

Democratizing Scientific Vulgarization. The Balance between Cooperation and Conflict in French Wikipedia

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Abstract

The free online encyclopedia project Wikipedia has become in less than six years one of the most prominent commons-based peer production example. The present study investigates the patterns of involvement and the patterns of cooperation within the French version of the encyclopaedia. In that respect, we consider different groups of users, highlighting the opposition between passerby contributors and core members, and we attempt to evaluate for each class of contributors the main motivations for their participation to the project. Then, we study the qualitative and quantitative patterns of cowriting and the correlation between size and quality of the production process.

Keywords: Wikipedia, involvement, authority, inequalities, resistance

The international Wikipedia project, that uses Wiki software to collaboratively create an encyclopedia, has become in less than six years one of the most consulted and controversial internet encyclopedia. By allowing users to participate to the writing of encyclopedic articles, Wikipedia has put forward auto-organization principles to coordinate and regulate peer-production activities. Wikipedia is a very original form of peer-production because it pushes to its extreme possibilities the principles of openness and of cooperation. The *writing process* is highly collaborative, in the sense that contributors must obey to strong procedural norms and apply a neutrality of point of view, which incites them to impersonality and to dissolution of their ego in an altruistic cooperation. Unlike the classical model of the "Encyclopédie des Lumières" from Diderot, most of the articles are written by more than one unique person and the visibility of the names of the authors is very low. The *rewriting process* of Wikipedia, his peer review, is highly open, too. There is no editorial committee and no list of proofreaders: thanks to "watch lists", the interface is designed to encourage the watching of other's contributions. Anyone can become a proofreader and the rewriting process is open to everybody.

The way this ambitious project works and evolves has given rise to numerous qualitative and quantitative studies, dedicated to the cooperative process of knowledge creation. There are a lot of studies about

Wikipedia. Most of these studies do not directly focus on social science issues but underline that both peer-produced and classical encyclopedias with a closed editorial committee go head to head. Discourse analysis methods show that Wikipedia entries tend to be indistinguishable from those found in print source (Emmig, Herring 2005). Quantitative metrics of site growth and complexity globally show an improvement of *rigor* and *diversity* (Lih 2004). Voss (2005) models the evolution of Wikipedia by a quantitative analysis of the growing number of authors, articles and edits. He underlines the exponential growth and scale-free networks already known in other contexts. A recent and very much discussed article compares Wikipedia to *The Britannica Encyclopaedia* and argues that the former comes very close to the latter in terms of the accuracy of its science entries (Giles 2005).

A limited number of approaches focuses only on social science issues and tries to exhibit the distribution of roles, or to describe the "careers" of contributors and to assess their motivation. They are generally based on very small samples. For example, Kuznetsov (2006) tries to explain why people are motivated to contribute to the Wikipedia project but her comprehensive analysis of the motivations of Wikipedians is based on an informal survey led on over one hundred New York Students who did participate to the project. Bryant Forte and Bruckman (2006) exhaust different roles and forms of involvement within the practices related to the project. Wattenberg and Viegas (2005) tackle the coordination of the Wikipedians through the analysis of the talk pages of some controversial articles. Nevertheless, those very interesting qualitative studies remained exploratory because they were led manually or semi-automatically on a small number of articles or talk pages corpora, or on classical interviews and online questionnaires.

To avoid this problem of exiguity and non-representativity of the corpus in social science approaches of Wikipedia, we extracted the complete database of the edits done on the French encyclopedia since its beginning (march 2001)¹ in 2006, April, the 4th. Our objective is to describe and qualify editorial practices thanks to quantitative analysis. The XML database contains the complete version history of the edits. Each revision is associated with an author (login or IP address), a timestamp and the contribution of each author to every page by the number of distinct contributions, the number of inserted, deleted and moved characters, the number of the characters remaining in the final version and the number of reversion done. The database provides new data that were not available in the previous statistical works on Wikipedia, which were mostly based on the *number* of contributions. It makes it possible to observe articles and contributors through the number of inserted characters and the *resistance* of the letters during the editorial process.

