Folksonomy, The Power Law & The Significance of the Least Effort

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ABSTRACT: The essence of folksonomies is user-created descriptive metadata as opposed to the traditional sender-determined descriptive metadata in taxonomies and faceted classification. We briefly introduce the beginning and principles of folksonomy and discuss the categorizing concept of folksonomies on the basis of the computer program *del.icio.us*. The selection of the metadata tagged is not accidental, rather tagging follows a pattern that proves to be the pattern for the classic power law, which, in many complex systems is seen to unfold as an imitation-dynamic that creates an asymmetry, where a few descriptive metadata are often reproduced and the majority seldom reproduced. In *del.icio.us*, it is the very broad and basic subject headings that are often reproduced and achieve power in the system – which in cognitive psychology is called cognitive basic categories – while the small, more specific subject headings are seldom reproduced. The law of power's underlying imitation-dynamic in *del.icio.us* is explained from the perspective of different theoretical paradigms, i.e. network, economy and cognition. The theorectical and speculative conclusion is that the law of power and asymmetry is biased by a cognitive economizing through a simplification principle in the users' construction of descriptive metadata. Free tagging in folksonomies is comparable to empirical experiments in free categorization. Users often choose broad basic categories, because that requires the least cognitive effort. The consequences are that folksonomy is not necessarily a better, more realistic and cheaper method of creating metadata than that which can be generated through taxonomies, faceted classification or search algorithms. Folksonomy as a self-organizing system likely cannot create better and cheaper descriptive metadata.

1. What is folksonomy?

Today programs on the Internet provide users with the possibility to freely mark out information by creating their own personal metadata. These collections of metadata are called folksonomies. The essence of folksonomies is user-created descriptive metadata as opposed to the traditional sender-deter-

mined descriptive metadata in taxonomies and faceted classification. To many, descriptive metadata is the determining prerequisite for better sharing of knowledge, because it is the key to creating better semantic relations and search possibilities in the explosive mass of data on the Internet. Supporters of the folksonomy principle perceive user-created metadata as better, cheaper, and more realistic than those that can be created in taxonomies and faceted classification.

The so-called folksonomies are concentrations of user-generated categorization principles that are both private and public. The term was coined in 2003 by information architect Thomas Vander Wal (Smith 2004). It is a neologism consisting of a combination of the words *folk* and *taxonomy*. Taxonomy is from the Greek *taxis* and *nomos*. *Taxis* means classification and *nomos* means management. Literally, it may be translated to "people's classification management." Folksonomy may be said to be metadata from and for the masses (Merholz 2004). In the etymological and connotative meaning of the term, the intention of folksonomy is to create a better, more popular and thus more democratic alternative to the elitist and undemocratic taxonomy. Folksonomies are thus created by the people for the people on the basis of the premise that categorizing people can create a categorization that will better reflect the people's conceptual model, contextualizations, and actual use of the data. With folksonomy, it would in this way be possible to create a more representative, natural, comprehensive, diversified, up-to-date and dynamic categorization than through the classic taxonomy.

This means that folksonomies are an expression of a paradigm shift away from classic cataloguing for better or for worse (Gorman 2004), with people everywhere beginning to tag information with their own words on the Internet. Folksonomies are spreading exponentially on the Internet and are now created by millions of users in a system which is no longer restricted by language or geography. Categorizing of information used to be a specialist job for a producer or a librarian, but now it is not just a professional job for the few, rather it has become a job for everyone and no one. The separation between user and producer implodes with user-generated metadata, when the active, co-creating user contextualizes and categorizes information in his new dual role as both producer and consumer, where meaning is created through self-reflective use and co-creating construction. Data explosion, digitalization and democratization of information have thus lead to privatization, socialization and individualization of the cataloguing of data through metadata. This has resulted in new systems for categorizing information spreading complementarily, in parallel or as a substitution for the classic semantic and hierarchical classification principles.

Folksonomy may be seen both as an individual act and as an expression of many people's collective, but independent, recording of metadata. As an act, it is the individual person who categorizes and thus tags information with his or her own metadata by adding personal keywords. In this way, a personomy of individual tags is created. To rephrase, folksonomy as an expression is a function of the total sum of personomies, where the individual users collect and tag in order to explore, remember and retrieve their own knowledge, thus creating a shared opportunity to explore and retrieve.

This sharing and copying of knowledge is of no great cost to the tagger; however, it is of great benefit to all. The individual taggers will invest their time and effort in helping themselves, and without further cost they will implicitly also help other taggers. In this sense, folksonomy is based on a more or less explicit social contract, where the individual tagger invests his or her personomy in order to relate his or her own personal categorization to that of others. Everyone can see and use the folksonomy, but if you choose to be excluded from the contract and not contribute with your own metadata, you will be forced to follow other people's keywords at random. However, if you choose to register as a user and start tagging pages as an active and contributing participant in the folksonomy universe, you will be rewarded, as the tags and links that you add are contextualized dynamically in a user-generated system and become transparent. Metaphorically it may be said that the benefit of participating in the social system of the network is that you can always see an updated "exchange rate" of your individualized world picture relative to other people's world picture. Here, the "exchange rate" is an infinite, relational social semiosis where everyone associates each other's associations further.

Since Thomas Vander Wal coined the term folksonomy, there has been a consensus that folksonomy is the collective term for a type of social classification on the Internet. However, this is an imprecise and incorrect definition. The distinctive feature of folksonomy is that it is not classification in a strict sense, but loose, horizontal social categorization (Jacob 2004). Folksonomy consists of disconnected and loosely related keywords, which ideal-typically exist

in a coordinated horizontal universe, only connected by associative relations. Here, there is no hierarchy between superior and subordinated concepts. No keywords are children, parents, twins or synonyms as in classic taxonomy. In theory, the user may thus choose freely without considering the hierarchy. In practice, however, there are forms of categorization in the folksonomies where the relations between the individual tags are hierarchical, because the user chooses tags that are not coordinate but subsets of each other. All words in the folksonomy are thus in theory unrelated. Only the associative relations between keywords are generated on the basis of the collaborative recording of tags. Contrary to formal taxonomy and classification, folksonomy thus lacks the explicit relations with predefined, consistent, descriptive and shared terms expressed as a controlled vocabulary (Mathes 2004). A distinctive feature of folksonomies is thus the possibility of adding one's own keywords unsupervised, and viewing the keywords added by other users unsupervised. By using other popular keywords, your own tags are rendered visible and you have the opportunity of following the tags of others with the same popular keywords.

In this sense, folksonomy may be regarded as a popular shift away from the hierarchical, controlled and authoritarian ways of categorizing information, where the user chooses not to learn a hierarchy but instead releases his or her own personal association chain in a common social forum (Quintarelli 2005). This is based on the notion that this forum makes it easier to find the relevant information, provides more transparency in respect of other people's knowledge, contains more representative, rational knowledge due to the number of participants, and that the knowledge in this system is more up-to-date, because it is more dynamic and social and is created through widespread collaboration over the Internet (Surowiecki 2005).

As mentioned, the principle in folksonomies is that the user adds information to both his or her own and other people's information sources. This process of adding metadata is called tagging. The user thus tags information with metadata and can subsequently use the generated metadata to organize the data. Metadata are of cause the pillars of all taxonomies and categorizations and the guiding principle of many content management systems in which the pages are compiled and placed according to the dimensions of the metadata. In connection with searches, metadata often also play an important part as a categorization tool in combination with free-text search.

