne operates outside of a well-defined space of practice, writing the articles the way she wants to. By avoiding the AfC review process, writing her articles offline and using the sandbox feature, Brianne creates a buffer between her work and a space where the standards of editing on Wikipedia are reified into a process and enforced in a relentless manner, performing a clear region of what standard practice is and is not. By avoiding the authoritative gaze of the AfC review process, Brianne works in the margins of Wikipedia, a space where the enforcement of article standards is not upheld as a process as it is in AfC. By participating in the margins, we observe both the performance of authority-subject presence and agent-centered presence, where she is at once excluded from standard project practice but also continues to contribute on her own terms. By writing what she wants to write, Brianne also challenges the standards of practice of Wikipedia, testing the definition of notability and leading the charge by establishing her own authority, redefining notability in the context of women in science. By being cast out to a sub-region of deviance, Brianne performs agent-centered presence, responding only to her interests and not focusing on any authority that exists in a distinct and well-defined region of practice.

While Brianne's story of challenging the standards of practice does not represent all the interviews I conducted, it does provide insight to the broader phenomenon of the margins of participation on Wikipedia. Many of the newcomers I interviewed retreated to their sandbox after having their work rejected, followed the feedback they received about how to improve their work, and returned to the article space abiding by the dominant norms of practice. In other cases, I interviewed newcomers who, after retreating to their sandbox, were unable to figure out how to get any of their work accepted, resulting in their articles existing in the limbo space of their sandbox.

5.2 Alignment and Creativity in Planet Hunters

Like many volunteers on Planet Hunters, Maria is interested in science. She holds a subscription to a science-themed journal and regularly watches science-themed television shows. Unlike many of the people I interviewed, she does not have an interest in astronomy. She points out to me that, like many of the projects she contributes to at Zooniverse.org, her knowledge of the science behind the projects is very limited. These aspects of her background stand out, since my assumption going into the interview is that, with over 12,000 contributions to Planet Hunters, I would be interviewing a knowledgeable astronomy super-fan, and yet she is not. What I learn instead is that Maria is a fan of citizen science who has a firm understanding of the computationally derived consensus model that shape all projects across the Zooniverse. Indeed, it is her understanding of the consensus model that has led her to be repeatedly selected as a moderator for new Zooniverse projects.

> "Whenever a new project starts the project scientists ask me to be a moderator and I say that I know nothing about the topic but they say that what I do know is how the Zooniverse works, which I agree with so that's is why I moderate for so many projects." (Interview with Maria, November 3rd 2014)

As a moderator, she often reassures people who worry about having provided an incorrect answer. She explains to volunteers that, since lots of people will view the same image, they should not worry about their response.

> "I know how the process of classification works, where the scientists get a consensus for decisions on a particular image. People who are new to the Zooniverse are always very afraid, thinking they made a mistake and wanting to correct it. When people say things like this I step in and tell them that it's not that big of a deal because lots of other people will see it." (Interview with Maria, November 3rd 2014)

For Maria, participation is a matter of doing work in a way that satisfies a relationship with both the scientists in the project and the technical mechanisms that process the contributions by volunteers. This theme of having a clear understanding of one's relationship to purpose and process of the project appeared in other interviews. For example, while they did not indicate an awareness of how the underlying data processing infrastructure works, Roger, a user who has been with the project for a few months, and Janice, a user who has been with the project for only a week, defined their sole purpose in the project as supporting the science team by following instructions given to them through the classification interface and tutorial.

> "I'm a helper; to try to sift through the mounds and mounds and mounds of data that Kepler has produced, and to try to whittle it down to those light curves that might have a possibility of transits, let the scientists take it from there." (Interview with Roger, September 18th 2013)

While the classification interface can be described as the central point of how work is done on the project, interviews with members of the Planet Hunters science team as well as volunteers reveals there are parts of the project that are not as well defined in terms of their role in supporting project goals. The Talk page is a feature where volunteers can leave comments about the data they have just classified. The Talk page, as one member of the science team describes it, is where you "*get to do the science you didn't plan for in the [classification] interface."* In interviews with the science team members and other project leaders, it was acknowledged that the volume of activity in these spaces outweighs the science team and moderators' ability to police and inform the activity that happens there. What has emerged in this generally unmoderated space are new forms of data analysis, where more experienced volunteers draw on external data sets and generate new tools for more detailed analysis of the data objects that are made available to them in the classification interface. As one of the early founders of Planet Hunters described to me, the purpose of the talk space is to encourage more emergent and unintended activity.

