how do users interact in Wikipedia?

Working Paper

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Sites of Interaction   **Forms of Collaboration**   **Recommendations**
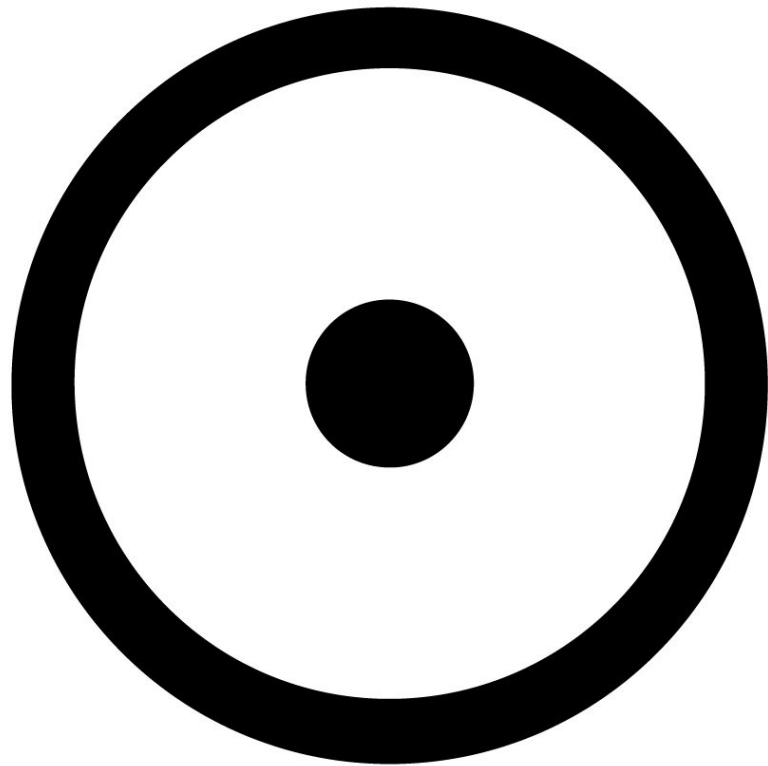
Introduction

This paper considers peer-to-peer interaction in the Wikipedia community, as part of a broader inquiry into the strategic importance of interpersonal communication and coordination to the Wikimedia Foundation. The first section synthesizes the main insights and opportunities identified in the academic literature on the role of talk pages in creating and maintaining Wikipedia's content. The second section examines four communication dynamics commonly found in the ways that users interact: cooperation, deliberation, conflict and coordination. Finally, the paper consolidates recommendations from the academic and grey literature as to how to ameliorate the challenges of interpersonal communication in the world's largest online encyclopedia.

Communication in a digital community of practice

The publication process of a Wikipedia article is a cycle of creation, revision, modification and negotiation. Users engage in 'reactive writing' in which multiple authors concurrently write and edit the same document – the most complex type of collaborative writing, and the one that requires the most amount of coordination (Ferschke 2014). Indeed, many editors may work on a particular article across its lifetime, changing the content, tone and organization to fit new information or clarify meaning. The same sentence – even the same word – can be revised multiple times. There is no singular author of an article: although an editor may be acknowledged as an originator or significant contributor through the permission ranking system, the award of barnstars, or a substantial presence in the article's editing history, every article (with the exception of, possibly, stubs and lists) is the result of informal (as in,

non-organized) collaboration. Rather than building a metaphorical 'cathedral' – under the authority of experts to a specific design – Wikipedia is more like the 'bazaar' of organization theory, in which "the product organically evolves as a result of swarm creativity, i.e. the aggregated individual contributions of the changing set of collaborators, and does not necessarily reach a final state of a finished product but rather remains in constant evolution" (Ferschke 2014).

Wikipedia is therefore connected together by common practice: individual editors must all execute their participation in terms of a shared linguistic, procedural and normative framework. It is a clear example of a '**network of practice**': loosely knit, geographically dispersed members engage in knowledge flows without meeting face-to-face (Brown and Deguid, cited in Wasko and Faraj 2005). In light of Wikipedia's increase in reach and depth, it has also been described as a '**community of practice**': a small group of connected people who "continually negotiate, communicate and coordinate" and in which "joint sense-making and problem solving" enhances interpersonal ties (Wasko and Faraj 2005; see also Jullien 2012, Zhao and Bishop 2011). Unlike a typical community of practice, however, Wikipedia projects remain principally anonymous and asynchronous: participants are strangers, without the expectations of obligation and reciprocity that typically derive from face-to-face relations (Wasko and Faraj 2005).

As an online community, Wikipedia therefore suffers some of the challenges typical of virtual teamwork. Without face-to-face encounters, Wikipedians lack the synchronous and spatialized working, and the nonverbal cues and informal interactions, that enable co-workers to establish and nurture trust (Black et al 2011). Instead, as in

other forms of computer-mediated communication, users are more likely to misread the emotional content of messages, leading to dissatisfaction and conflict (Johnson, Bettenhausen and Gibbons 2009). Without the routines, values and stereotypes that enable shared expectations, it is difficult to manage individual expectations, establish shared norms and resolve disputes (Black et al 2011; Bosch-Sijtsema 2007). Research finds that virtual team members are less likely to feel positively towards their colleagues, and have lower levels of identification and attachment to the team and the task, increasing absenteeism and decreasing organizational citizenship (Johnson, Bettenhausen and Gibbons 2009).