The French database contains 317 000 contributors (for circa 400 000 articles and 6 millions of edits). For comparison, the French Wikipedia is the third one in the world in size, after the English (circa 1.4 million of

¹ The study was led within the Autograph project, a French public research project about auto-organization in large online cooperative groups (<http://overcrowded.anoptique.org/ProjetAutograph>).

articles) and the German (circa 500 000 articles) ones. We address to this original corpus - built from the *complete* database - two research questions. Firstly, we tried to evaluate the *patterns of contribution*: we aimed at a better understanding of the social logics of involvement of contributors. What are the different roles of the contributors who ensure the efficient² functioning of the collaborative production? We tried to identify different classes of contributors, and analyze the main motivations of the contributions from each class thanks to qualitative interviews of different samples of contributors.

Secondly, we tried to evaluate the *cooperative patterns*. Wikipedia is a miracle and an astonishing challenge, because it is an auto-organized coproduction where people do not know each other and where there are surprisingly very few definitive bans. However, it reaches authority and liability. How is it possible? What are the regular *cooperative patterns*? We tried to exhibit which cooperative patterns were connected to badly evaluated articles (articles tagged as "partial ones"), and well-evaluated articles (tagged as "quality articles"). So, we aimed at distinguishing "good" and "bad" cooperative patterns. The exhibition of the contribution and cooperation patterns allows us to better understand the social logics of cooperation in the production of this common good.

Why do French Wikipedians contribute? A contrast between two classes of contributors

Contrary to most free software or open content movements, where reputation incentives play a big role and where people expect delayed rewards (Lerner Tirole 2002), each wikipedian article is *anonymous* and has most of the time several cowriters. In that respect, one of the greatest characteristics of the productive collaboration in the case of Wikipedia is the strongest weight of the collective norms and the greater humility of the members. In most cooperative productions, the individuality of the members is evaluated (Himanen 2001), even more than in academic research where the humility is appreciated, as Robert Merton highlighted in his sociology of knowledge. The benefits of participation consist of immediate and delayed payoffs: being paid to participate ; user need for particular software (von Hippel 2001). On the contrary, the members of Wikipedia are modest and have a high sense of solidarity and a dedication to a public good.

An heterogeneous community

On the basis of our extracted data, the Wikipedia population can be divided into two groups of users: anonymous, or IP users and registered users. Anonymous users refer to the users who write on Wikipedia without being logged, consequently identified by their IP address. Registered users, or Wikipedians, refer to

² By "efficient functioning", we mean a collective production which reaches legitimacy and credibility. It seems to be the case for Wikipedia since a recent *Nature* article (Giles 2005) exhibited the quasi-equivalence for some expert panelists between Wikipedia and a famous online encyclopaedia.

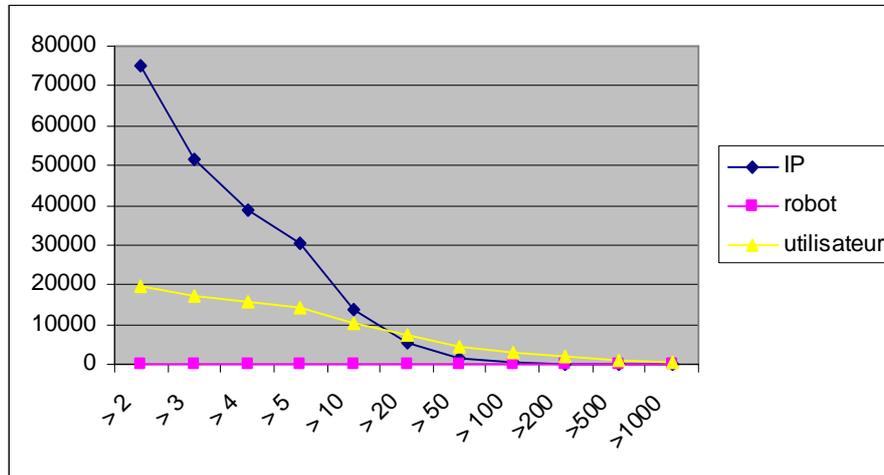
the participants who have an account on Wikipedia. Registration is free and open to all users, and Wikipedians, who are identified by pseudonyms, can access different technical and political facilities: on the technical plan, they can track a list of articles through watch lists or personalize their user page according to their needs and practices, and the political level, they can participate to the decisions related to the organization of the project (proposals, elections). Anonymous users represent the greatest part of the Wikipedia population, that is 90.22% of population (286 350 IP addresses) in April 2006. Wikipedia is indeed mainly populated by an unknown crowd which is not very involved in the project. We counted a total of 30 985 registered members (9.76%).

