

“VAGUE BUT EXCITING” – THE NARRATIVE BEHIND THE HISTORY OF TIMOTHY BERNERS-LEE’S INVENTION OF THE WEB

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“Science has never been speechless.”
Lorraine Daston

*“Weaving the Web is a unique story
about a unique innovation,
by a unique inventor.”*
Michael L. Dertouzos

Background. The history of science is a multifaceted endeavor. It comprises theory and practice of scientific inquiry, epistemological issues, the formation and evolution of scientific paradigms, language and science, but, above all, people’s trials and tribulations, needs and aspirations. Ours is the age of the World Wide Web – also termed as the WWW or simply the Web - part and parcel of present-day information and communication technologies age. The key person behind this seminal invention and disruptive innovation is the British scientist and engineer Timothy Berners-Lee.

Objective. The aim of this paper is to unveil the history of the World Wide Web through the prism of the narrative identity of Tim Berners-Lee – the WWW initiator and developer.

Methods. We used mixed (both quantitative and qualitative) methods, specifically, discourse analysis and postmodern narrative research methods, as well as quantitative Lawrence Anthony’s AntConc corpus analysis toolkit for the keyword, frequency, collocation and text analysis. The material of our analysis is mostly Tim Berners-Lee’s book “Weaving the Web” plus several other resources.

Results. The case of the WWW, specifically, the story of Tim Berners-Lee is an example of a “little narrative” that fits within the current postmodern narrative paradigm. His narrative identity is elucidated via Michael Bamberg’s “three-level positioning” narrative analysis technique: authorial positioning on the level of the story, on the level of the interaction, and on the level of self-defining. Berners-Lee is viewed as a humanist, an altruistic and modest person who is enthusiastic about scientific progress for the benefit of humanity.

Conclusions. The story behind the history of the WWW invention proves the importance of studying “little narratives”. Berners-Lee’s story could best be described as the narrative of human interconnectedness via technology to solve problems.

Keywords: the history of the World Wide Web (WWW); Tim Berners-Lee; narration; narrative identity; humanism; interconnectedness.

I. INTRODUCTION

Throughout history, we have witnessed a plethora of prominent engineers with remarkable achievements to their names, well-known for their lasting influence in various areas of science whose inventions have withstood the test of time and laid the foundations of modern science and technology. It is widely agreed that Tim Berners-Lee, Kurt Gödel, and Alan Turing are the pivotal pioneers who have “opened the door to the Information Revolution. The

contributions of Gödel (what is decidable?), Turing (what is machine intelligence?), and Berners-Lee (what is solvable on the Web?) are central to just how much “intelligence” can be projected onto the Web.” [1]

One of such father figures is Tim Berners-Lee. Despite the fact that the history of telecommunications is quite well-documented (see, for example, 2, 3, 4, 5, 6, 7, 8], a story of Tim Berners-Lee’s contribution to science through the prism of his authorial narrative identity is yet to be

told. In this paper, we aim to somehow fill this gap by telling the backstory to WWW creation. History, story, narrative – all these terms are interrelated. In simple terms, "a narrative is a spoken or written account of connected events: a story." [9].

Michael Gordin [10] argues the past decade, like all prior ones, has seen a steady stream of works on language in the history of science, with the issue of how language and science interact being a primary topic of preoccupation. However, the idea of the analysis of scientific reasoning and scientific change through linguistic vocabulary belongs to the eminent philosopher of science Thomas Kuhn. Such developments resulted in what is known as "linguistic turn" of the 1990s [11].

Today, we speak of language and science, or, to use the term that highlights a way more intimate interconnection between the two, about the language of science. The study of scientist's authorial identity is part of scientific discourse, yet, what exactly is the language of science? As Steven Darian aptly put it, there are many languages of science: "the language of university science lectures and the explanatory inquiries of the elementary school classroom; the language of scientists debating issues in the laboratory; the language of papers presented at conferences and of articles in scholarly journals; plus the actual language of discovery. We also find pieces for the layman, from *Popular Mechanics* and *Scientific American* articles to accounts in print and broadcast journalism; and then, the language of textbooks, from primary and secondary school through university level, in textbooks introductory and advanced...with a nearly endless variety of audiences and participants, purposes, and degrees of complexity." [12]. The aim of this paper is to elucidate the history of the World Wide Web through the prism of Tim Berners-Lee personality as a scientist who is credited with the WWW initiation and development.