1.1 Strategies for Organizing Content

Basically, there are three strategies for creating descriptive metadata and thus organizing content: hierarchical, polyhierarchical, or horizontal (Quintarelli 2005). In its pure form, taxonomy is vertically constructed in a hierarchical structure, in which descriptive data are assigned on the basis of predefined rules. Different types of information fit into different places in the often very comprehensive hierarchy of classes, such as supercategories or subcategories or synonyms. Everything has its place, and if you know the system, it is fairly easy to retrieve information. Because integrity and consistency are its strength, this strategy requires a comprehensive overview, consistency, and a methodical knowledge requiring professional metadata administrators (normally librarians), who will assign the information to its rightful place in the system.

With a polyhierarchical strategy, it is possible to go across the hierarchical structures in a kind of faceted classification, where the same information unit may be assigned different facets which may then be used for searching. A facet is a category (Ranganathan 1962; Ranganathan 1964; Wynar 1992). The notion behind faceted classification is to create a higher degree of multidimensionality in the metadata. For each search, the different facets are filtered and selected until the user reaches a manageable and limited set of facets meeting the entered search criteria. In stead of navigating through a predefined hierarchy, the organization is determined on a current basis by the user's searches and thus by the dynamic polyhierarchies. Thus, the search is dynamic, but limited, since the facets have been defined centrally and as a final repertoire updated through guided navigation (Vickery 1966) in contrast to folksonomy, where the repertoire is infinite and decentralized. The difference between the faceted classification and folksonomy is that in the former there are many categories of links, while in folksonomy every link is a category.

While folksonomy can clearly be distinguished from the two other principles in all dimensions as a radically different and innovative way of creating metadata, because it is the user who creates the structure, taxonomy is centralized, hierarchical and structuralist, and faceted navigation is polyhierarchical structuring with a predefined set of facets. In both cases, the user's role is more limited and structured than in folksonomy.

2. A Case of Folksonomy: *del.icio.us*

The Internet now features a vast number of programs supporting folksonomies as a social practice, e.g. computer programs such as *Flickr, Technocrati, Shadows, Yahoo!, My Web 2.0* and *del.icio.us*. In order to create a better framework for the discussion of folksonomies, *del.icio.us* has been chosen for this case, as the program was one of the first and is one of the leading folksonomies. In December 2005, the inventor of *del.icio.us* was named the Innovator of the Year by Massachusetts Institute of Technology's *Technology Review Magazine* for his work with the *del.icio.us* program. The name *del.icio.us* contains an invitation for the users to compile everything that is delicious.

Del.icio.us is a broad folksonomy, because many people tag many different websites as well as the same websites, as opposed to the photo database *Flickr*, which is a narrow folksonomy, where few people tag their own pictures with their own words (Vander Wal 2005). *Del.icio.us* is essentially a system that can be used to keep track of your own and other people's bookmarks on the Internet by saving links for selected pages and adding your own keywords in connection with the link. These keywords are the information architecture and navigation principle of the website. The users can basically do four things in the system: They can follow a certain tag (e.g. business), follow a certain user or group of users, or create their own lists of tags. When the users press a keyword or create their own keywords, they can see what links other users have added to the same or related keywords. This requires registering as a user and opening an account, in which you then gather links and related keywords of your own choice in a very simple interface. You may then choose to publish your keywords and links and thus share them with others, who may follow the tags and see what other users in turn tag with the same keyword. This unique knowledge-sharing technology provides new scope for sharing bookmarks and keywords between large groups of people who used to be separate in time and space, but who are now joined in the words they use to describe the world. The technology thus creates the opportunity of having a joint association field on the basis of the total sum of tags. *del.icio.us* users call this a tag cloud – a joint cloud of tags in the form of keywords.

It is clear in the system that the user-generated tagging does not result in anarchy or coincidence, but tends towards a consensus on specific words related to a specific website over time. This will be obvious to any user of the system. You would think that the opportunity of choosing tags freely would create a chaotic and idiosyncratic mass of tags without a clear pattern. However, figures show that this is not the case. On the contrary, a number of patterns relating to frequency, interpretation communities and relations between the different tags can be seen in the *del.icio.us* database and among the almost 70,000 users. There is regularity in the way the tags are used, their frequency and the relative distribution of frequency between the different tags.

If we look at one article in *del.icio.us*, the pattern will become clearer. We have chosen a famous article by the American economist Milton Friedman from the *New York Times*, which has been tagged by 75 users. The article criticizes the idea of corporate social responsibility, and the message is that companies have been founded to make money for their shareholders and do not have to pursue politics by taking on a social responsibility. Of the total number of 198 tags from the 75 users, we can see that subject-wide categorizations are very predominant (*business*, *economics*, *politics*). We may also see a few examples of a task-oriented categorization (*toread*) and a formalistic categorization through the media (*article*, *articles*). Furthermore, there is a categorization based on the producer (Friedman) and related to time (future). Figure 1 below shows the frequency of the individual tags.

Concretely, over time the users of the system start to agree on which words best describe the content. Not surprisingly, it is the broad subject categories that take the prize as the ones describing the website article in the best possible way (Business, Economics etc.). Figure 1 clearly shows that this one article also follows a pattern where a few tags are over-represented. This may also be visualized in an abstract sense in the following way, where we see a marked over-representation and use of certain keywords for the entire database (see Figure 2).

The curve demonstrates that a so-called power law exists in the users' tagging of pages where a few keywords are used to tag several websites (Shen and Wu 2005). As mentioned, the power law results in some tags being very dominant and frequently used. The majority of tags are peripheral and used very rarely.

Many of the authors who have written about folksonomies and *del.icio.us* acknowledge the existence of these patterns and the power law (see, for example, Shirky 2004 and Shirky 2005). The majority of authors note the existence of some or all of these regularities; however, they do not provide an actual explanation of the background: What is the impact