5.2.1 Predictable versus Collaborative and Unmoderated work. The description of Maria's work on Planet Hunters reflects the performance of authority-subject presence in the way volunteers are made valuable contributors to the project. From the start, volunteers are positioned in relationship to the needs of the scientists who, through the classification interface immediately provide volunteers with a legitimate and valuable task. Newcomers and more experienced members alike describe how they define their role in the project in relationship to answering the questions that are given to them through the classification interface. Becoming situated within an established region of practice and being made a functional and valued contributor is also revealed in the way that their contributions, regardless of their accuracy, are processed to be made valuable to the scientists, making the continued and long-term participation of volunteers a primary objective for the science team.

For more advanced volunteers making contributions to Planet Hunters outside of the classification interface, there is a configuration of practice that shifts the relationship not only between the volunteers and the science team members, but also amongst the volunteers. In the configuration of using the discussion feature and external tools for analysis, collective presence is performed, where volunteers shift their attention away from the instructions of the classification interface and interact with other volunteers and science team members, working with each other to build knowledge related to the goals of the project. The configuration of using the discussion feature and external tools for analysis can also be described as the performance of agent-centered presence in two ways: First, participants engage in a practice that fall outsides the science team's predefined goals for volunteers and second, the volunteers are drawing on tools to do work that exist outside of the Planet Hunters platform. In

the example of doing tasks and using tools that fall outside of the science team's design, experienced members are participating in the margins of the platform, taking advantage of conditions that permit the repurposing of the project to meet their interests while also drawing on tools that exist outside of the platform, unsanctioned by project scientists.

6 DISCUSSION

Drawing on Sørensen's forms of presence as an analytical lens, the findings reveal distinct participatory conditions in both cases that suggest varying degrees of constraint on the agency of volunteers. To reveal these conditions of participation I illustrated the relationships between the volunteers, project experts and leaders, and various artifacts to which specific processes of participation have been delegated. This analysis demonstrates how on Planet Hunters and Wikipedia, volunteers may find themselves in settings where the possibilities of participation are limited to options that ensure their work will adhere to project objectives or they may participate in settings where there is little authoritative oversight on their work. Participatory conditions in which volunteers are faced with a limited range of possibilities define the center of the platform while conditions where volunteers have relative freedom define the margins of the platform. Responding to the call by Barney et al, this section defines the participatory conditions at the center and margins of digital participatory platform, also offering insight into how these conditions play into the stability and flexibility of platforms.

6.1 Participatory Conditions in the Center

Both Wikipedia and Planet Hunters have features that frame the activity of volunteer work in such a way that contributions will either be aligned with project objectives or they will not be included. Such features, like Wikipedia's Articles for Creation (AfC) review process and Planet Hunters' classification interface, are situated in the experience of volunteers such that there is a high likelihood of encountering them. By capturing the attention of volunteers and working to align their contributions with project objectives, the center of participation on both platforms can be described as exhibiting the effects of authority-subject presence.

At the center of both Wikipedia and Planet Hunters, authority-subject relationships are observed through distinct regions of participation, one occupied by the authority of experts and project leaders, and the other occupied by contributors who direct their attention to and coordinate their work around the instructions of the experts and leaders. The capturing of attention and coordination of activities works to promote stability and homogeneity of practice by accepting or rejecting contributions from volunteers or computationally processing contributions such that the value of their work is assured. The distinct regions of participation are also revealed in the way that learning guides for new volunteers or review systems exist as reified processes, created and defined only by expert consensus.