II. MATERIALS AND METHODS

We analyzed Berners-Lee's book "Weaving the Web: The Original Design and Ultimate Destiny of the World Wide Web"[13] and other relevant materials by using mixed (both quantitative and qualitative) methods, specifically, discourse analysis and postmodern narrative techniques, as well as quantitative Lawrence Anthony's AntConc corpus analysis toolkit for the keyword, frequency, collocation and text study [14]. The corpus being used in this study comprises Berners-Lee's book

"Weaving the Web" and several short documents available online.

III. THEORETICAL PREMISES

Over years, at least in the language of science, a broad concept of identity still lacks clear definition. It is being used mostly in collocations such as "national", "political" etc. This notion is usually discussed in the context of "stance", "appraisal" and "evaluation", as suggested by Ken Hyland [15]. On the one hand, the metaphoric sense of "voice" as social aspect of "discoursal self" is addressed by Roz Ivancic [16]. Various lenses through which authorial identity could be looked at, reflect its multi-layered nature [17, 18]. Modern research tends to view identity not as some fixed thing, but rather, a fluid and malleable entity being shaped by the interplay of social, cultural and other factors. For example, postmodern narratologists, speaking of narrative identity, mean a person's internalized and evolving life story of the self that integrates the reconstructed past and imagined future to explain how the person came to be and where his or her life may be going [19]. It should be noted that postmodern scholars tend to emphasize social and cultural aspects of narrating. One of such researchers, Mark Currie, notes that our identity is not inside a person, like the kernel of a nut. Rather, identity is relational, meaning that it resides in the relations between a person and others. Alternatively, identity is structured by differences through which human individuality is constructed. Yet, the only way to explain who we are is to tell our own story by selecting key events and organizing them as a narrative for the purposes of self-representation. [20].

Biographical, historically situated and narrative approach to identity (the concept of "narrative identity") correlates with the notion of three levels of positioning via narration, first suggested by Michael Bamberg:

1. Positioning on the level of the story: "How are the characters positioned in relation to one another within the reported events?"
2. Positioning on the level of the interaction: "How does the speaker position him- or herself to the audience?"
3. Positioning with respect to the questions: "How do narrators position themselves to themselves?" and/or "Who am I?" [21, 22]

We think that such postmodern narrative approaches are plausible for our study. Postmodern ideas on narrative identity construction seem to be in line with the views of one of the pioneers of discourse analysis, Zellig Harris, who observed an important correlation between language and personality: “most individual textual characteristics (as distinguished from phonetic characteristics) correlate with those personality features which arise out of the individual’s experience with socially conditioned interpersonal situations” [23].

The story of Berners-Lee’s invention is a living proof of the trend outlined by eminent philosopher Jean-François Lyotard who noted postmodern transition from grand narratives (or metanarratives) towards the so-called “little narratives” (*petits récits*), because the little narrative “remains the quintessential form of imaginative invention, most particularly in science” [24].

Tim Berners-Lee’s self-narration - as told in his book “Weaving the Web” - is a proper example of such narrative. This book, according to the blurb posted on amazon.com, is a portrait of Tim Berners-Lee’s invention. We argue that it is also a self-portrait of the scientist’s personality.

IV. RESULTS

Sir Timothy Berners-Lee is often called “a low-profile genius”. Indeed, he never intended to personally profit from his seminal invention, the World Wide Web. Only later, in 2004, was he knighted by Queen Elizabeth II. He was also awarded Finland’s hefty million-euro Millennium Technology Prize “for outstanding technological achievements that directly promote people’s quality of life, are based on humane values, and encourage sustainable economic development.” Born in London in 1955, in the family of computer scientists who happened to work on the world’s first commercial computer Mark I by Ferranti, Tim developed a keen interest in computers, and even built his own computer from an old TV set and a processor. An Oxford graduate, he devised the World Wide Web in 1989 at CERN, in Geneva. His inspiration was obviously ignited by an old book he read while a child, titled “Enquire Within upon Everything”, a how-to book, a sort of a short miscellany encyclopedia, first published in 1856. The book most definitely had an ambitious intention of covering a wide array of various topics ranging from etiquette to domestic life. By the look of things, this is a possible reason why his computer program – that could store information and use random

associations to provide links among multiple documents – was called Enquire.