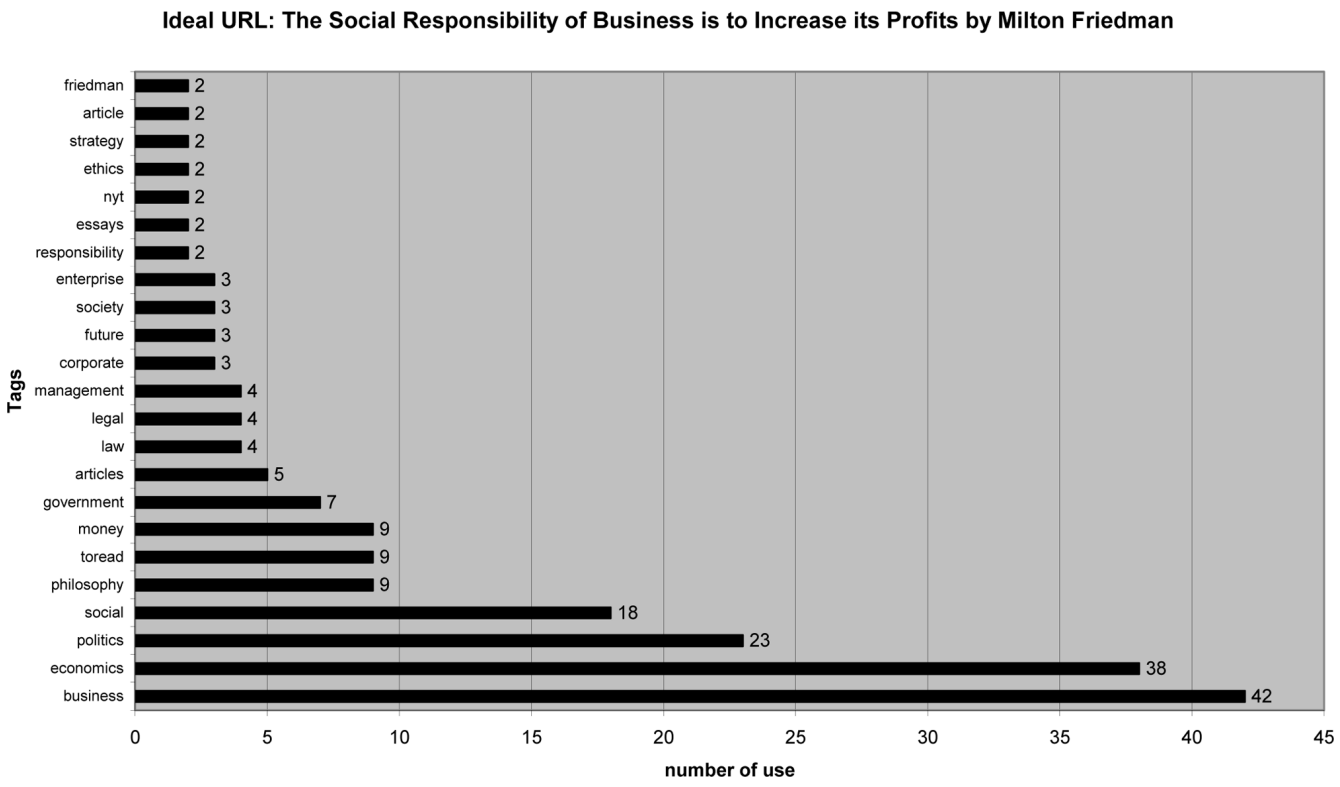
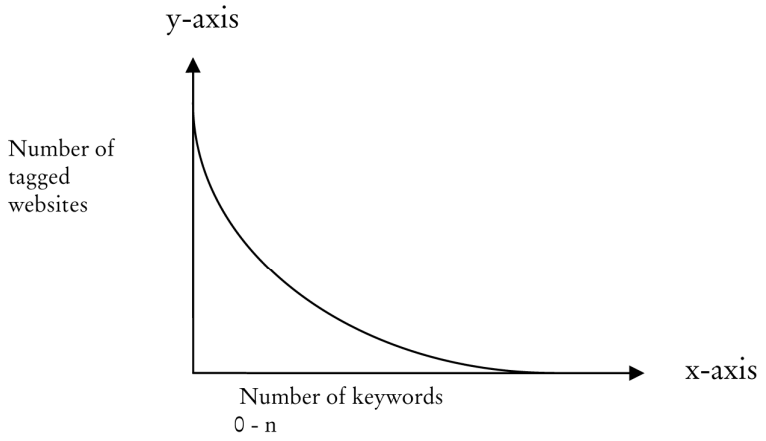


Figure 1. Frequency of individual tags



The x-axis represents all the tags used in folksonomy.
The y-axis is the number of websites tagged with the tags on the x-axis.

Figure 2. Power Law and User Tags

of the power law with the broad cognitive categories on the benefits of *del.icio.us*? What is the impact on the benefit of using the system? And most importantly, why does power law arise?

The only attempt to explain power law in this context has been made by Golder & Huberman (2006), whose descriptions relate specifically to *del.icio.us*. They explain the patterns in *del.icio.us* as a result of three equal factors: imitation, knowledge sharing and the robustness of the cognitive concepts. Imitation and thus the constancy take place through the users' copying of other people's tags, where the

dynamic is that the users perceive it as more legitimate and "safer" to use other people's tags than finding new tags themselves. The two authors consider this imitation to be an expression of a social imitation, where other people's use is social "proof" of what is right and thus safe to copy. Consequently, the explanation is sociological, and the premise is that popularity is attractive and becomes even more attractive in step with the popularity of the keyword. At the same time, they believe that stability is a consequence of the fact that the users have a number of work-related joint interests and thus the same world picture, for which reason they conceptualize/tag the world in the same way using the same keywords. In this world picture, certain keywords are dominant, because *del.icio.us* is predominantly a tool with a specific dominant purpose. In this case, the purpose is to solve certain IT-related work assignments. According to the two authors, while ideas come and go, the terms used to describe the world and thus the changing ideas of the time are far more constant and less dynamic. They do not change much or quickly. This is a tendency in the database which is reinforced by the fact that it primarily concerns the operationalization of basic and very broad categories. The constant is thus a consequence of the robustness of our system of concepts and of the abstraction level and thus the representativity of the basic categories.

Golder & Huberman's explanations of the stability and imitation dynamics are not sufficiently thorough. Explaining the stability as imitation, knowledge-sharing, and socio-linguistic robustness is essentially a conceptual displacement and a process description, where it is not clear what creates the conditions and the dynamic driving imitation, but only imitation explained as imitation. Imitation is thus both a premise and conclusion in respect of the process description. There is no coincidental imitation in the system, where everything is imitated to the same extent; only imitation is selected. Explaining this as an expression of social behavior does not explain why people perceive it to be "safer" to copy others. What creates this perception of safety, and what drives the users to do it? Is it because you buy other people's meaning in this way? Is it because you agree? Or because you do not have the time or the resources to make your own "unsafe" tags? This remains unclear, because it is uncertain what the social proof, although it is proof, is proof of.

In the same way, the concept of knowledge-sharing is an explanation providing a new concept for the description of the same process; however, it far from explains the imitation or puts it into perspective. The cognitive robustness may partly explain the accessible universe of conceptualizations and thus possible tags; however, it is a long way from explaining the constancy in certain categories and tags. We have the same linguistic terms to describe the world; however, the universe is so enormous and the combinations are so many among the almost 70,000 users that the robustness and the common basis can no longer explain the imitation. In the following, a different explanation of what creates these patterns for knowledge-sharing, tagging, and imitation in the database will be described in order to provide a better explanation than that of Golder & Hubermann.

3. How to Explain Power Law

What is fascinating about the power law in the system is that, as in other complex systems, the system is holographically organized, where all the tags follow the power law; however, the tagging of each individual website also follows the power law. This means that the shared power law consists of a million different power laws. This is the fractal organization principle seen in complex systems and recurring in folksonomies. The theoretical starting point is the emerging scientific network theory, where it has been demonstrated mathematically that all complex networks follow a number of general regularities. The connection between the different vertices in the network is thus not a coincidence; rather it forms a pattern. The pattern of all complex systems is the power law. In *del.icio.us* and in many other networks, a few vertices in networks have many connections, while the majority of vertices have few connections (Barabási and Albert 1999; Barabási 2000; Barabási and Albert 2002; Shen and Wu 2005). These central vertices are very important for the functioning of the network, while the majority of vertices play a more peripheral role. The power law thus not only appears in *del.icio.us*, it may be found in a number of biological and non-biological systems. It may be perceived as a law of nature for complex networks. As described by one of the leading network theorists, Barabási and Albert (1999, 59), writing on the power law and the common topology for all complex systems:

> Systems as diverse as genetic networks or the World Wide Web are best described as networks with complex topology. A common property of many large networks is that the vertex connec-

> tivities follow a scale-free power-law distribution. This feature was found to be a consequence of two generic mechanisms: (i) networks expand continuously by the addition of new vertices, and (ii) new vertices attach preferentially to sites that are already well connected. A model based on these two ingredients reproduces the observed stationary scale-free distributions, which indicates that the development of large networks is governed by robust self-organizing phenomena that go beyond the particulars of the individual systems.