6.2 Participatory Conditions in the Margins

In both Planet Hunters and Wikipedia, volunteers have opportunities to pursue their interests even if their approach to making contributions and the objectives of the work are not completely aligned with those of the platform. In such cases, the conditions of participation are not defined by strong and persistent relationships between volunteers and the authority of expert and leaders, instead they are defined by the direction that a volunteer wishes to take their work. The margins, unlike the center, are an "uncontrolled" territory of a project, where the standards of project practice are not easily enforced. The only authority that exists in the margins is an aggregate one, where volunteers define the direction in which they wish to go or build on the emergent directions of others. The lack of a singular authority shaping participation and the opportunity to define one's own direction reflect what Sørensen describes as agent-centered presence. The participatory condition of agent-centered presence therefore represents the possibility to define new directions or processes that were not designed into and enforced at the center of the platform. In Planet Hunters, the margin appears in the way the science team members provide few constraints on how people engage in their work on the Talk and Discussion interfaces. This strategy of creating spaces for unconstrained participation has paid off in that experienced users who create their own approaches to analyzing data have played an integral role in working with scientists to discover planets. For

Wikipedia, the margins emerge in spaces where feedback and demands for adherence to standards of practice are not easily enforced, allowing for work that does not strictly adhere to editing standards to take place. In the margins of Wikipedia, we see how volunteers who are pushed away from participating at the center of the platform can create opportunities for challenging the established modes of practice. In showing this, the idea of margins of participation also demonstrates how participatory platforms afford opportunities for practice that deviate from the norm that, in the case of Wikipedia, challenge systemic bias and work to redefine standards of practice.

6.3 Varying Conditions of Participation in the Margins

Each case offers descriptions of two distinct types of participatory conditions in the margins that support deviance: one that is implied and leaves room for more contentious action, and another that is explicit but controls the impact volunteers can have.

6.3.1 Implied conditions for deviance. In the case of Wikipedia, the margin appears as a space that a user must negotiate and carve out for themselves. The margin exists in contrast to AfC, which acts as the center where the norms and policies of Wikipedia are rigidly enforced under the authoritative gaze of participants conforming to an established article review workflow. While new articles on Wikipedia are indeed subject to scrutiny outside of AfC, the case illustrates how Brianne situates herself outside a space where guidelines and policies are actively enforced, creating a possibility to do work that does not strictly conform to current standards of practice.

This possibility to work outside of the rigid constraints of AfC is implied but not made explicit in the user experience. Supporting this implied possibility for deviance is a culture of experimentation encouraged through well-known and often cited guidelines that invite editors to "Be Bold" and make edits that potentially challenge existing standards. Not mandating AfC can be seen as a critical move that preserves the possibility for the inclusion of work that may not conform to current normative definitions of practice on Wikipedia.

6.3.2 Explicit and controlled conditions for deviance. While participation on Planet Hunters is predominantly limited to the goals of the project enacted through the features of the classification interface designed by the science team, volunteers are repeatedly invited to participate in the Talk and Discussion space after they make their classifications. In the Talk and Discussion space it is not uncommon for divergent themes of participation to emerge. Here volunteers may contribute to the project using means other than the classification interface to analyze data for evidence of transiting planets. Although the talk and discussion space act as a margin to the narrowly constrained modes of participation in the classification interface, offering participants an opportunity to experiment with new approaches to data classification, such emergent pathways of participation do not necessarily alter the broader trajectory and goals of the project without oversight of the science team. For example, conversations between the advanced volunteers and project scientists reveal that, while the project scientists are excited about the extensive analysis by volunteers, the scientists eventually take over the work of data analysis to determine if the volunteer work is useful. Such interaction performs the boundary between advanced participants and project scientists, making the participants subject to a more traditional conception of expertise (i.e. expertise as institutionally validated) and indicating that there are parts of the broader project that are off limits even to the most advanced participants.

An example such as this illustrates an explicitly designed margin to support emergent practice but does so in a way that is controlled, leaving the leaders of the project with the option to include or exclude the activity taking place in the margins.