Actually, hypertext started as early as 1945, when Vannevar Bush suggested an electromechanical device called the Memex that enabled linking documents on microfiche (he didn’t use the word “hypertext”, though). Two decades later, Ted Nelson developed some kind of software framework called Xanadu and actually coined the term “hypertext”. Soon after that Douglas Engelbart, another early computer and Internet pioneer, devised a prototype for the so-called “oNLine System” (NLS) that could link documents via hypertext. Still, Berners-Lee’s Enquire was a second to none invention in many ways. Not satisfied with the clumsiness of the Internet that was only 15 years old by then, but rather reliable in terms of its operation, the scientist developed what is known today as HTML (Hypertext Markup Language) that allows formatting Web pages and enables hyperlinks and hyperlinking (a.k.a. connecting documents) via specific coding system. On top of that, Berners-Lee has also developed URLs (Web pages specific locations) and HTTPs (documents’ linking system), to say nothing of Web navigation browsers.

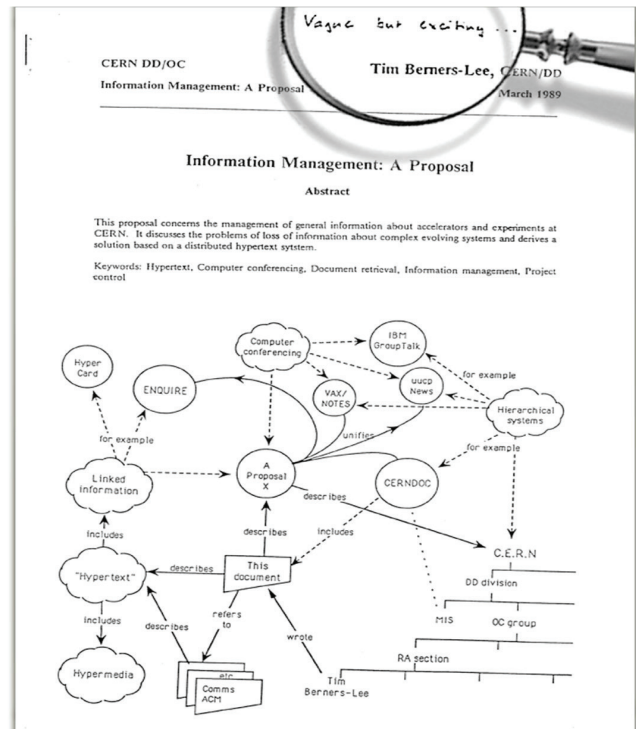
Technology aside, Berners-Lee’s professional endeavors as reflected in his writings are a perfect mirror of his personality and self. Linguistically speaking, his narrative identity is unveiled through narrative inquiry techniques. As such, this might shed some light on Berners-Lee’s identity construction through the prism of his authorial positioning on the levels of story, interaction and self-defining.

Overall, “Weaving the Web” is a unique book in that it chronicles the infancy of the WWW by the person who best knows how it evolved into one of iconic symbols of our times. And, like the father of his brainchild, he, just like any parent, believes that his baby will make the world a better place. Yes, he mentions several pitfalls of his invention, but most of the time he tends to view it positively. The book starts with Berners-Lee’s acknowledgement of his colleagues: “A book is quite a project. I had thought about one from time to time, but did not take it on until Michael Dertouzos introduced me to Mark Fischetti as someone who, unlike me, could actually make it happen without stopping everything for a year. And so began the telling of the story, past, present, and future. Without Mark this book would never have been more than an idea and some bits of unordered web pages. I owe great thanks to Mark for applying his ability to find the thread running through my incoherent ramblings and then a way to express it