The power law has thus been found in networks as diverse as the relation between Hollywood stars, the distribution of wealth in a population known as Pareto's Law (Frank and Cook 1995), the pattern of scientific references, the relational size of big cities, active words in the English language (Zipf's Law), and in many biological systems (Barabási and Albert 1999; Barabási and Albert 2002). The power law has its own cumulative dynamic over time, which is popularly called the "The rich get richer" effect or the "The winner takes it all" logic, because winners become more and more victorious over time. This dynamic is also called the Matthew Effect, because the system follows the line in the Gospel of Matthew saying that "For unto every one that hath shall be given, and he shall have abundance."

As described in the Barabási quote, the power law arises because the network expands with the addition of new vertices which must be connected to other vertices in the network. In the case of *del.icio.us*, this takes place with the addition of new tags. Secondly, the new vertices have a general tendency to be attracted by the vertices that have many connections, have existed for a long time and already have a high frequency. The stronger and more well-connected a vertex is to begin with, the more probable it is that new vertices/tags are connected with it. In *del.icio.us* this means that the users have a tendency to use the keywords that already exist and which many users have already chosen. The power law is based on the principle of preferential attachment (Barabási and Albert 1999). In short, this means that popularity is attractive. The longer a tag has existed, and the more popular it is, the more attractive it will be. As described by Barabási and Albert (1999, 511):

> These examples indicate that the probability with which a new vertex connects to the existing vertices is not uniform; there is a higher probability that it will be linked to a vertex that already has a large number of connections …. Because of the preferential attachment, a vertex that acquires more connections than another one will increase its connectivity at a higher rate; thus, an initial difference in the connectivity between two vertices will increase further as the network grows.

The strong tags in *del.icio.us* are naturally the broad tags, since they can be connected to most websites because they are so broad. In the *del.icio.us* database, it is, for example, evident that the broad basic keywords are the ones added to most websites. However, the constancy in the tags may be explained by the fact that the popular tags are attractive over time. The existing tags are ever visible in the system, which makes it very probable that they will be used again. This creates constancy. Here, the fact that the system makes existing keywords and information about them visible (the "Most popular" function) plays an important part in imitation. The closest that the scientific network theory has come to explaining preferential attachment is by referring to it taking place "due to the local decision … based on information that is biased toward the more visible" (Barabási and Albert 1999, 512). The authors continue to express this somewhat vaguely:

> Similar mechanisms could explain the origin of the social and economic disparities governing competitive systems, because the scale-free inhomogeneities are the inevitable consequence of self-organization due to the local decisions made by the individual vertices, based on information that is biased toward the more visible (richer) vertices, irrespective of the nature and origin of this visibility.

Unfortunately, this explanation generates more questions than answers. This quotation still lacks an explanation of "The local decision." It is mentioned only that the phenomenon may be explained by the degree of visibility, competition and as an individual decision. The scientific network theory can thus explain how imitation takes place in all types of complex systems; however, not why people decide to use the same tags. In classic scientific network theory, we thus see a naturalization of the power law as a law of nature in all types of complex systems, which, unfortunately, limits the scope for explaining this regularity. The scientific approach seems convincing in its

empirical and mathematical interpretation of complex systems and its description of the power law. However, this perspective seems more like a descriptive understanding and a model used to show the dynamic than as an actual tool for explaining it. Consequently, the mathematical modeling of the power law says nothing about its origin or background. As poignantly described by the famous biologist Evelyn Fox Keller (2005, 1066) in her critical essay "Revisiting 'scale-free' networks":

> First, power-law distributions are neither new nor rare; second, fitting available data to such distributions is suspiciously easy; third, even when the fit is robust, it adds little if anything to our knowledge either of the actual architecture of the network, or of the processes giving rise to a given architecture (many different architectures can give rise to the same power laws, and many different processes can give rise to the same architecture). Finally, even though power laws do show up in the physics of phase transitions, the hope that the resemblance would lead to a "new and unsuspected order" in complex systems of the kind that physicists had found in their analysis of critical phenomena appears, upon closer examination, to lack basis.

Natural science is thus not very helpful when it comes to explaining preferential attachment. It is explained as a unique and dependent feature of any system, which may not be explained by the general theory for complex networks. Albert and Barabási (2002, 83) explain it as follows:

> It is now established that highly connected vertices have better chances of acquiring new edges than their less connected counterparts. The Barabási-Albert model reflects this fact by incorporating it explicitly through preferential attachment. But where does preferential attachment come from? We do not yet have a universal answer to this question, and there is a growing suspicion that the mechanisms responsible for preferential attachment are system-dependent.

Consequently, despite the fact hat the power law is evident everywhere in nature, there is no unambiguous explanation of where it comes from. This must be explained differently for each network. This also means that the mathematical network theory can easily co-exist with other theoretical explanations provided in this article. The scientific network theory is thus not able to provide an unambiguous explanation of the background to imitation in *del.icio.us*; however, it does provide a number of tools for better conceptualizing the degree and quality of knowledge sharing in the system. To explain the "local decision" we must turn to other types of theories which better capture the special aspects of *del.icio.us* as a complex system.

4. The Cognitive Economic Explanation of the Power Law in *del.icio.us*

In cognitive psychology, a great number of empirical studies of how the brain categorizes, when the categories, as in folksonomy, are not predefined, have been carried out (Rosch 1976). These studies unambiguously show that people spontaneously use basic names as keywords in unsupervised categorization (Rosch 1976; Jolicocur and Kosslyn 1984). Generally, people thus categorize through a number of cognitive basic categories which everyone is able to activate directly. The basic level of categories plays a central role in cognition and in any form of categorization. This may be perceived as an archetypical abstraction level in an implicit shared taxonomy (Rosch 1976, 382). The basic categories may be defined as follows:

> Categorizations which humans make of the concrete world are not arbitrary but highly determined. In taxonomies of concrete objects, there is one level of abstraction at which the most basic category cuts are made. Basic categories are those which carry the most information, possess the highest category cue validity, and are thus the most differentiated from one another. Basic categories are shown to be the most inclusive categories for which a concrete image of the category as a whole can be formed, to be the first categories sorted and earliest named by children and to be the categories most codable, most coded, and most necessary in language.

The basic-level categories are the large, broad denotative categories that the brain processes fast such as cat, dog, car, house etc. These may be perceived as prototypical categories for a group of objects. These basic categories have the highest cue validity, which may be defined as (Rosch and Caroly 1975, 575):

> The validity of a cue is defined in terms of its total frequency within a category and its proportional frequency in that category relative to contrasting categories. Mathematically, cue validity has been defined as a conditional probability – specifically. The frequency of a cue being associated with the category in question divided by the total frequency of that cue over all relevant categories.

These categories are very basic and thus require few cognitive resources to activate (Rosch 1976). By activating these basic categories, you can thus save cognitive resources, because you do not have to consider category conflicts or the deeper meaning of the content. The basic categories are created as a function of a cognitive economizing and task assessment on the basis of the requirements and expectations of the surroundings (Rosch 1976, 383).