Of course, not all computer-based teamwork is negatively experienced. Some research suggests that the anonymity of computer-mediated communication can lead to better divergent thinking and idea generation than face-to-face teams (Johnson, Bettenhausen and Gibbons 2009). As discussed in this paper, Wikipedia users have found multiple ways to collaborate and coordinate editing and meta tasks despite their physical estrangement. Nonetheless, challenges remain in the form of social and technical impediments to shared working and community building, including the norms against socializing outside of non-content topics (Musicant et al 2011), the lack of notifications about responses to comments, and the difficulty of following unthreaded talk discussions. These issues are considered in the remainder of the paper in conjunction with a review of Wikipedia's more effective mechanisms of peer interaction.

Sites of Interaction

Where does interpersonal communication take place on Wikipedia? As Klemp and Forcehimes (2010) note, the principal interactions between users occur in the substance and process of article content creation: in submitting content, reverting changes, checking sources or adding links, users indirectly engage with hundreds of other editors. Interventions on article pages are, of course, highly individualized and coincidental. To engage directly with other users, Wikipedia editors must use other aspects of the wiki software.

There are several formal fora for interpersonal communication and coordination efforts within the Wikipedia community. These include the Village Pump and **Internet Relay Chat** (IRC) channels. Keegan, Gergle and Contractor (2011) found that IRC channels can serve as important hubs that:

- create **micro-communities** (for instance, they studied power user "Chzz", whose IRC channel was frequently visited by other power users editing similar topics, and also used as a resource by other users who would follow the discussions;
- work as **command-and-control centers** (for instance, to coordinate real-time editing work on breaking news articles).

There is little specific research on these sites of communication, however. The literature tends, instead, to focus more generally on Wikipedia's talk pages, the principal site of communication in Wikipedia. All talk pages are publically available wiki pages that can be accessed by anyone at any time by clicking the Talk tab on every page. Indeed, as Schneider, Passant and Breslin (2011) note, talk pages are the most easily accessible of

Wikipedia's discussion forums for readers, although they may not be well known by the casual browser.

Talk pages are the backbone of Wikipedia collaboration, enabling users to give reasons for edits, advocate for reversions or alterations, engage in discursive encounters to enhance factual content, references and external links, or converse together via a kind of "public inbox" (Laniado et al 2011). Users interact directly or indirectly through a question-and-answer/comment-and-reply dynamic on both article-specific and user pages. Participants engage in direct exchanges or post generic messages designed to be read as a statement of intent or explanation of an edit.

Image 1: Example of a positive conversational exchange on a Wikipedia talk page (Ford 2012).
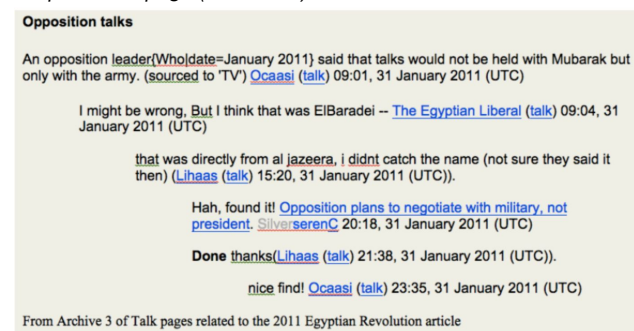
Of course, despite the sometimes-lengthy interactions that editors may experience on a particular issue, talk pages remain "pseudonymous discussion spaces" in which editors speak through their username rather than personal connection (Ferschke 2014). On the one hand, these exchanges can be marked by pleasant, polite and helpful collaboration, as in Image 1. On the other hand, despite regulation by Wikipedia's conduct policies, these spaces can be characterized by criticism, nitpicking, hostility and personal conflict (see

Coopetition). Like other namespaces, talk pages are also subject to vandalism (Ferschke 2014).

Wikipedia's talk pages have grown to be a considerable segment of the encyclopedia (Schneider, Passant and Breslin 2011). In many cases, talk pages have a greater volume of edits than the corresponding article page – in 2011, for instance, the 'Barack Obama' article had been edited 17,500 times, but the talk page was groaning at 22,000 comments (Laniado et al 2011).