simply. Mark and I together owe thanks to everyone else involved in this process [13].” Here, Berners-Lee highly praises his colleagues and diminishes his own role as the book author: he actually says that unlike himself, Mark Fischetti was able to find the common thread running through Tim’s “incoherent ramblings”, as he puts it. Here we observe the maximum degree of modesty and politeness ever possible (see underlined fragments), sincere expression of deep gratitude to everyone who “made the dream of the Web come true”. He apologizes for being too stubborn, thanks his immediate family for “a sense of perspective and reality and fun that underlies everything we do”, acknowledges the people who, unbeknownst to him, had hit upon similar concepts: Vannevar Bush, and his the Memex, Ted Nelson, who suggested a new, nonlinear format called hypertext plus masterminded Xanadu project, and Doug Engelbart’s legacy. Caveat: these ideas were never implemented, unlike Berner-Lee’s ones, simply because they were too far ahead of time. Such implicit, but high appraisal implies positive evaluation of the role of Berners-Lee’s predecessors in forthcoming technological advances. Also worth noting is Tim Berners-Lee’s altruism. In his preface to “Weaving the Web”, Michael Dertouzos notes that most people involved with the net developments “seemed fixated on one question “How can I make the Web mine? Meanwhile, Tim was asking: “How can I make the Web yours?” [13].

In his 1992 article, “The world-wide web”, co-authored with Robert Cailliau and Jean-Francois Groff, Tim Berners-Lee notes: “The W3 project is not a research project, but a practical plan to implement a global information system. However, the existence of the web opens up many interesting research possibilities. Among these are new human interface techniques for managing a large space and the user's view of it, and automatic tools for traversing the web and searching indexes in pursuit of the answers to specific questions” [25]. This paragraph again shows authorial modesty mixed with implicit excitement about the Web prospects. It should be noted that the word “excitement” and its derivatives “exciting” and “excited” are used in “Weaving the Web” 25 times. Here we speak of Berners-Lee’s excitement about doing science (which, in many ways, is similar to another genius’s, Richard Feynman’s “pleasure of finding things out”). Interestingly, on Tim’s very first proposal for information management, dated March 1989, his supervisor wrote: “Vague but exciting...” Not overly

enthusiastic, but definitely implying: promising enough to care.



Timothy Berners-Lee’s philosophy behind his invention is caring about people and putting others first. In 1992, the first picture ever posted on the Web was not Tim’s, but that of “Les Horribles Cernettes”, a parody pop-group of CERN’s female scientists: Michele Muller, Colette Marx-Nielsen, Angela Higney, and Lynn Veronneau. This photo has started the never-ending saga of visual storytelling.



Putting others first is an important part of Berners-Lee's philosophy as a professional: "the Web is more a social creation than a technical one. I designed it for a social effect – to help people work together – and not as a technical toy. The ultimate goal of the Web is to support and improve our weblike existence in the world" [13]. However, the scientist admits that "human communication scales up only if we can be tolerant of the differences while we work with partial understanding. The new Web must allow me to learn by crossing boundaries. It has to help me reorganize the links in my own brain so I can understand those in another person's. It has to enable me to keep the frameworks I already have, and relate them to new ones. Meanwhile, we as people will have to get used to viewing as communication rather than argument the discussions and challenges that are a necessary part of this process." One more pertinent point. Freedom for all could be achieved because "the Web is so huge that there's no way any one company can dominate it [13]. But then again, Berners-Lee is concerned about privacy and security: since personal information could be easily collected, companies might harm people. The way out? People should be able to surf the Web anonymously: "I would like to be able to decide who I will allow to use my personal information and for what"[13]. Again, security inevitably comes first, especially today.

Another important part of the scientist's philosophy behind his professional feats is establishing all kinds of connections. He says: "In an extreme view, the world can be seen as only connections, nothing else. We think of a dictionary as the repository of meaning, but it defines words only in terms of other words. I liked the idea that a piece of information is really defined only by what it's related to, and how it's related. There really is little else to meaning. The structure is everything...What matters is in the connections. It isn't the letters, it's the way they're strung together into words. It isn't the words, it's the way they're strung together into phrases. It isn't the phrases, it's the way they're strung together into a document [13]."