In a cognitive sense, social tagging as in folksonomy thus activates the problem of what to define as a basic category for whom, since different tags of varying degrees of specification may be added to different subjects on the basis of who knows what. The basic categories may thus vary due to differences in knowledge and culture (Tanaka and Taylor 1991, 457-82). Friedman's article can be tagged with everything from *economics* to *neoliberal shareholder theory*. For people who know a little about Friedman, the first very general tag is the best way they know how to categorize the article; however, for a professor in corporate social responsibility at the London Business School, the last more specific category could be the immediate categorization. The point is that different people have different ways of categorizing the world on the basis of how much they know. And the more you know, the more thoroughly you can categorize. They have different basic levels and immediate basic levels (Tanaka and Taylor 1991, 457-82).

In social bookmarking systems, the different categorizations and knowledge levels meet between people and in respect of the dynamic development of different people's ability to categorize. The thing is that a person's own basic categories are not constant over time either; they develop dynamically in step with the acquisition of new knowledge. The professor from London Business School would thus not have categorized Friedman's article as for instance *neoliberal shareholder theory* while he was still a bachelor's student. Then, he would in all probability have used the tags *business* or *readlater*. But now, after many years of studies, he is able to tag the article more precisely relative to the content. Over time, his basic level has changed.

The point is that the benefit of knowledge sharing in connection with the *del.icio.us* system depends on whether the user's categorization of his or her surrounding world corresponds to the way in which other users in the system categorize the world. The challenge is to find twin thinkers who categorize the world with the same terms and connect the terms with the world in the same way. The ability to find these twin thinkers is one of the system's greatest strengths.

For example, as mentioned before, few of the users work with marketing, branding or PR. This means that people who are interested in these subjects and know many terms in this area have relatively less to gain by participating. They simply lack terms for searching. Here, there are not only too few tagged bookmarks; there are also too few categories within these subjects. It is simply not interesting to use the system for these subjects, as the categorization is not detailed enough and the user group is too small. On the other hand, the benefit is greater within the areas where the users have far more varied categorizations, and where there are more people with knowledge about the subject. In the *del.icio.us* database this applies to the IT field. Here, there are far better and more varied conceptualizations and thus more to gain from knowledge-sharing. This all points to the fact that the system's possibilities and limitations in respect of knowledge-sharing are mainly a consequence of practice, including which people choose to participate in the system with which resources and levels of basic categories. The quality of knowledge-sharing thus does not depend on the quantity but on the quality of participants.

As explained above, the system is characterized by a power law created by an imitation logic, where the majority of users often use very broad and few, widely known keywords, which provides more broad and imprecise information than a little precise information. This wish for quantity over quality may probably be explained by different cognitive factors. Firstly, the broad basic categories are intuitive and part of the immediate repertoire in the cognitive consciousness.

Furthermore, the users are without doubt driven by a cognitive simplification principle in their categorization (Chater 1999; Chater and Pothos 2002). By choosing very broad categories, users save cognitive resources and can just add the first impulsive basic categories directly without having to consider it much. In this way, users do not have to reflect on the

depth, hierarchy or the keyword's family or associative relations. The cognitive explanation of imitation logic thus forms a contrast to other explanations. In other explanations, imitation logic is a consequence of dedication, investment and attitude. However, in the cognitive explanation, the power law occurs in the unsupervised categorization as a consequence of the need for simplification and complexity reduction (Chater 1999; Chater and Pothos 2002; Chater and Hurley 2005).

This point has also been made by the linguist Zipf in his comprehensive statistical analysis of the use of words in the English language (Zipf 1949). In this analysis shortly after World War II, he found that a power law represented the distribution of words in the English language. He explained the existence of this power law with the concept of least effort. What he meant by this was that the speaker endeavored to save cognitive resources by exerting the least amount of effort, while the listener wanted to get the most out of it and required more from the speaker. The relationship between the speaker and the listener is thus a struggle between the attempt to communicate with the least effort and to understand with the greatest benefit. Zipf referred to this trade-off as the least effort, and it is this least effort that is significant in folksonomy. Zipf's power law is thus also driven by a cognitive economizing in addition to other biases and thus supports Chater's central premise, as described by Vogt (2000, 125):

> Humans undoubtedly try to minimise the cognitive effort to categorise sensorimotor events. It is therefore plausible that the tendency to use generalised categories is a bias that – *in addition to other biases*, such as reducing articulatory effort (Zipf, 1949) and other frequency-related approaches – yields the emergence of the Zipf-Mandelbrot law.

For both Zipf and Chater, simplification is thus a basic dynamic in the cognitive consciousness when objects are to be categorized and classified (Chater 1999).

The idea of the economizing of thought may be traced back to Ockham's razor in scholasticism and the contemplations of the empiric scientist Mach on the explanative power of scientific theories; however, it has later been brought up again in the cognitive psychology. An exponent of this is the cognitivist Nick Chater, who views the hunt for simplicity as a fundamental cognitive principle:

> "The cognitive system imposes patterns on the world according to a simplicity principle: Choose the pattern that provides the briefest representation of the available information. The simplicity principle is normatively justified – patterns that support simple representations provide good explanations and predictions on the basis of which the agent can make decisions and actions. Moreover, the simplicity principle appears to be consistent with empirical data from many psychological domains, including perception, similarity, learning, memory, and reasoning. Thus, the simplicity principle promises to serve as the starting point for the *rational analysis* of a wide range of cognitive processes." (Chater 1999,273)

The general principle of simplification and reduction of cognitive complexity has subsequently been demonstrated empirically by Chater through a number of tests with unsupervised categorization, using an experimental design which is essentially identical to tagging as a cognitive process in folksonomies. In these experiments with unsupervised categorization, the test persons automatically choose the simplest categories. As expressed by Pothos & Chater (2002, 333):

> There are situations where people would spontaneously recognize that a set of objects can be organized in different groups, with no information either about the number of groups sought or the distributional properties of the objects (in other words, there are no prior expectations for the objects to be categorized).We have argued that this process of unconstrained classification is a process like perceptual organization. Utilizing the simplicity principle from perceptual organization …. we proposed and empirically tested a simplicity model for unsupervised categorization.

The Internet is full of millions of websites and the users have a limited amount of time to search, for which reason they sometimes try to save cognitive resources, because they are driven by the need for cognitive economizing. Therefore they often choose the shortest and fastest entry of descriptive metadata. In the words of Friedrich Nietzsche (1980, 330): "To predict the behavior of ordinary people in advance, you only have to assume that they will always try to escape a disagreeable situation with the smallest possible expenditure of intelligence." It will be the basic-level categories that are the preferred descriptive metadata, because they are the fastest and

most profitable solution to a disagreeable situation with the smallest possible expenditure of intelligence. This is due to the fact that the basic categories are the most coherent categories in our shared world picture, which is determined by culture, as described by Pothos & Chater in their article on the relation between the basic-level categories and unsupervised categorization (2002, 309):

> A possible relation can be established between basic-level categorization and unsupervised classification. Rosch and Mervis (1975) noted that out of the hierarchy of more or less general categories into which we may place an item (as being a Scottish highland terrier, a terrier, a dog, an animal, a living thing, and so on), there appears to be a privileged 'basic' level. This seems to be the default level for identifying new objects with linguistic labels (seeing Fido, the default is that we say or think "A dog!" rather than "An animal!" or "A terrier!"). The notion of basic-level categories has been supported from a range of converging sources of evidence. For instance, basic-level categories lead to rapid picture naming in comparison with subordinate or superordinate categories, and there is less between-participant variation concerning what attributes objects have, if they belong to basic categories (Rosch, Mervis, Gray, Johnson, & Boyles-Braem 1976). Similarly, Mervis and Crisafi (1982) showed that basic categories are privileged in naming and other category-related behavior of children (see also Horton & Markman 1980). Basic-level categorization can relate to unsupervised classification if basic-level categories are viewed as *especially* coherent.