Amongst the "registered users", we distinguished the "top 100" largest contributors. Our statistical analysis of the exhaustive database allowed us then to highlight the opposition between two very contrasted groups of contributors:

- A « kernel » of activists: with a high involvement, they are all registered and often benevolent to assume administrative duties. For example, on the first 100 editors (the "top 100") in april 2006, 54 were already administrators and 11 became administrators after the date.
- The « passerby contributors »: with a contribution limited to their areas of expertise, they are occasional writers; they have weak ties, often remaining anonymous (IP). They stroll in the corpus like walkers in a town. Occasional writers are passerby contributors who wander in the website and contribute to a topic, once or rarely.

The participation by entering an « IP » address is a good proxy of the belonging to the category of the « passerby contributors". As a matter of fact, there is a very low number of IP which have a big number of contributions: only 7 IP have more than 1000 contributions, it means less than 0.001%. A registered contributor contributes an average of more than forty times as much as the IP ones (average number of contributions: 141.67 vs. 3.49).

Fig. 1. Variation of the number of each class of wikipedians depending on the number of their contributions



The diagram above gives a more comprehensive vision of the fact that the IP are almost always “passerby contributors”, with less than 10 interventions in the text of the encyclopaedia. The registered people have a more balanced distribution and that is why we took the top 100 as a proxy of the “kernel of activists”.

The kernel of activists is a very small group. We first noted that only 10% of the contributors have a user account ... while they edit 70% of Wikipedia (total inserted characters). Amongst them, the « top 100 » (0,03% of the editors) do 26,92 % of the contributions. A surprising result of our study is that these 100 editors contribute 1.5 more to the encyclopaedia than the 286 350 IP (1 661 296 contributions for the top 100 vs. 998 361 contributions for the IP). There is indeed a strong inequality of participation between the “Core team” and the “peripheral members”.

Our result feeds the issue of the controversy on the importance of the contributors in the collective production of the encyclopaedia as a common good. During the elections of the Board of the Wikimedia Foundation, Aaron Schwarz posted the results of his own investigations (a hand made result built on less than 500 articles) and highlighted the weight of the small contributors. Opposed to the elitist vision of the founding member, Schwarz suggested that most of the writings are created by less-active and anonymous users. Things are in fact more complex: there are lots of contributors, but a few group of them (0,02%) do fourth of the job. Fruitful interpretations and analysis can be further done on the functioning of Wikipedia. We can observe a transformation of participation in the process of membership: beginners do occasional contributions and are “passerby contributors”, while advanced members become after 6 months core members. They participate not only to the redaction of articles but also the whole project (talk pages,

management, appropriation of tools and techniques) and their center of interest will gradually move towards the "hidden order" of the encyclopedia: talk pages, discussions on coordination and management of portals. The hidden order of the project is the non-visible work which allows the project to work.

Passerby contributors: good Samaritans?