Both parts of his philosophy seem to intricately interplay: "I have a dream for the Web...and it has two parts. In the first part, the Web becomes a much more powerful means for collaboration between people. I have always imagined the information space as something to which everyone has immediate and intuitive access, and not just to browse, but to create... In the second part of the dream, collaborations extend to computers. Machines become capable of analyzing all the data on the Web

– the content, links, and transactions between people and computers. A "Semantic Web," which should make this possible, has yet to emerge, but when it does, the day-to-day mechanisms of trade, bureaucracy, and our daily lives will be handled by machines talking to machines, leaving humans to provide the inspiration and intuition [13]." So people will rule over machines, and use them for mutual collaboration to solve problems, not the other way round.

Berners-Lee's humanism shines through his words: "hope in life comes from the interconnections among all the people in the world. We believe that if we all work for what we think individually is good, then we as a whole will achieve more power, more understanding, more harmony as we continue the journey... Should we then feel that we are getting smarter and smarter, more and more in control of nature, as we evolve? Not really. Just better connected [13]." Berners-Lee also calls the Web "universal" and admires its "beauty".

In more quantitative terms, AntConc software has helped us establish the frequency rate of the elements of Berners-Lee's vocabulary. First come the words that reflect "interconnectedness". The word "the Web" that itself conveys this notion is used 998 times, "hypertext" - 211 times. In "Weaving the Web", the scientist uses the word "connection(s)" and its derivatives ("connect", "connected", "connecting", "connectivity", "interconnection", "interconnected") 60 times. Surprisingly, the only word that contains morphological marker of negation – "disconnected" – is used in the so-called double negation collocation, and, in fact, denotes affirmation ("seemingly disconnected", i.e. "connected"). Other frequently used words critical to understanding Berners-Lee's personality and professional endeavors are: "ideas(s)" (112 times), "universal(ity)" (34 times), "rule(s)" (41), "useful(ness)" (25), "excitement" (and its derivatives "exciting" "excited" – 25), "hope(s)" (15), and "freedom" (9). One more point. Berners-Lee uses self-mention pronouns or "stance markers" – first person pronouns and possessive adjectives "I" "my" and "mine" a bit more frequently than "reader pronouns" or "engagement markers" (in Hyland's terms), such as "you", "your(s)", "we", "us", and "our(s)" : 919 vs. 782 times, which amounts to 54% vs. 46%, respectively. However, this fact could be explained by Anglophone linguaculture specificity: it is perfectly acceptable and polite enough to use "I" in scientific writings. Overall, it is considered to be a current trend in the language of science [26]. Ken Hyland

argues that such self-mention pronouns/"stance markers" are used to strongly identify oneself with a particular argument and to gain credit for an individual perspective [27], which seems to be perfectly fine in case of Berners-Lees authorial chronicling of the history of the Web – the most impressive disruptive revolutionary innovation of recent times. Summing it all up, we can conclude that Berners-Lee's narrative personality positions other human beings before his own self on the level of the story, on the level of interaction, and on the level of self-defining.

V. CONCLUSIONS

The history behind the WWW, one of the major inventions that shape our world, is nothing but extraordinary. Full of twists and turns, and blessed by Tim Berners-Lee genius, it celebrates human interconnectedness via technology to solve problems. The Web as seen by Berners-Lee, enables communicating, networking, problem-solving, creating and sharing knowledge. Science, like language, is all about communication. And the invention of World Wide Web is a fascinating story of making digital communication available to all. After all, as Tim Berners-Lee put it, "hope in life comes from the interconnections among all the people in the world". The key word here is interconnectedness. The study of self-narration through the prism of a person's unique linguistic manifestations looks like a promising way of addressing an array of broader issues, such as identity construction, human-human and human-technology interaction.

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«Туманно, але захоплюю» – наратив за лаштунками винайдення всесвітньої павутини Тімоті Бернерсом-Лі

Проблематика. Історія науки – багатогранна галузь. Вона охоплює теорію та практику наукового дослідження, епістемологічні проблеми, формування та еволюцію наукових парадигм, мову і науку та, щонайголовніше, людські випробування і страждання, потреби і прагнення. Ми живемо в епоху Всесвітньої павутини (World Wide Web) – також відомої як WWW чи просто Веб (Web) – яка є невід’ємною частиною сучасного віку інформаційно-комунікаційних технологій. Ключовою людиною, яка стоїть за цим потужним винаходом та підривною інновацією, є британський вчений та інженер Тімоті Бернерс-Лі.