The size of these pages makes them difficult subjects for content analysis (Schneider, Passant and Breslin 2011). Research into talk pages has also struggled with the form of the data. Although used as discussion forums, Wikipedia talk pages do not follow the conventions of other web forums, lacking dedicated formatting or explicit threading structures that could demarcate the beginning or end of comments, or delineate different users (Laniado et al 2011; Ferschke 2014). Rather, **editors have great freedom in how they use talk pages** (Laniado et al 2011). Whilst users are encouraged to use templates, paragraphing and indentation, many do not. In 2007, Viegas et al (2007) found that less than 70% of users signed their posts, which led to more concerted efforts to emphasize the Signatures policy (see Beschastnikh, Kriplean and McDonald 2008) and the use of bots to automatically include usernames (Ferschke 2014). By 2011, Laniado et al (2011) had found that comments on article talk pages were now signed 85% of the time, with signatures on 87% of user page comments. Nonetheless, the impression remains that talk activity is difficult to follow.

Analyzing talk pages

Changing conventions and patchy adherence to the Signatures policy means talk pages remain difficult to read and analyze by non-users (Laniado et al 2011). Yet, despite these challenges, there have been several efforts to understand their content and form, across three main themes. Studies in the literature find that inter-user discussions on talk pages:

➔ identify heavily discussed or controversial topics and narrate an article's editing journey
➔ tell us about social interaction in the Wikipedia community
➔ are the locus of editorial coordination.

Talk pages signal patterns of editing activity

Firstly, talk pages can help us understand the way editing is undertaken in Wikipedia, including the items that focus editors' attention. Laniado et al (2011) analyzed the length of discussion "chains" on article talk pages, finding that pages with high volumes of sub-threaded comments were typically about highly disputed topics, such as politics, religion, ideology and science. The articles they reviewed and categorized as philosophy, law, language or belief were notable for having the deepest discussions with the most numbers of users (ibid). Similarly, Schneider, Passant and Breslin (2011) argue that controversial pages are often marked by voluminous, long and entrenched revert discussions on the corresponding talk pages.

Talk pages therefore offer an insight into **how articles are edited**, and the types of peer-to-peer interactions that take place to drive content. For instance, Ferschke, Gurevych and Chebotar (2011) undertook automatic dialog act classification of

100 talk pages in the Simple English Wikipedia to understand how talk discussions are used for article improvement. They found that talk related to criticism, questions and answers happened early in the life of the article. Other kinds of comments, such as those related to the reporting or suggesting of edits, and interpersonal talk in which members discuss attitudes towards editing and editors, became more fulsome as the article matured. To interpret these conversational dynamics, the literature points to the role of social dynamics within the Wikipedia community.

"[The most recent article] is the outcome of a community process involving certain social interactions." – Korfiatis, Poulos and Bokos (2006)

Talk pages foreground Wikipedia's social roles

Secondly, talk pages highlight the various ways that inter-user communication is shaped by the social roles, hierarchies of experience, levels of engagement, and personalities of the Wikipedia editorship. A significant corpus of research (see, for example, Baytiyeh and Pfaffman 2010; Iba et al 2009; Jemielniak 2014; Jullien 2012; Sundin 2011 Welser et al 2011) has found that users adopt different kinds of work on Wikipedia – such as substantive or technical editing, anti-vandalism or arbitration – that maps in part on their level of experience and engagement with Wikipedia (administrators have deeper access and appetite than IP users, for instance); and in part on the type of work that appeals to their personal skill-set and interests. Participants may thus focus their 'talk' in ways designed to address this role-based work or

direct their comments towards their interest or responsibility on article work.

Different levels of system engagement therefore shape the type of work undertaken on a talk page. Schneider, Passant and Breslin (2011), for instance, argue that whilst regular editors peruse talk pages to glean information and understand the editing dynamics of an article, administrators undertake monitoring and structural editing. Talk pages that exhibit infoboxes and discussion threading also seem to have been the subject of administrator attention, suggesting that the article and its discussion enjoy a higher level of community interest (ibid). Laniado et al (2011) similarly found that influential users on talk pages choose either to be "**hubs**" that interact with many users, including newbies and inexperienced users; or "**authorities**" who interact preferentially with other experienced users. They concluded that these dynamics emerged from the way interactional links are based in social roles, and the relative importance of codified rules as the basis of solving issues in Wikipedia.

"Communications in Wikipedia are part of a complex social system" – Laniado et al (2011)

The **hierarchies of experience, engagement and editing privilege** (between IP, registered and sysop users; and between newbies and veterans) that characterize the Wikipedia community are therefore evident in talk pages. Although the content of talk activity is task-based, Bender et al (2011) argue that users undertake "all of the 'identity work' … in the text of their comments". In other words, unless readers of a talk thread

routinely click on each username in turn to assess edit activity (as a credential proxy), **talk participants can only assess – and assert – credibility by what they type**. A study of 365 discussions from 47 talk pages by Bender et al (ibid) found that:

➔ Users more integrated into Wikipedia (measured by volume of edits in a set time period) were more likely to make "authority claims" to bolster their credibility in a discussion.
➔ Administrators were more likely to claim authority in a discussion by appealing to policy, norms and contextual rules of behavior, whilst unregistered users sought to bolster their comments by appealing to outside sources of expertise.
➔ Making an authority claim opened up users to positive or negative "alignment moves" by other participants. Appeals to external authorities were more likely to be negatively commented on than appeals to "forum" rules.