6.4 Contributions to CSCW Scholarship and Design

This research offers insight into how CSCW platforms can strike a balance between supporting the stability of standards through features that promote efficient coordination and cooperation while also leaving room for emergent possibilities that cannot be predetermined and supported through specific technical design. As the findings demonstrate, participatory conditions that promote stability and predictability or permit deviation from platform objectives can exist as either explicit spaces of participation (e.g. the Talk and Discussion feature or

classification interface on Planet Hunters), or they can be cobbled together through a tactical approach by a volunteer working to avoid the authoritative gaze of experts (e.g. avoiding Articles for Creation on Wikipedia). As such, the findings suggest that CSCW platforms can exhibit a topology of authoritative strength, where some spaces act as a margin, featuring weak relationships between platform goals and volunteers that allow for more deviation from objectives, while other spaces act as the center, creating a strong relationship between participants and platform objectives, constraining the possible impact a participant can have.

By providing a description of how platforms can offer participatory conditions with varying authoritative strengths, this work contributes to the critical HCI scholarship that attends to tactics and strategies for revealing and responding to configurations of power in sociotechnical systems (e.g. [3, 32, 41]). In contrast to contestational design practices [10, 24, 32], where design tactics work to build friction with or situate someone outside of dominant power relationships on a platform, the margins as a design strategy reveals how challenges to power or the revealing of existing dynamics is achieved through a latent strategy that works to act as a safe haven, a place where movements against existing models, for example, can emerge and have refuge as they build their case to change existing approaches. Furthermore, the value of the margins as a necessary participatory condition could support existing conversation about the potential downsides of algorithmic regimes of editing on Wikipedia [36], where, because algorithmically assisted editing tools are so effective at detecting edits that do not align with platform policy, the margins may be difficult to preserve. While researchers and designers have created new tools that encourage the nuance of human judgement in the use of algorithmically assisted editing tools [21], the idea and urgency of preserving the margins could offer a new set of values focused on the need to support possibilities of resistance to systemic bias in design and deployment of such features.

The contributions of this research also highlight the different options designers and managers of participatory platforms can deploy to define the conditions of participation. The findings draw attention to how participants negotiate these conditions and in some cases, how they resist and subvert the conditions of participation. As the findings demonstrate, opportunities for resistance and subversion are important to the growth of the project and ensure degrees of inclusivity as well.

7 CONCLUSION

This work demonstrates how a digital participatory platform can have varying topologies of authoritative strength, in some cases exhibiting strengths that automatically align volunteers with objectives of the platform and in other cases exhibiting weaker bonds, allowing volunteers to deviate from project objectives. In revealing these contrasting conditions of participation, this work suggests that participatory platforms have a center and a margin, with the center perpetuating stability around contributions and the margin acting as a counter balance, allowing volunteers to resist and reimagine the definition and approach to practice. By outlining these distinct opportunities for participation, this work responds to the call to bring more texture and nuance to how we define the conditions of participation on digital participatory platforms, pushing past an idea of open participation to reveal how users must negotiate distinct relations of power that work to stabilize or provide flexibility around how platform objectives are perpetuated.

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REFERENCES

[1] Philip Agre. 1997. *Computation and human experience*. Cambridge University Press, New York.

[2] Johan Asplund. 1985. *Tid, rum, individ och kollektiv [Time, Space, Individual and Collective]*. Liber Forlag, Stockholm.

[3] S Bardzell, J Bardzell, J Forlizzi, and J Zimmerman. 2012. Critical design and critical theory: the challenge of designing for provocation. 288–297.

[4] Darin Barney, E Gabriella Coleman, Christine Ross, Jonathan Sterne, and Tamar Tembeck. 2016. The Participatory Condition: An Introduction. In *The Participatory Condition in the Digital Age*, Jonathan Sterne, E Gabriella Coleman, Christine Ross, Darin Barney and Tamar Tembeck (eds.). University of Minnesota Press, Minneapolis, vii–xxxix.