Мета дослідження. Мета дослідження полягає у тому, щоб розкрити історію Всесвітньої мережі крізь призму наративної ідентичності Тіма Бернерса-Лі, її засновника та розробника.

Методи. Ми використовували змішані (як квантитативні, так і квалітативні) методи, зокрема дискурсивний аналіз та методи постмодерного наративного дослідження, а також квантитативні інструменти корпус-менеджера AntConc (розробленого Лоуренсом Ентоні) для виявлення ключових одиниць, підрахунку частоти вживання, визначення колокацій та текстового аналізу. Матеріалом нашого дослідження послугувала, передусім, книга Тімоті Бернерса-Лі "Weaving the Web" та деякі інші джерела.

Результати. Історія розробки Всесвітньої павутини та, зокрема, історія Тімоті Бернерса-Лі – це приклад т.зв. малого наративу, що вписується у сучасну постмодерну наративну парадигму. Його наративна ідентичність висвітлюється нами із застосуванням такого прийому наративного аналізу, як «трирівневе позиціонування» Майкла Бамберга: авторське позиціонування на рівні історії, на рівні взаємодії, на рівні самовизначення. Розкриті такі якості Бернерса-Лі, як гуманізм, альтруїзм, скромність та палке захоплення ідеєю наукового прогресу заради користі людства.

Висновки. Історія, яка стоїть за винайденням Всесвітньої павутини, доводить важливість вивчення «малих наративів». Історію Бернерса-Лі найкраще можна описати як наратив людського взаємозв’язку шляхом технологій заради вирішення спільних проблем.

Ключові слова: історія Всесвітньої павутини; Тімоті Бернерс-Лі; нарація; наративна ідентичність; гуманізм; взаємозв’язок.

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«Туманно, но захватывающе» – нарратив за кулисами изобретения всемирной паутины Тимоти Бернерсом-Ли

Проблематика. История науки – многогранная область. Она охватывает теорию и практику научного исследования, эпистемологические проблемы, формирование и эволюцию научных парадигм, язык и науку и, самое главное, человеческие испытания и страдания, потребности и стремления. Мы живем в эпоху Всемирной паутины (World Wide Web) – также известной как WWW или просто Веб (Web) – которая является неотъемлемой частью современного века информационно-коммуникационных технологий.

Цель исследования. Цель исследования – раскрыть историю Всемирной сети через призму нарративной идентичности Тима Бернерс-Ли, ее основателя и разработчика.

Методы. Мы использовали смешанные (как количественные, так и качественные) методы, в частности, дискурсивный анализ и методы постмодернистского нарративного исследования, а также количественные инструменты корпус-менеджера AntConc (разработанного Лоуренсом Энтони) для выявления ключевых единиц, подсчета частоты употребления, нахождения коллокаций и текстового анализа. Материалом нашего исследования послужила, прежде всего, книга Тимоти Бернерс-Ли "Weaving the Web", а также некоторые другие источники.

Результаты. История разработки Всемирной паутины и, в частности, история Тимоти Бернерс-Ли – это пример т.н. малого нарратива, который вписывается в современную постмодерную нарративную парадигму. Его нарративная идентичность освещается нами с применением такого приема нарративного анализа, как «трехуровневое позиционирование» Майкла Бамберга: авторское позиционирование на уровне истории, на уровне взаимодействия и на уровне самоопределения. Раскрыты такие качества Бернерс-Ли, как гуманизм, альтруизм, скромность и пламенная увлеченность идеями научного прогресса ради пользы человечества.

Выводы. История, которая стоит за изобретением Всемирной паутины, доказывает важность изучения «малых нарративов». Историю Бернерс-Ли лучше всего можно описать как нарратив человеческой взаимосвязи посредством технологий ради решения общих проблем.

Ключевые слова: история Всемирной паутины; Тимоти Бернерс-Ли; наррация; нарративная идентичность; гуманизм; взаимосвязь.