These findings suggest that **inter-user talk reinforces the importance of forum knowledge –** particularly of policy and norms – which is typically the domain of more experienced editors. Since outside credentials are rejected, these forms of "homegrown expertise" (O'Neil 2011) matter in interpersonal communication (see Authority and expertise). Talk activity thus reproduces social hierarchies whereby **newbies and unregistered users defer to the credibility assertions of more senior editors**; and may utilize the tropes of communication preferred by veterans in order to make their point (Bender et al 2011). This is supported by research by Danescu Niculescu-Mizil et al (2012, cited in Ferschke 2014) who found that users engage in language coordination (stylistic mimicry) when

communicating with editors with higher privileges, particularly when trying to convince someone with an opposing viewpoint.

"Wikipedians perform authority by adopting insider language and norms of interaction" – Bender et al (2011)

Talk pages are therefore an important site for analyzing not only the breadth of social roles but the interaction between different kinds of users on Wikipedia.

Talk pages enable coordination activity

The ways in which some users demonstrate leadership in article talk, taking on hub and authority roles, is part of the third theme of research: that talk pages are a key site of coordination efforts.

On article talk pages, inter-user interactions take the shape of requests for information, questions about approaches, template addition and other forms of task sharing. Viegas et al (2007) found that talk pages are primarily used to coordinate editing work, with their analysis showing that requests for coordination accounted for more than half the contributions on sampled talk pages (see also Schneider, Passant and Breslin 2011). These requests include assistance with sources, a key component of meeting verifiability and reliability standards on Wikipedia. Ford (2012) analyzed the evolution of Wikipedia's coverage of the 2011 Egyptian Revolution, finding that talk pages were used to alert other editors to new

information, to seek sources or to request they were found, and to store references as the situation developed. In some cases, users interacted directly or semi-directly to coordinate their efforts (such as in Image 1); in others, editors made generic comments or queries to the wider pool of interested parties.

Coordination is also undertaken in a different sense on Wikipedia: to capture the emerging consensus on an area of shared policy, actively discussed on policy talk pages, as covered in the Coordination section below.

Forms of Communication

We have discussed the spaces within which interpersonal communication takes place in Wikipedia, and reviewed the types of interaction that characterize talk activity. Now we turn to unpacking the 'collaborative ethos' that defines Wikipedia by distinguishing four types of communication and coordination:

➔ Task-sharing and/or other forms of working together on pre-agreed outcomes (cooperation)
➔ Positive efforts to generate consensus or align editing work (deliberation)
➔ Negative or conflictual interactions that may still lead to beneficial editorial outcomes (coopetition).
➔ Governance (policy coordination).

The following sections offer an overview of these in turn.

Cooperation

Why do Wikipedians cooperate with and assist each other? Wasko and Fajar (2005) suggest the reasons for knowledge contribution in electronic networks of practice can be categorized in terms of three kinds of 'capital'. When individuals directly and repeatedly interact, they develop "habits of cooperation" that make collective action easier and more likely (Wasko and Fajar 2005). People centrally situated in collective networks that are rich in this '**structural capital**' have dense connections with others, and are more likely to understand and comply with the group's norms and expectations (ibid). Repeated interactions also help build '**cognitive capital**': the skills, knowledge and comprehension of a network's shared practice, which may be shared between members through hands-on experience or 'war stories' that explain how others have faced the same challenge (ibid). Participants in networks without face-to-face interactions can also benefit from '**relational capital**' by which members have a strong identification with, and obligation to, the collective (ibid).

The social capital explanation does seem to fit at least certain aspects and/or users of Wikipedia. Numerous studies confirm that a sense of mission and commitment to the project (relational capital) is a strong motivator of initial and sustained participation in Wikipedia (Baytiyeh and Pfaffman 2010; Bryant, Forte and Bruckman 2005; Nov 2007; Sundin 2011). Rafaeli and Ariel (2008) theorize that Wikipedia's interactivity promotes attachment: a form of structural capital. Nemoto, Gloor and Laubacher (2011) also find persuasive evidence of social capital as a key collaborative resource, specifically in the form of editing networks.

Networks

Editing networks can be an important source of inter-user cooperation on Wikipedia. Network analysis has revealed webs of editors characterized by broad relational ties – for instance, between editors who have contributed to the same article – as well as interaction ties between editors who have engaged on a particular item, for instance, in a dance of edit and counter-edit (Korfiatis, Poulos and Bokos 2006). Through editing activity visualizations (Viégas, Wattenberg and Dave 2004), network analysis (Iba et al 2009; Welser et al 2011), and examinations of hierarchies and dyads (Lerner and Lomi 2017), researchers have attempted to understand more about how these networks function.

The research is not conclusive, however, and is characterized by two key debates: whether Wikipedia's networks are relatively stable or merely temporary assemblages; and whether they are animated by formal collaboration or accidental co-working.