The cognitive basic categories are activated because they reduce the cognitive complexity consisting of the following (Chater and Pothos 2002, 335):

> According to the simplicity principle, the best explanation of a set of data (e.g., patterns of sensory input, or a set of objects) corresponds to the shortest description that encodes that data. Similarity- and theory-based categorizations can then be viewed as complementary ways of building short descriptions of available data. For example, the category of birds may be justified on the basis of similarity, to the extent that birds are highly similar, so that it makes sense to encode their common properties in a single category, rather than separately for each specific bird. But equally, the category of birds may be justified by the commonsense 'theoretical' generalizations defined over birds, concerning their biology, behavior and so on. One classification is preferred to another, if it provides a shorter overall description of the relevant data.

According to these theorists, the least effort is thus probably the dynamic behind imitation and reproduction in the system. The most popular tag is the shortest possible tag. These are typically monosyllabic words which can be written in a few seconds, such as *blog*, *web*, *read*, *ajax* etc. – all among the keywords most frequently used in *del.ico.us*. The most important quality of all tags is that they are easy to write and are the shortest overall description of the relevant data. However, the cognitive perspective is not unproblematic and should be varied a bit. The theory of simplification cannot stand alone as the only dynamic in the users' categorization. The users choose not only the shortest possible tag; they also categorize in relation to certain interpretation communities and tagging strategies. Complexity reduction must thus be regarded as a dynamic which is contextually activated according to interpretation communities and pictures of the world.

It is probable that the users are what we could call "lazy." However, they are lazy in different ways in respect to different subjects according to who they are and what they know. The ways in which the users' "laziness" differs can be seen as a function of interpretation communities and tagging strategies. Consequently, there is a tendency of homogenization in the system, making the few, strong keywords have a great influence. The point is that the users are likely to act on the basis of the equation: great knowledge sharing benefit = a large and surprising volume of information from many users if you use very popular keywords. The broader the keywords, the more contextualization and transparency, even though the result becomes more imprecise. This may be illustrated as follows: If we, for example, look at the very popular tag *branding*, we will potentially get the opportunity to see far more references, more people will refer to the term, more people will see the tags, and we will get a lot more information than if we used a narrower, more precise, but less popular tag such as *corporate_branding*. If we used this tag, we would have more precise but fewer links to this

keyword. The very existence of power law shows that many users clearly reject the few, but more specific, keywords, in favor of having more and more imprecise keywords. This is underscored by the information architecture in *del.icio.us*, where all tags are quantified and given a number. We thus see that the most popular is made visible, and what has already been purchased is offered directly to the new shoppers. In this way, the power law is made visible, which again reasserts its power. Thus, in *del.icio.us*, you always see the most recent entries first, regardless of which keyword you are following. In this way, the system is in its essence centered on news value and in this sense always reflects the classic news criteria and how the media always choose the news and thus also always reject that which is no longer news. In this way, the system's organizing impetus becomes news and not lasting relevance.

It also means that these systems tend towards favoring contagious information. Contagious information becomes clearly visible in the system, and often you will see that the same links appear several times on the same list, because new participants are infected with these links and spread the information virus in the social system. In this sense, the system may also be criticized for being meme-centric (the people who are very contagious become stronger) and having a viral bias (what is reproduced often, gets more power).

The problem is that the potential value of the distributed cognition in folksonomy is reduced, because the system is affected by and favors information cascades exemplified by the fact that contagious information, the possibility of easily copying one's own previously used keywords and unproblematically copying keywords used by others are all aspects characterizing the system. (Bikchandani, Hirshleifer et al. 1992; Bikhchandani and Welch 1998). They are follower processes where the users copy and imitate other people's tags without considering how to tag in relation to a given website. This is also a consequence of the cognitive economizing and is reinforced by the fact that the system automatically offers users the opportunity to see other people's tags as well as their own previous tags. In both cases, the user is lured into not using his or her own current and private information but only copies from others or from a previous cognitive investment from another context. This means that the cognitive load is reduced much too much (Macgregor and McCulloch 2006, 4). The result is an accelerating sequence of uninformed choices (Surowiecki 2005, 54). The complexity reduction and cognitive economizing are also due to the fact that most users of the Internet skim more texts than they read. There fore we may presume that some people in practice add keywords or copy other people's keywords, without necessarily having read the texts or links they are tagging. They simplify because they cannot make it more complex. In this way, the power law is reinforced by the widespread cognitive simplification and eternal hunt for the shortest possible entry of metadata. This suspicion is partly backed up by the frequency with which keywords such as *readlater*, *toread*, *checkoutlater* occur. These are all tags illustrating that articles are tagged to the system, but have not been read. The system also contains many lists to which the users do not add keywords at all. Here, folksonomy is thus simply used as a collection of links. We thus probably see a decoupling of parts of the system, where only a few parts are used, while others are ignored. Again an indication that cognitive costs of a more full use of the system are considered too high by some users and thus represent what you could call cognitive economizing is a central selection criterion.

In other words, much seems to indicate that bookmarks circulate unread in the system, while they have been skimmed and given, at best, imprecise and general and, at worst, incorrect keywords. This situation is probably the result of many users' implicit maximizing strategy for knowledge collection, where they rarely reject information out of fear of not being able to retrieve it. On the basis of the notion of "better safe than sorry," large amounts of information are piled up – information that has not been read but only skimmed and given a number of superficial, very simplified keywords taken from the brain's immediate store of denotative basic categories. As it is very simple to save links, and the cognitive costs of having to retrieve something in the chaos on the Internet, the majority of people choose to fill the system with texts that they have quickly skimmed with general and thus superficial keywords, which do not contribute anything towards actual organization. The fear of not being able to retrieve a website again is greater than the willingness to spend time and effort on a thorough read-through and tagging.

Consequently, the value of the system decreases, because the users most likely sometimes choose to simplify complexity considerably and spend too little time on tagging. The quality and the cognitive benefit are thus reduced as a result of the cognitive investments in the system being too modest. The power law, the imitation logic, the broad categories

and the constancy of certain tags may thus over time be explained as a more or less conscious wish to save cognitive resources. When a group of users save cognitive resources, it is obvious that the end result will be impaired. This may be regarded as the weakness of the system, while its supporters on the other hand indirectly consider it a strength.

In the cognitive sense, the system still has some strengths. Compared to related methods, folksonomy provides a better reflection of the users' cognitive conceptual models, practice and language for better or worse. Despite the fact that folksonomy in many cases probably reflects the users' cognitive simplification, complexity reduction is to be preferred, as it is closer to the users' reality and the living languages. In folksonomy, users create the keywords themselves, for which reason there is no distance between the users' conceptualization and the system's concepts, since they are identical. Compared to the classic taxonomies, folksonomy thus better reflects the users' own language and their world. They are iterative systems which dynamically reflect the dynamic development of language through quick updates *and not least the development of the co-producing users' own basic categorization over time.* Folksonomies may not be as precise, but the metadata have been created on the basis of the users' own horizons and are thus much more valuable than machine-generated metadata. However, idealistic supporters of the system cannot deny the lack of precision in the system. As mentioned before, individual websites are often described with an insufficient number of tags and with very general keywords, because amateurs do not necessarily understand or have not experienced the need for a stringent and precise hierarchization of the information. In this sense, folksonomies often do not yield better search results than using the same keywords in search machines such as Google, because the majority of the keywords used are very general and at a very high abstraction level such as *marketing*, *PR* or *business*.