We further wanted to identify the specificity of the motivations of the "passerby contributors". How are anonymous users implicated in the process of quality? Virtually all theories of social dilemmas would predict low quality contributions from anonymous contributors, especially those with low levels of participation, since they are supposed to have little motivation or incentives to contribute. But in Wikipedia, like other open source projects where the altruistic involvement is high valued, we could assume that it is not the case. Antony Smith and Denise (2005) demonstrated the importance of IP users in the project: although the knowledge of the procedural rules increases with the number of edits, less-active users (called good Samaritans) provide contributions of high quality. Quality is measured by the resistance of the contribution, that is the retention period of the wikitext before it is deleted. What is striking in their study is the resistance of small users, and particularly the point that among the users who did less than five editions, anonymous users turn to produce contributions of better quality than registered ones. In that respect, it would be prejudicial to Wikipedia to exclude IP users from the writing of articles.

The first step of our study was to assess this hypothesis of « good Samaritans ». More specifically, we aimed at validating the results and hypothesis of these qualitative studies on the French Wikipedia. Our study do not clearly confirm the hypothesis of Antony Denise Smith: passerby editors do contributions with a lower rate of survivability than kernel members. The difference between inserted and remaining, or resistant characters, is striking: the contributions made by registered users are far more resistant than the editions of IP users. For the top 100 members, 78,68% of all characters inserted resist; for the IP, less than 50% of all characters were able to survive³. A further look on the activity of "passerby contributors" shows that they are more often involved in the redaction of controversial articles than the registered users. For instance, passerby contributors are overrepresented in the "semi-protected articles", which is an endogenous category grouping articles subject to heavy and continued content dispute or degradation.

³ However, we found that the survivability ration of IP members (passerby contributors) was quite higher for the French database encyclopaedia than for the English one. This could be explicated by the fact that English registered users face to the prominent intrusion of anonymous users, which would lead registered users to be more drastic, as they feel an increase of vandalism. Another possibility is that they would be uncompromising concerning edits that do not fit the editing standards of Wikipedia. For a deeper analysis of this comparative result between French and English wikipedias, see Levrel Pons Poudat (2006).

Fig. 2. Passerby contributors are overrepresented in the controversial articles

	% of IP contributors	% of registered contributors	% of bots
Semi-protected articles (ie controversial, or badly-evaluated articles)	49,29%	46,25%	4,36%
The database as a whole	19,35%	65,22%	15,43%
Articles tagged with the label « quality articles »	35,64%	54,65%	9,71%

Our second step was to highlight the main motivations of the passerby contributors. Passerby contributors essentially want to give back to the common good. The 'wiki' technology, which expands the potential population of contributors, reduces the costs of their participation. They are moved to act because of a sense of reciprocity: their tribute is like a counter gift. They don't consider the community as *a network of people* but as a "common good", a blackboard, a corpus, *a set of words*.

Kernel members : editing authority and legitimacy?

The registered contributors (circa 10% of the all contributors) have an intensive involvement in the project. Their mean number of contributions on the whole is 141.67. By comparison, the mean number of contributions for the IP members is 3.49 on the whole period. It shows that they have an intensive involvement. They spend plenty of time in the writing activity, often many hours each week, and interviews of a sample of those kernel members indicate that this strong involvement is run on a short period of their life: 24 months after their registration they do twice less articles.

The registered contributors have a more various activity: they appear on talk pages and on coordination activities. They almost have a monopoly on talk pages: 35% of their contributions are placed there, against only 8% for the IP. Kernel members control the procedural instances in case of conflicts and they have « the last word ». They are involved in the organization of different editorial spaces which are coordinated within different Wikiprojects covering themes. Although the editorial spaces are open to all participants, we might observe a predominance of registered users in such places, as creating and applying categories requires a good knowledge of the organization of Wikipedia. In such a complex project, registered users cover a wide range of forms of involvement. Previous studies proposed various ways to tackle this diversity, by focusing on a specific group of users (Wattenberg Viégas Chris Van Ham 2007). Our study confirms those results but gives them a more exhaustive basis.