Keegan, Gergle and Contractor (2011) argue that academic research tends to assume that collaboration networks are relatively stable over time, but it is difficult to find evidence to support this. Nemoto, Gloor and Laubacher (2011), for instance, found that an article is more likely to reach coveted Featured Article status if its editors are connected by a pre-existing collaboration network, particularly one characterized by cohesion and centralization. However, we do not know how such a network might come into operation nor how it is sustained. This is particularly significant in light of other research that suggests that the experienced or 'super' contributors who tend to shepherd articles to featured status are less likely to be motivated by

pro-social concerns (Algan et al 2013), such as building or promoting social capital.

Cooperation may also be much more informal and transient than the proposition of formal networks. Certainly this seems to be the case on breaking news articles which are characterized by groups of editors more similar to disaster response groups than official emergency organizations (Keegan, Gergle and Contractor 2011). Analyzing the activity of editors of the 2011 Tohoku earthquake/Fukushima nuclear disaster, Keegan (2014) found that high-volume editors worked independently on their "own" articles. Rather than leveraging social capital to get the work done, cooperation was implicit or even accidental without significant overlap between editors and articles on the topic. In other words, rather than galvanizing a network of editors in a coordinated fashion to work across the related pages, editors carved out their own niches with no expectation of future collaboration (see also Ford 2012).

It therefore seems that more investigation is required to understand how editors cooperate – implicitly and explicitly – on Wikipedia, including when and where they communicate about shared goals, divide up tasks and resolve conflicts; and how these networks emerge and persist.

Deliberation

Wikipedia is in many ways a unique online environment in terms of the effectiveness of its community self-governance. Wikipedians regularly commend (and defend) their strong sense of mission and common purpose, and the policies that uphold Wikipedia's most important principles (cf Farič and Potts 2014; Jemielniak 2014; Proffitt 2018). Wikipedia is structurally egalitarian in that anyone can edit the

encyclopedia, although, of course, not everyone is equal in practice. These administrative hierarchies and policy constraints do not necessarily inflect every encounter. Yet for a community designed to be egalitarian, open and collaborative, interpersonal communication in **Wikipedia does not demonstrate strongly consensual or deliberative qualities**.

Dryzek (2005) describes deliberation as a form of communication that is non-coercive, and capable of inducing reflection and linking the particular experience of an individual or group with a general point or principle. This "reason-giving requirement" – that people must give reasons for their positions, and these must be reasonably presented – is at the heart of deliberation (Zhang et al 2013). Deliberative processes require that participants have adequate or equal opportunity to express opinions or preferences, raise issues for discussion, and evaluate and endorse outcomes. To be successful, the full range of affected actors must be welcome to engage in interactive dialogue on equal terms, with efforts made to identify mutual interests, promote trust and confidence, ensure transparency, and enable the creativity and flexibility needed to find the right solutions (Sisk 2001).

Does Wikipedia's design and ethos invite the possibility of deliberative interactions and decision-making? In general, there is some agreement that Wikipedia has the theoretical potential to be deliberative. Klemp and Forcehimes (2010) argue that whilst lacking the informal cues of the face-to-face discussion that conventionally permits deliberation, Wikipedia discussions typically encourage reason-giving. The size and anonymity of the Wikipedia community technically also enables more inclusive conversation: unlike typical deliberative fora,

participants are not crowded out because of lower social status (ibid).

> For those who lack rhetorical eloquence, dread public speaking, or are intimidated by high status individuals, Wikipedia's virtual community offers a much safer space for collaborative content creation (Klemp and Forcehimes 2010).

However, this view appears to be in the minority, with other studies arguing that the theoretical egalitarianism of Wikipedia does not translate into fair, consensual decision-making or discussion. Black et al (2011) studied the discussion page of the 'no personal attacks' policy page from 2002-2005 to understand whether talk interactions were marked by the deliberative qualities of offering solutions and evaluating options in a respectful and considerate manner.[1] They found that whilst some posts provided information and included a solution, the overwhelming majority of posts did not balance the pros and cons of suggested edits. More than half of posters appeared to consider others' views, but **requests for clarification were most typically sarcastic rather than helpful**. "Although group members ... proposed and built on one another's solutions, they were heavily skewed to finding faults" (Black et al 2011). This suggests that such discussions are functionally deliberative rather than imbued with the social qualities necessary for effective deliberation.

Black et al's analysis also suggested that participants with the highest levels of participation were unlikely to be highly deliberative. This observation fits with other research that argues that senior editors and administrators, as a class of actor, may demonstrate cliquey, arrogant and

domineering behavior, reserving their collaborative impulses for more elite work, such as refining an article in a bid for Featured Article status (Nemoto, Gloor and Laubacher 2011). Of course, we could also read these more strident interventions as efforts to reach decisions on individual items rather than perpetuate discussion for discussion's sake. For instance, Kriplean et al (2007 cited in Beschastnikh, Kriplean and McDonald 2008) found that "consensus is often moved forward only through a variety of power plays that contributors make in order to claim legitimacy of their actions". The predominance of the "rough consensus" (Butler, Joyce and Pike 2008), shaped by dominant voices to meet Wikipedia's standards, seems to characterize the discussion of content creation and revision.