Today, the strong keywords used are very broad, which enables the users to find many different "superficial" surprises under a term such as *business*. This form of surprise is, however, worth less than if the users were surprised more often through a more fine-meshed and varied categorization. It would thus provide a higher quality knowledge-sharing about e.g. "neoliberal stakeholder theory", if the surprise were based on new knowledge from new sources through very precise and varied subject headings, where the relation between the keyword and the source was deep – what could be termed "deep" surprises because the combination of keywords gives more knowledge where quality is explicitly defined as a combination of several specific keywords linked to the same website, which results in "deeper" metadata.. The homogenizing bias of the system, and thus the dynamic of the power law, is thus in many cases contra-productive relative to an optimal knowledge-sharing through the system, because the broad categories get the power.

The point is that optimal knowledge sharing is not brought about by a few broad keywords standing alone with many connections and a central position in the network. It is achieved by the existence of many varied connections between many different tags. The more homogenized, the higher the general density and the fewer "true" surprises, since people know the same, refer to the same and use the same few words. However, the higher the heterogeneity, the lower the general density and the more surprises, because there are more people who know different things and use different keywords at the same time at different websites. The more different tags people use, the more diversification and heterogeneity there is in the system and the more varied the categorization of the content will be. This is due to the fact that the benefit of the database and knowledge sharing, as mentioned before, depend on the match between one's own and other people's categorizations of the world.

The more varied people tag with several tags at a time, the more other people can learn from the tags. For example, if you tag Friedman's article with the keywords *business* and *economics*, you may learn that this article is about business life and economics. This is not a relatively great benefit. If you had used these broad tags in combination with a number of more specific tags instead, other users would learn a lot more about the subject and the article. But, take for example, the combination of the following tags: *business*, *economics*, *CSR*, *neoliberal stakeholder theory*. Here, the people who categorized the article with the very general tags could learn something with the existence of the more specific tags. The problem with the power law and the very broad subject categories in a network-theoretical perspective is that they mathematically give an excessive density between the few and strong tags, which reduces homogeneity and thus the opportunity of getting surprised by new tags and thus new conceptualizations. In this way, Granovetter's network-theoretical point about the strength of the weakest link also applies to a network like *del.icio.us* (Granovetter 1982; Granovetter 1995).

With Granovetter, it may be said that the problem is that the weakest links are too invisible in *del.icio.us* and that there is no dynamic in the system challenging and contrasting the homogenization and thus the strong, broad tags. In the system, lists of the most popular tags take up a lot of space on one's own lists and on the system's lists of all tags used.

Here, the supporters of folksonomies would of course raise objections and emphasize that the transparency of the system ensures that all keywords and thus also the weak ones are potentially visible. That is of course correct; however, the problem is that the keywords are relationally too invisible. They are impossible to find unless you know them, and they do not appear in combination with other keywords, because many often use only one or at most two keywords per website. The mere existence of the power law illustrates this point and shows that the law regarding the strength of the weakest link applies here. The message is thus that the optimization of knowledge-sharing is a function of the fact that different people collect and share different websites with as many different tags as possible to describe the same website instead of having the same people share the same knowledge, the same few strong tags and the same websites. In this case, you will risk having a high degree of redundancy, where you will benefit less from the system. The possibility of sharing new knowledge thus depends on the existence of many people who do not know the same. The best knowledge sharing thus happens when there are a number of structural "gaps" in the network of unconnected people, tags and websites, where there is a low density and thus a good possibility of surprises and acquisition of knowledge (Burt 1982; Burt 1992; Burt 2005).

While the supporters see a digital expression of the wisdom of crowds, the critics see wisdom dependent on who is tagging and how the majority tags. The fewer tags, the fewer combinations of several keywords, and the more botched and broad keywords, the more imprecise the tagging will be as a joint expression relative to the ideal. Information quality is thus not directly proportional to the number of participants, and the system is in its essence difficult to scale. The risk is thus that there is a direct proportionality between the number of participants and the volume of infotrash (Doctorow 2005), because a lot of people perhaps simplify, skim, and thus add general and superficial keywords, which means that everything will end up a chaos of meaning due to indolence.

The consequence of the fact that the shared tags have poor relevance and value is that most users choose alternative methods of assessing and selecting which information they want to reach, and here the populist functions in the system are preferred as a method of assessing the content of the database, because the metadata are so devoid of meaning and of such a poor quality. The search result will thus be what the majority prefers, and thus a result which is not very different from or better than that created by the classic search algorithms. As a result, folksonomies become a tool for becoming inspired and surprised within the framework of some very broad categories. This is due to the fact that the central search imperative and the most optimal use of the system are generally the hypothesis-generating intention and not a narrow and targeted search. The users thus want as much as possible in order to be as inspired as possible in the most possible ways and as cheaply as possible.

Thus, the power law supports and favors a certain explorative use of the system. The explorative benefit of using the system is partly a consequence of the use of the very broad categories. If you search on the tag *business*, you may also find everything under the sun. This may be expedient as long as you are exploring; however, it is less expedient if you are searching for subjects that may be categorized more precisely than *business*. For example, if you look for Friedman's article which could rightly be categorized under *neoliberal stakeholder theory*, the article is unfortunately almost impossible to locate, because it is categorized under *business* together with thousands of other articles.

In the face of such criticism, the supporters argue that answering concrete questions or locating specific articles are not the purpose and object of folksonomy. Rather the unique quality of folksonomies is that they can be used to explore a knowledge area and lead the users to unforeseen and unacknowledged knowledge resources. Through the system, you surf other people's networks of associations and contextualize your own associations. The system is thus excellent at assisting in the formulation of questions; however, it is not good for finding answers to unambiguous and clearly formulated questions. It is an excellent tool for explorative journeys and exploration of problems. As Mathes puts it (2004):

> There is a fundamental difference in the activities of browsing to find interesting content, as opposed to direct searching to find relevant

documents in a query. It is similar to the difference between exploring a problem space to formulate questions, as opposed to actually looking for answers to specifically formulated questions.

Ultimately, According to Mathes the purpose of folksonomies is not to find specific answers, but to be inspired by others. If the user is not able to find a certain thing, he or she will find something else. The lack of precision challenges the way in which the users would clarify the point and formulate their problems themselves. Folksonomy thus gives the user a unique chance to find what they are not looking for or what they did not know that they were looking for. Also in this context a combination of several keywords is, however, an advantage, because it provides inspiration for the generation of hypotheses. The definitory change in the purpose of folksonomy from the precise search to hypothesis generation does not affect the status and bias of the broad tagging – on the contrary, "deep" metadata support hypothesis generation. They help phrase better questions and new hypotheses. They generate learning.