The “kernel members” of the French Wikipedia speak for themselves as a family. They are proud to be wikipedists and to acquire this collective identity made of a shared meaning about the responsibility of being a wikipedist. A majority of our respondents are skilled and experienced professionals. We find that enjoyment-based intrinsic motivation, namely how creative a person feels when working on the project, is the strongest and most pervasive driver. We also find that user need and intellectual stimulation derived from writing are top motivators for project participation. They essentially value intrinsic motivations: not only fun or challenge⁴, but political convictions. The political ambition is made of a strong sense of community behavior.

They enjoy contributing because their participation gives a sense to their life. For example there are lots of scientific workers who have professional frustrations: overspecialization and lack of global vision on their field, or intellectual lability because they are forced to jump from projects to projects and cannot cumulate a stable knowledge.

To be a “kernel member” requires a manifest good will (expressed through activities like reverting vandalism for example) and a high degree of involvement, assessed by the number and the diversity of the contributions. Administrators have a career and more rights within the project, and can resort to specific tools to perform regulation and maintenance tasks (deletion of pages which are a copyright violation for instance).

A normative relativism

Further, they explain vulgarization *in political terms*, as a way to pacify society and to make people more virtuous (like the historical Diderot's one). The “kernel activists” of Wikipedia have strong political convictions about the fact that knowledge diffusion and scientific vulgarization increases the level of welfare in our society. They share an original conception of knowledge. The “non bias policy» or their credo in the neutrality principle is an original cultural value which leads them to a “normative relativism”. As the founding member of the Wikipedia Project, Jimmy Wales, stated: what people believes *is* the objective fact. Neutrality connotes a modular plurality that permits one to accommodate multiple policies or positions. This claim of normative relativism is very original. For instance, this claim has been contested by critics such as Lessig (1997), because supporting multiple policies was itself a policy, and one that could facilitate the censorious actions of China. This normative relativism is a political norm which structures civic participation of registered members of Wikipedia. In a sense, this “normative relativism” is the collective construction of

⁴ Csikszentmihalyi (1975) was one of the first psychologists to study the enjoyment dimension. He emphasized that some activities were pursued for the sake of the enjoyment derived from doing them. He proposed a state of “flow”, in which enjoyment is maximized, characterized by intense and focused concentration; a merging of action and awareness; confidence in one's ability; and the enjoyment of the activity itself regardless of the outcome (Nakamura and Csikszentmihalyi 2003).

an inexhaustible matter of contest: there is a strong debatability of different acceptions of this principle, which is an unexhaustible matter of contest. There is for instance a permanent tension between a "strong relativistic" position, for which neutrality (as the way to make your redaction more encyclopedic) is to indicate only what people think, and a "more realistic" relativism for which some points of view should not be considered in regard to scientific common norms.

A common practice of cowriting : what are the patterns of cooperation?

The success of Wikipedia is based on the cohabitation of two classes of contributors, Both categories develop a *solidar involvement*, but for individual motivations. However, they are "together separated". The public exhibition of « intimacy » is limited to the topics which are discussed and there is not so much repetitive personal relationships: they don't see much themselves face to face. They develop a new sense, a pragmatic one, of community. The quality of the collective production should depend on the cooperation (in the same article) between the two types of contributors. They search for self-esteem or consideration rather than for indirect payoffs. They value symbolic aspects of recognition.