"It is unusual for decisions on Wikipedia talk pages to operate on a true consensus"
– Butler, Joyce and Pike (2008)

In summary, it seems that whilst discussions may include reason-giving and the possibility of equal access, in reality interpersonal communication on Wikipedia tends not towards deliberation. More research on this topic will help shed light on the role of consensus in Wikipedia's discussions, and the ways in which different users are able to voice their opinions in shared spaces.

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[1] Black et al (2011) utilize a distinction between the functional or analytical aspects of deliberation, such as identifying solutions, articulating core values, and coming to a decision; and the social aspects, such as turn-taking and presumed honesty.

Coopetition: Conflict as a creative force in Wikipedia?

The third type of Wikipedia user communication to consider is the dynamic of interpersonal conflict. We know that many Wikipedia editors experience conflict in their day-to-day editing activity (cf Collier and Bear 2012; Kittur et al 2007; Konieczny 2018; Viégas, Wattenberg and Dave 2004). Can inter-user conflict be directed collaboratively to further the common goals of the encyclopedia?

As noted in the [Introduction](#), conflict in Wikipedia stems in part from structural impediments to inter-user trust and communication derived from its status as a virtual community across temporal, spatial and cultural contexts. Wikipedia is not a Habermasian public sphere in which participants leave their personal status and identity 'at the door' to engage in discussion about matters of common interest (Fraser 1990). Rather, different personalities, priorities and peccadilloes inevitably clash over different approaches to editing the commons. Despite the commitment to egalitarianism and collaboration, Wikipedia is paradoxically stricken by hierarchical power struggles, conflict and dissent (Jemielniak 2014).

Although the content of discussion posts ostensibly focuses on the application of relevant Wikipedian norms, **the tone of posts on talk pages is often flavored by long-running personal grudges, snobbery towards newcomers, or more insidious prejudices** (Black et al 2011). Of course there are exchanges such as that screen-grabbed by Ford (2012) in Image 1 in which users encourage each other to find the best outcome for the shared task. Yet, lack of civility, double standards and *ad hominem* attacks have been cited by newbies and veterans alike as reasons for leaving Wikipedia (Konieczny 2018). In their study

of policy talk pages, Black et al (2011) found that whilst interactions between members may initially be respectful and limited to analytic issues, the longer discussions between a dyad of editors continues, the more sarcastic they become. The tone, if not the content, of these exchanges may therefore be sufficient to incite quarrels and contribute to the sense of Wikipedia as a confrontational arena.

Since there is never a final consensus on policy, governance-related talk can also instigate contention and conflict: Wikipedia governance is marked by "a continuous process of battles engaged in and won or lost so that no conclusion is achieved" (Butler, Joyce and Pike 2008).

"In that instance, I learned that some editors are jerks" – Robichaud (2016)

Even micro-exchanges between users who are unfamiliar with each other are reported to contain hostility. For instance, clashes over contrasting interpretation, particularly issues of NPOV and source verifiability, seem to be antagonistic by default. For instance, Robichaud (2016) recalls:

> I added a citation needed tag to unreferenced information. A seasoned editor responded by adding a link and leaving the comment: 'Why whine when it's easy to find the reference?' In that instance, I learned that some editors are jerks and moved on.

Beschastnikh, Kriplean and McDonald (2008) also find this dynamic notable. They quote from an

encounter between two users arguing over the verifiability of a video clip as a reference source:

> U1: Then cite some of those *reliable, notable sources*. That's all I'm asking.

> U2: I don't feel its [sic] necessary. If you feel its [sic] necessary, you are more than welcome to add them.

> U1: "The obligation to provide a reputable source likes with the editors wishing to include the material, not on those seeking to remove it."

> U2: … If you feel more is needed, the burden is on you to add.

Many editors, particularly long-tenured Wikipedians, withstand this conflictual climate. Editing controversial or longstanding pages simply requires enduring strong criticism, sarcasm and reversion. As one observer put it, "defending edits requires an almost unlimited tolerance for argument and friction" (Brown 2015). However, other editors are worn down by the emotional labor of arguing over edits. Women users are more likely to cite conflicts with other contributors and fear of being criticized as the most common reasons for their reduced activity or departure (Collier and Bear 2012), but a broad spectrum of users also find interpersonal conflict to be demotivating. In a survey of the highest edit-count editors in English Wikipedia, 70% of those who left attributed it to repeated conflict (Konieczny 2018).

How much of this is unique to Wikipedia? The literature on virtual teamwork finds that social and geographic distance is more likely to lead to conflict due to "challenges resulting from different perspectives, inconsistent norms, incongruent temporal rhythms, reduced familiarity and demographic heterogeneity" (Bosch-Sijtsema 2007). These conflicts emerge because of disagreement, misunderstanding or expectation mismatch related to specific tasks and processes/methods, as well as differences in the relational or emotional status of team members (ibid).