Thus, the system provides a possibility of dynamic learning which is not offered by other organization principles. The user-generated metadata create room for learning and learning about learning by making the relationship between categories and objects visible and reflecting it. Knowledge-sharing through the system is, in this perspective, described as the result of cognitive categorization and associations. If you are better able to understand the cognitive processes, you will understand the conditions and thus the possibilities of better knowledge-sharing, both as an individual and as a social process. In this perspective, the problem regarding the quality and precision of metadata is shifted through differentiation of knowledge concepts and knowledge collection processes. Now, it is not a question of sharing knowledge, but of sharing a certain hypothesis-generating knowledge, for which reason the lack of precision and quality is not a problem, but a necessary prerequisite for the surprise. The system must thus be viewed as a tool for exploring and wondering, not for finding and understanding. This still means that the combination of several keywords at the same time and the use of many different keywords are even more important in order to reach the optimal knowledge-sharing.

5. Conclusion

At the start of this article, we raised the question of whether folksonomies are a better, cheaper and more valid method of creating descriptive metadata than taxonomies and faceted navigation. The answer is no. For different reasons, folksonomy is not a better, cheaper or more realistic method of creating metadata. In that sense, folksonomy does *not* represent an epochal paradigmatic and substituting shift that will replace other categorization principles. Such idealism is more of an ideological position, false essence thinking about folksonomy as a method and a media-essential idealization of the Internet at the expense of other media, than a scientific reflection. Folksonomy should not substitute for taxonomy and faceted navigation. Folksonomy is a complementary knowledge-sharing tool which *potentially* has the qualities that search algorithms, the classic taxonomies, and polyhierarchical principles, lack. The traditional methods are efficient tools for finding what you are looking for, while folksonomies are efficient tools for looking for what to look for. Folksonomy is thus an excellent tool for reframing, exploring, hypothesis-generating and contextualizing information on the basis of the user-created metadata's pluralism; however, it is no good if you want to find clearly defined information quickly and reliably. Only by combining the three different methods is the complementarity exploited, making the search explorative, pluralistic and teleological.

The reason why folksonomy has this complementary quality may be explained by two factors. The first is tagging in practice. Users often use very broad keywords to cover many different websites, and therefore there is great scope for surprise. The second reason is the dynamic of the system. Pluralism occurs as a consequence of the fact that the system makes it possible for a distributed cognition and network structure dynamics to emerge. The metadata created in folksonomy are not better, since the pluralism is often the wrong pluralism. The surprise occurs because many users spend too little time and too few resources adding the tags. Pluralism is thus a function of the fact that very broad keywords are used for too many websites too imprecisely. The essential ability of folksonomy to surprise and create the right pluralism is thus a potential and a possibility condition that may be utilized to a lesser or greater degree. The possibilities for this pluralism are conditional upon tagging as practice. When attempting to understand folksonomy and its potential, you

must necessarily stop the mistaken essence thinking, where you have looked at tagging in an ideal-typical way and not as a practice that could be better or worse. Because the better and more precisely you tag, the greater the potential. Here, better must be understood as a more precise and qualified relation between keyword and website.

In practice, the use of keywords in the system is often too basic and the categories are much too wide and often do not go beyond the name or the heading of a website. The poor and unqualified relation is a consequence of the fact that some users tag too superficially and invest too few cognitive resources in choosing the tag and checking the content behind the bookmark. The result will be that the users of the system use the broad basic categories with the resulting simplification, because they do not take the time to read or choose the most suitable keywords. The consequence is that there is a large pool of very superficial keywords and websites, which have, at best, been skimmed or, at worst, have not even been read, only copied.

The proof of this is first of all that tagging as a practice has many common features with experiments with free categorization. The important underlying dynamic in the system creating the imitations is thus essentially the cognitive simplification which has been demonstrated in free categorization. The descriptive metadata created in folksonomy are thus potentially poorer, because the imitation does not happen as a result of a major investment of resources, but as a consequence of the lack of time and will in the process. The power law, where a few strong tags become stronger, cannot in itself be criticized. This is a law of nature for complex systems. However, what can be criticized is the context of cognitive simplification, which means that the very general tags win. A power law driven by simplification is untenable and an important bias in the system. Polemically it could be said that the problem is that folksonomy is an expression of the meaningful cloud of tags with simplification. This is why folksonomy can and will be a fruitful foundation for the creation of more descriptive metadata in its present form. Folksonomy in its present form is thus not the magic entry to a better Internet based on the users' reception and not the senders' intention, the so-called web 2.0.

The realization of the true pluralistic potential is, however, conditional upon a number of properties in the people and their mutual relations in the system. In folksonomy, the associative semiosis among large groups of people is set free, which creates a distributed cognition, where the total sum of cognitive resources is only large because of the amount of people participating. However, not all tags are interesting, and some people have more in common than others. The result is thus not only dependent on how people tag; it is also dependent on who participates in the system in practice with which interests and qualifications. The users' "laziness" is thus also a function of these interpretation communities and is only structured on the basis of these cognition interests and the personal tagging strategies. The benefit to be gained from the system therefore very much depends on whether the users' motivation and tagging strategy are identical to the interpretation communities already existing in the system. If not, as in the case with the public relations field, the benefit to be gained from the system and from sharing bookmarks is quite limited. Either the user perceives the world as one big community of other users, or he or she has very little to gain by using the system.

For this reason, it is important to settle with the false myth about the wisdom of crowds and the magic belief that the mere volume and the system's self-regulating and emerging mechanism can create better metadata. The thing is that the constancy over time of the tags does not necessarily reflect a consensus of reflective meaning, but is a consensus to invest the fewest possible cognitive resources. The rest is a romantic and illusory idea about the emerging intelligence, which can be confirmed by this discussion. As described above, the problem is that the potential value of the distributed cognition in folksonomy is reduced, because the system is affected by and favors information cascades and is most likely biased towards cognitive economizing. To this should be added that folksonomy is still quite a new phenomenon, and many users have never before had the fascinating experience of transparency and flow, where you can easily "surf" other people's tags and see what they are thinking. Amidst all the enthusiasm for the new experience, the users are unable to assess the quality of this experience, because it is new and thus incommensurable to what they know. The point is that the quality and the experience could be better if the users in practice became better taggers and invested more time and effort.

The true pluralism and quality are, however, not only a function of who is participating in folksonomy. The quality of the tags also depends on which network relations exist between the participants in the system. The more heterogeneity and the lower

the density in the network, the greater is the possibility of being surprised in the true, "deep" way – defined as being challenged by other people's manner of categorizing the world and learning from their new additional keywords. The point is that the system works best if the other users know something that you do not, but tag it under the same keywords that you use combined with some other and more specific keywords from which you can learn something. This requires that there are knowledge gaps in networks which may be filled by the distributed cognition of folksonomy. Again, the value of the system very much depends on external factors such as who is participating in the system and whether someone in the system possesses knowledge that you do not, but expresses it through the same keywords in connection with new unacknowledged keywords. Many researchers have perceived folksonomy as a cheaper and more realistic way to create descriptive metadata. In short, it is not a very good route, because, as mentioned above, the users take a shortcut, most likely in many contexts. As in other systems, the "benefit" to be gained from a folksonomy is a function of the "investment." In this case, the total pool and quality of distributed cognition are reduced, because the investment made by the individual participants is sometimes insufficient. If folksonomies are to create "better" descriptive metadata, it requires that the users are taught how to become better taggers, just as people all over the world are taught how to write in order to become part of the pluralistic and democratic writing culture. In conclusion, we need a higher degree of "tag literacy", if the system is to realize its fullest potential. Otherwise, the future potential of the much too meaningful meaning of the least effort will be wasted.

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