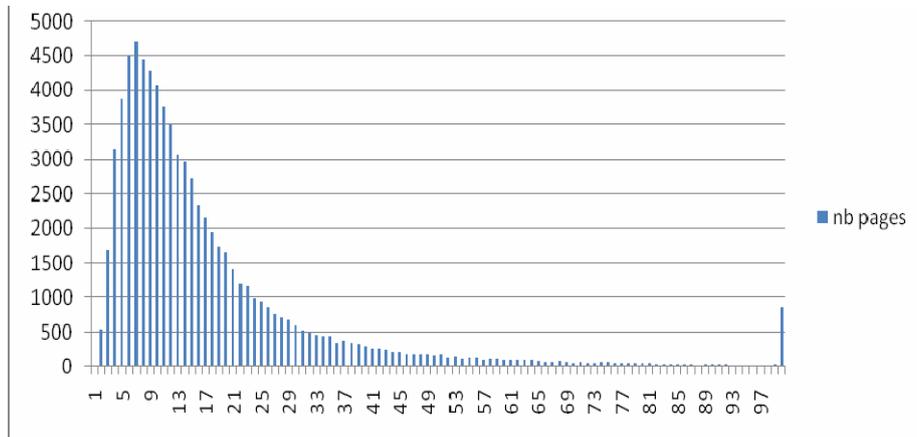
Both classes of contributors are strongly separated. But how are they connected and how is the cooperation built? In a study that we have already discussed, Anthony Smith and Williamson (2006) showed that there is a complementarity between both of them. It is the conjunction between weak contributors (called Samaritans) and strongly involved members (called Zealots) which creates quality and robustness, too. There are complementarities between both enthusiastic and experts. To go further, we tried to analyze the French database of Wikipedia to see the specificity of the patterns of cooperation. What are the patterns of cooperation which characterize the quality of redaction? Do people really cooperate in the same article? Do the different classes of articles have the same patterns of cooperation?

The co writing activity is the norm

The daily frenzy of editing provides a resource that many individuals regard as well-written and accurate. But how is the cooperation really processed? Mostly, the statistics on Wikipedia articles underestimate the cooperation because they calculate it on the whole basis: they include the young articles which have only a few months⁵. So, to have a more realistic view of the co writing activity, we selected only the articles which have more than 1 year.

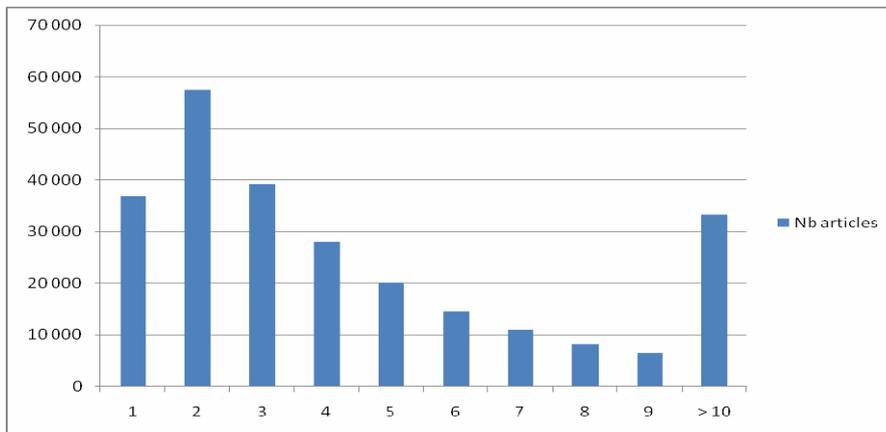
⁵ Another problem of the calculation of cooperation is the fact that a lot of articles are only redirections, so we must eliminate them to have a more precise view.

Fig 3. Size distribution of the articles older than 1 year, after deletion of the redirections (size = number of different contributors)



We can observe that the statistical mode is at 7: the most common number of contributors for the articles older than 1 year equals seven. Numerous articles have between 7 and 21 members. If we do not eliminate the young articles and the redirections, we obtain the following diagram, with a center of gravity which is pulled down:

Fig 4. Distribution of size for all articles excepted redirections (size = number of contributors)



The correlation between size of articles and quality

Wikipedia has endogenous categories which are very interesting to contrast the different articles in terms of their quality. For instance, there are the "semi-protected articles", which is an endogenous category grouping articles subject to heavy and continued content dispute or degradation. There are the "quality" articles, which gather the articles labeled as "good" ones. How does the size vary depending on the level of quality of the different articles? We tried (fig.5) to study the size of those three classes of articles.