Wikipedia's large, anonymous, dispersed community is susceptible to these challenges of virtual working, which may inflame small instances of interpersonal conflict and create a sense of a conflictual culture. However, it is worth noting that certain users and commentators regard a certain type of conflict to be a useful creative driver between weakly connected participants. For instance, the personal testimony of Wikipedians who experience negative comments, particularly early on in their editing career, often note that this forced them to learn and improve (cf Proffitt 2018; Robichaud 2016). Keegan, Gergle and Contractor (2011) suggest that the inevitable edit conflicts that accompany the most popular articles actually help ensure article quality since it ensures the participation of expert and committed editors who have the patience and skills to survive the intense editing climate. Kittur and Kraut (2010, cited in Schneider, Passant and Breslin 2011) also argue that although talk pages exhibit conflict between users, they can be used to defuse disputes as discussants attempt to find consensual editing solutions, whilst the social benefits of having a place to talk may also help to mitigate conflict. Further research into the experience and impact of interpersonal conflict in Wikipedia for editors across the spectrum of experience, social background and context will help distinguish the coopetitive mechanisms that lead to improved common outcomes.

Coordination

Collaboration requires a vernacular language with which to express needs and opportunities for working together. Whilst there are no dress codes or rules about the coffee machine in the online workspace, Wikipedia users do have a shared context of language, (in)formal rules and expectations of behavior in the form of the policies and guidelines that are designed to ensure consistency and reliability in Wikipedia editing (Butler, Joyce and Pike 2008).

Wikipedia is therefore not an anarchic space but an institution with a bureaucracy that has emerged in "magical" ways (Viégas, Wattenberg and McKean 2007; see also Butler, Joyce and Pike 2008). After two decades of development, much of Wikipedia's normative architecture is well established and accepted (such as, 'neutral point of view' and 'no personal attacks'). At the same time, the essential editability of policy pages, as well as the existence of a multitude of "experts", means that governance is dynamic and reflective of practice (Beschastnikh, Kriplean and McDonald 2008). Indeed, the fact that matters of governance are treated like encyclopedia entries – pages that anyone can discuss and edit – is part of what makes Wikipedia such **a special case of 'self-governance'** (Black et al 2011).

Butler, Joyce and Pike (2008) suggested early on that Wikipedia's guidelines work as intentional efforts to eliminate or at least reduce the costs of interpersonal communication. In fact, considerable talk activity is related to policy (citations and discussion), and thus is **an important source of inter-user interaction**.

During the first decade of Wikipedia, all policies grew "enormously": Butler, Joyce and Pike (ibid),

for instance, calculated that the 'copyright' and 'what Wikipedia is not' policies had both increased in size by over 900% since their first versions. The archives of NPOV, for instance, record voluminous comments, with each page containing just one or two days' worth of comments (ibid). Whilst some policies are more open to interpretation – viz the extensive discussion of the contours of neutrality – others have clear applications and a notable impact on user activity. For example, the three-revert rule, designed to reduce edit wars, is an important example of an influential and enforceable policy (Buriol et al 2006, cited in Beschastnikh, Kriplean and McDonald 2008). These policies and guidelines reflect a codification of norms and/or consensus that emerge from the actual social practice of editing the encyclopedia as a collaborative enterprise. Managing these policies – their form and application – takes up increasing amounts of Wikipedians' time (Iba et al 2009).

"Policy citations are a valuable micro-to-macro connection between everyday action, communal structures and the governance structure" –
Beschastnikh, Kriplean and McDonald (2008)

From the start of the project, Wikipedia's policies have set the ethical tone of how content is created and edited, and are referenced frequently and voluminously to maintain the neutrality and good faith on which Wikipedia's reputation rests. The discussion of any possible subject, from hairstyles to human rights, is likely to eventually include the citation of a relevant policy to bolster or sanction the case for an edit. Such "metacommunicative

comments" (Black et al 2011) about one's own or other's contributions – for instance, calling someone out for being disrespectful or inconsiderate – instantiate and reinforce Wikipedia's normative culture (Beschastnikh, Kriplean and McDonald 2008). Frequent references to the standards by which Wikipedia content is edited remind new and "deviant" users of the rules (ibid). On this view, these micro moments of policy citation are at once disciplinary and also democratic, distributing governance across users by making them responsible for upholding or changing the 'law'.

Authority and expertise

An alternative perspective is to regard policy as a domain principally inhabited by authoritative Wikipedians. Technically anyone can edit policy pages and be part of the discussion upholding and amending them. Beschastnikh, Kriplean and McDonald (2008) found that 10% of those citing policies in discussions were first-time users, supporting the essential inclusiveness of Wikipedia policy governance. However, it remains the case that administrators are guardians of policy: they are more likely to have knowledge of and to cite relevant policies in discussions, and to engage in the defence or development of policies and guidelines; in addition, some policies regulate activities that only sysops have access to (such as deletion or blocking). A successful bid for administratorship includes proving adherence to these Wikipedia principles (Beschastnikh, Kriplean and McDonald 2008). In this way, Wikipedia policies and guidelines work to confirm the authority of administrators (ibid), despite the fact that Jimmy Wales' initially conceived of the 'sysop' position as purely technical. "[B]ecoming a sysop is 'not a big deal'. ... I want to dispel the aura

of 'authority' around the position', he said in 2003 (cited in O'Neil 2011).