[5] Yochai Benkler. 2006. *The Wealth of Networks*. Yale University Press, New Haven.

[6] D C Brabham. 2013. *Crowdsourcing*. MIT Press, Cambridge.

[7] Brian Butler, Elizabeth Joyce, Jacqueline Pike, undefined author, and undefined author. 2008. Don"t Look Now, But We"ve Created a Bureaucracy. 1101–1110.
[8] Juliet Corbin and Anselm L Strauss. 2008. *Basics of Qualitative Research: Techniques and Procedures for Developing Grounded Theory*. Sage, Los Angeles, CA.
[9] P B de Laat. 2015. The use of software tools and autonomous bots against vandalism: eroding Wikipedia's moral order? *Ethics and Information Technology*. http://doi.org/10.1007/s10676-015-9366-9/fulltext.html#
[10] Carl DiSalvo. 2012. *Adversarial Design*. MIT Press.
[11] Elizabeth Dubois and Heather Ford. 2015. Trace Interviews: An Actor-Centered Approach. *International Journal of Communication* 9: 2067–2091.
[12] Henry Etzkowitz, Stefan Fuchs, Namrata Gupta, Carol Kemelgor, and Marina Ranga. 2008. The Coming Gender Revolution in Science. In *The Handbook of Science adn Technology Studies*, Edward J Hackett, Olga Amsterdamska, Michael Lynch and Judy Wajcman (eds.). MIT Press, Cambridge, 403–428.
[13] Heather Ford. 2015. Fact Factories: Wikipedia and the power to represent. 1–324.
[14] Andrea Forte and Cliff Lampe. 2013. Defining, Understanding, and Supporting Open Collaboration Lessons From the Literature. *American Behavioral Scientist* 57, 5: 535–547.
[15] B Friedman and H Nissenbaum. 1996. Bias in computer systems. *ACM Transactions on Information Systems (TOIS) 14.3 (1996): 330-347*
[16] R Stuart Geiger and David Ribes. 2011. Trace Ethnography: Following Coordination through Documentary Practices. IEEE, 1–10.
[17] R Stuart Geiger, Aaron Halfaker, Maryana Pinchuk, and Steven Walling. 2012. Defense Mechanism or Socialization Tactic? Improving Wikipedia's Notifications to Rejected Contributors. 122–129.
[18] Jim Giles. 2005. Internet encyclopaedias go head to head. *Nature* 438: 900–901.
[19] T Gillespie. 2015. Platforms Intervene. *Social Media + Society* 1, 1.
[20] A Halfaker, R S Geiger, J T Morgan, and J Riedl. 2013. The Rise and Decline of an Open Collaboration System: How Wikipedia's Reaction to Popularity Is Causing Its Decline. *American Behavioral Scientist* 57, 5: 664–688. http://doi.org/10.1177/0002764212469365
[21] Aaron Halfaker, R Stuart Geiger, and Loren G Terveen. 2014. Snuggle: designing for efficient socialization and ideological critique. ACM Request Permissions. http://doi.org/10.1145/2556288.2557313
[22] Martin Heidegger. 1977. *The Question Concerning Technology*. Harper Torchbooks, New York.
[23] Christine Hine. 2000. *Virtual Ethnography*. Sage Publications, Thousand Oaks.
[24] Tad Hirsch. 2008. *Contestational Design: Innovation for Political Activism*.
[25] L C Irani and M Silberman. 2013. Turkopticon: interrupting worker invisibility in amazon mechanical turk.
[26] Dariusz Jemielniak. 2014. *Common Knowledge? An Ethnography of Wikipedia*. Stanford University Press, Stanford, CA.
[27] Dariusz Jemielniak. 2016. breaking the glass ceiling on Wikipedia. *Feminist Review* 113, 1: 103–108. http://doi.org/10.1057/fr.2016.9
[28] Henry Jenkins, Sam Ford, and Joshua Green. 2013. *Spreadable Media Creating Value and Meaning in a Networked Culture*. NYU Press.
[29] Henry Jenkins. 2006. *Convergence culture: Where old and new media collide*. NYU Press.