The "good" articles (those with a label of quality) are three times smaller than the "bad" ones (those which are badly-evaluated and semi-protected): it means that they have three times less contributors. This result is particularly interesting when it is compared with the fact that the "good" articles and the "bad" ones have not the same differential for their magnitude. The "good" ones have only twice fewer contributions. So, reported to the same magnitude (it means the same number of contributions), the "good" articles have approximately 1.5 times less contributors than the "bad" ones. Therefore, we can highlight the existence of a "threshold of congestion". Beyond a certain number (circa 150) of different authors, the quality of the article tends to suddenly decrease.

Fig. 5. Mean number of contributors and of contributions for each category of articles

	<i>Mean number of contributors for an article</i>
Articles with long semi-protection (base SPL)	186,13
The whole basis without redirections	5,26
Articles with the label of quality	68,57

	<i>Mean number of contributions for an article</i>
Articles with long semi-protection (base SPL)	449,30
The whole base without redirections	10,40
Articles with the label of quality	207,03

The existence of this threshold means that the quality degradation is not linear. This crowding effect can be understood by the locking of the solidarity mechanisms when the community of authors increases. The level of mutual understanding between all the authors falls ever lower, and in the same time it is increasingly difficult to make decisions because there are threats of paralysis.

Kernel activists do a lot of formal corrections

Previous section tried to discuss the extent of the cooperation between the contributors in attempting to assess the density of the co writing process. Such an approach must be complemented by a review of the division of roles. To highlight the division of task between the IP and the registered users, we tried to analyze the characteristic of the intervention patterns of each class of contributors.

One of the good indicators to find out patterns of contribution is the average number of characters for each contribution: a low average indicates a predilection for minor and formal corrections; a high average indicates a predilection for content providing. We observe (fig.6) that on the average each contribution of an IP user is more than twice bigger than the contribution of a registered user. The passerby contributors are rather oriented towards the provision of content. On the contrary, the registered users have a more diverse and evenly distributed activity: they provide new content and do at the same time formal corrections. The tendency to provide content is much less marked than for the registered users than for the IP contributors. However, the tendency rises a little among the kernel activists.

Fig.6. Average number of characters per insertion for each class of contributors (IP, registered and top 100)

	number of inserted characters	number of contributions	average number of characters per insertion
Top 100	167 670 072	412 961	40 601.91
Registered users	1 259 942 753	3 590 426	35 091.73
IP	373 619 816	422 874	88 352.51

The analysis of the *patterns of cooperation* shows that the co-writing activity is the norm. A majority of old articles involve between 7 and 20 contributors. The correlation between size of articles and quality has been further analyzed: it seems that there is a threshold (circa 100 or 150 contributors) above which the quality decreases. The understanding of the cooperation patterns is clearer when we look at the style of cooperation for each class of contributors. The passerby contributors and the registered ones seem to be complementary: the first ones are concentrated on content providing, while the registered ones do more likely formal corrections.

Conclusion

Wikipedia illustrates a new social form of innovation. Its success is grounded on the heterogeneity of his community of contributors, mixing passerby contributors and kernel members. They share one thing in common: the valuation of the symbolic aspects of recognition like self-esteem. But the passerby contributors are involved by a sense of reciprocity while the members of the core are powered by a "normative relativism" : the principle of neutrality acts as a matter of concern : it *opens* discussions and do not close it.

Since the 1980s, the innovations among the microcomputing and the new information technologies illustrate a tendency of empowerment of users. This tendency is nowadays characterized by the increased weight of users in the innovation process. This process is marked by *a more egalitarian* participation of users. This phenomenon has been called the democratizing of innovation (von Hippel 2001). Our insight in the collaborative process of the French version of Wikipedia, the famous collective good based on user generated content, allows us to have a more precise view on this democratic process. Our statistical analysis highlighted a inequality of contributions and of authority between many passerby contributors and a handful of core members. Despite this inequality, there remains a democratic atmosphere, in a sense of a social mobility: to join the "core team" is very simple. To put it very simply, in distributed collaborative productions, the "cores" are not clans.

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