Despite this sentiment, editors with substantial experience, reputation and/or responsibility have a level of "expertise" that gives them authority and clout in interpersonal communication (see [above](#)). Contributions from highly experienced editors have been found to accelerate an article's promotion to featured article status in both English and German Wikipedia (Iba et al 2009; Stein and Hess 2007). Keegan (2012) argues that breaking news articles are driven by editors with "credible local reputations" in edit volume and quality, editing skills and norm familiarity: they are neither experts in the knowledge topic or in writing current affairs, but in Wikipedia itself. As discussed [above](#), these Wikipedian experts form important nodes within the webs of interpersonal communication: as hubs and authorities (Laniado et al 2011), they direct activity, respond to questions and uphold standards, even if the tone is less than conciliatory and the outcome less than consensual.

Recommendations

As we have seen from the research review in this working paper, collaboration is especially difficult in the virtual environment since "members have little time to engage in extensive social dialogues to learn about each other" (Bosch-Sijtsema 2007). In the absence of physical co-location and interpersonal encounters, they rely on categorical roles and types of behavior to size people up and define expectations (ibid). De Cindio and Peraboni (2010) therefore recommend that "digital habitats" are designed with two essential dimensions: *gemeinschaft* – the sense of community that arises from members freely interacting over time towards a common interest; and *gesellschaft* – the

corpus of implicit and explicit policies that regulate their interactions. We have seen how these two aspects of communication on Wikipedia – cooperation in content creation, and coordination of policy – are at the center of interpersonal interaction. We have also seen that, despite years of growth and efforts (formal and informal) to welcome and socialize members, there remain challenges.

The preceding synthesis of the academic and grey literature on user interaction in Wikipedia identifies several areas for improved design and development. These have been clustered into five related themes. Of each we can ask: how this can be improved for Wikipedia users of all levels of experience and backgrounds?

➜ Reduce anonymity

Alleviating even some of the anonymity of virtual work seems to have a positive impact on online teams. Research by Johnson, Bettenhausen and Gibbons (2009) into virtual working by MBA students found that even a small amount of face-to-face time can improve team effectiveness. Boons (2014) reports that enabling members of a crowdsourcing website to see each other's contributions and provide feedback enhanced the sense of being valued within the group, which in turn improved feelings of respect and satisfaction. Boons' (2014) research emphasizes the importance of "considering the actual social cues that group members receive in a particular social environment". Designing in opportunities for direct interaction between members can lead to positive feelings that can motivate their continued participation.

➜ Feel included

Participation in online environments is enhanced when the virtual experience is designed in win-win terms: participants give their time freely in return for having their voices heard (De Cindio and Peraboni 2010). Particularly when deliberation is an important value in interpersonal encounters, users must feel that the time they take in giving their opinion on a community matter is rewarded by action, for instance making a complaint leads to an investigation or a fix (ibid). Individuals want to feel that they are being treated fairly by authorities and peers, and that procedures are equally applied. Wikipedia users, particularly new and episodic editors, seek knowledge of, and participation in, the ongoing construction and maintenance of the Wikipedia *gesellschaft*.

➜ Enhance respect

Unsurprisingly, feeling respected in a group is important for feelings of belongingness and status: individuals want to feel important to the group and that their contributions matter (Boons 2014). In online communities framed by the "hacker ethic" – whereby competence and status are displayed in terms of technical virtuosity and public performances of excellence (O'Neil 2011) – respect is an important component of interpersonal communication. Encouraging sensitive feedback, minimizing sarcasm and criticism, and fostering kindness are repeatedly recommended as important conduits to enhanced interpersonal relations within the Wikipedia community (cf Collier and Bear 2012; Halfaker, Kittur and Riedl 2011).

➔ **Flag network positions**

Wasko and Fajar's research into collaboration in an electronic network of US legal professionals suggests that flagging an individual's centrality – for instance, by displaying the richness of their connections in their identification – can have two benefits: firstly, by incentivizing a person to respond frequently and helpfully to other network members; and secondly, by helping others assess the quality of answers to their questions. Signalling Wikipedia editors' place within interaction networks – their structural capital – may help to enhance peer-to-peer support, for instance by encouraging mentoring and co-editing (Schneider, Gelley and Halfaker 2014).

➔ **Connect up communication spaces**

Although dating from 2008, a recommendation from Beschastnikh, Kriplean and McDonald (2008) remains important. They note the difficulty of correlating activity in different social spaces: for instance, that a matter might be discussed on an article talk page, and also be taken up on user pages, in dispute resolution fora or in WikiProjects spaces (ibid). They encourage the development of techniques to identify related activities in order to help us understand collaboration patterns, as well as connect users' communications. This suggestion fits with other researchers' recommendations to address users' difficulties in understanding where and when communication takes place in Wikipedia, as well as recommendations to support editors to engage effectively with peers, for instance through improved threading, notifications and simplicity in cross-page communication (Musicant et al 2011).

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