[30] Christopher M Kelty and Seth Erickson. Styles of Participation. 1–37. Under Review
[31] Christopher Kelty. 2016. Participation. In *Digital Keywords*, Benjamin Peters (ed.). Princeton University Press, Princeton, 227–241.
[32] Matthias Korn and Amy Voida. 2015. Creating Friction: Infrastructuring Civic Engagement in Everyday Life. *Aarhus Series on Human Centered Computing* 1, 1: 12. http://doi.org/10.7146/aahcc.v1i1.21198
[33] Bruno Latour. 1987. *Science in Action: How to Follow Scientists and Engineers Through Society*. Harvard University Press, Cambridge, MA.
[34] Bruno Latour. 1991. Technology is society made durable. In *A Sociology of Monsters. Essays on Power, Technology, and Domination.*, John Law (ed.). Routledge, London, 103–131
[35] Lawrence Lessig. 2008. *REMIX: Making Art and Commerce Thrive in the Hybrid Economy*. Penguin Press, New York.
[36] Claudia Müller-Birn, Leonhard Dobusch, and James D Herbsleb. 2013. Work-to-rule: the emergence of algorithmic governance in Wikipedia. ACM Request Permissions. http://doi.org/10.1145/2482991.2482999
[37] Carsten Østerlund. 2008. The materiality of communicative practices. *Scandinavian Journal of Information Systems* 20, 1: 7–40.
[38] S Sawyer, E Kaziunas, and C Østerlund. 2012. Social scientists and cyberinfrastructure: insights from a document perspective. *Proceedings of the 2012 conference on Computer Supported Cooperative Work*.
[39] Theodore R Schatzki. 2001. Introduction: Practice Theory. In *The Practice Turn in Contemporary Theory*, Theodore R Schatzki, Karin Knorr Cetina and Eike Von Savigny (eds.). Routledge, New York, 1–14.
[40] Kjeld Schmidt. 2014. The concept of 'practice': What's the point? 1–17.
[41] P Sengers, K Boehner, S David, and J J Kaye. 2005. Reflective design.
[42] Aaron Shaw and Benjamin M Hill. 2014. Laboratories of Oligarchy? How the Iron Law Extends to Peer Production. *Journal of Communication* 64, 2: 215–238. http://doi.org/10.1111/jcom.12082
[43] Clay Shirky. 2008. *Here Comes Everybody: The Power of Organizing Without Organization*. Penguin, New York.
[44] Cayley Sorochan. 2016. Participation as Ideology in Occupy Wall Street. In *The Participatory Conidtion in the Digital Age*, Darin Barney, E Gabriella Coleman, Christine Ross, Jonathan Sterne and Tamar Tembeck (eds.). University of Minnesota Press, Minneapolis, 21–42.
[45] Estrid Sørensen. 2009. *The Materiality of Learning: Technology and Knowledge in Educational Practice*. Cambridge University Press, New York.
[46] Estrid Sørensen. 2013. Human presence: Towards a posthumanist approach to experience. *Subjectivity* 6, 1: 112–129. http://doi.org/10.1057/sub.2012.31
[47] Misha Teplitskiy, Grace Lu, and Eamon Duede. 2015. Amplifying the Impact of Open Access: Wikipedia and the Diffusion of Science. *arXiv.org cs.DL*. http://doi.org/10.1002/asi.23687
[48] Nathaniel Tkacz. 2014. *Wikipedia and the Politics of Openness*. University of Chicago Press.
[49] David Weinberger. 2011. *Too Big to Know: Rethinking Knowledge Now that the Facts Aren't the Facts, Experts are Everywhere, and the Smartest Person in the Room is the Room*. Basic Books, New York.

[50] C Østerlund, J Snyder, S Sawyer, S Sharma, and M Willis. 2015. Documenting Work: From Participant Observation to Participant Tracing. In *Handbook of Innovative Qualitative Research*. Routledge.

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