

Participatory creation of multidirectional links aided by the use of Co-link technology

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Abstract: Discussions on democratic online participation, cooperation in digital communities and network openness have highlighted the communication processes through services such as chat rooms, forums and weblogs. This article, however, aims to focus on the politics of hypertext. But, instead of solely focusing on the quantity of links offered for a multidirectional reading, this research is dedicated to the possibility of participatory creation of links. Until now, associative links on the Web were still unidirectional vectors (with rare exceptions), and link creation remained normally on the hands of who had access to the server, to the code and knew HTML. Facing these limitations, Alex Primo conceived and Ricardo Araújo programmed the technology of co-links (<http://www.co-links.org>), aiming to surpass that gap. This new service, which will be here introduced, opens Web pages to cooperative creation of multidirectional links. Co-links technology may then open hypertext to the participatory construction of a social memory on the Web, registering the mental associations made by the participants between that text and others read before. It is also suggested that this system could be of particular interest to educational projects: aiding cooperative processes, promoting group activity and collective writing. In order to test that hypothesis, this paper analyses the use of co-links technology by two study groups, located in two different cities in Brazil. These groups of students using discussion list, blog, a Wiki system and co-links technology, produced a cooperative article on cyberculture and later included links and co-links to the document. This paper presents the results of the investigation that followed the whole process of cooperative construction of knowledge. The debates, the openness of the system to collective writing of the hypertext, the potential and difficulties of participatory online communication are then discussed.

Keywords

Co-link, collective writing, link creation, multidirectional link

1. INTRODUCTION

Digital hypertexts are not all alike. Primo (2002) proposed a typology to differentiate them, concerning the interaction that they mediate. The **potential hypertext** allows readers solely to surf among pre-disposed links. Only the reader is transformed, while the hypertext maintains its original characteristics. In a **cooperative hypertext**, on the other

hand, all the participants contribute to the invention of the common hypertext. And, as they cooperatively construct it, they are recursively impacted by the group, the relationship constructed among them and by their creative process and product. Finally, **collage hypertext** is also a collective creation, but texts are produced separately by different authors. They may be automatically set side-by-side or glued together by one or more organizers. Thus, this type of hypertextual production does not involve cooperative invention or a debate to plan, write and revise the creative product (as in cooperative hypertexts).

In a previous research, the authors have dealt with two recent Internet phenomena that foster the construction of cooperative hypertexts: blogs with commentaries and the Wiki system (Primo and Recuero, 2003). While studying the most basic element of hypertexts — the link — and confronting the collective writing practices on the Web with the limitations of potential hypertexts, Alex Primo conceived Co-link technology for the open creation of multidirectional links, which may contribute for the participatory construction of hypertextual structures. With the implementation of Ricardo Araújo, Co-link pages were also opened for the collective writing of texts.

This paper, thus, intends to criticize the limitations that the greatest part of hypertexts imposes to their readers, limiting their participation. After the discussion about the politics of linking, this paper introduces the Co-link technology, and discusses the first results of its use among two study groups, located in different cities of the state of Rio Grande do Sul, in Brazil. Even though the experiment, that will later be reported, had a focus on the participatory creation of multidirectional links, this research also discusses the process of writing together one common hypertext.

2. LINKS AS UNIDIRECTIONAL VECTORS

Hyperlinks are frequently described as a bond, a tie or a connection between pieces of information, and as the achievement of systems imagined by Vannevar Bush and Ted Nelson. Links are considered the “primary navigational means of the Web” (Obendorf and Weinreich, 2003, p. 736) and the essence of hypertextual technology (Landow, 1997). Hyperlinks have been accused, however, to be disaggregating, as commented by Johnson (1999). The supporters of print, according to Bolter (2001, p.43), understand that “letting the reader choose links only gives the illusion of control, which is really withheld from the reader. If authors prescribe links, they deny the reader the choice of making her own associations.” Talbott (1995) will even compare the link to a remote control, and Web surfing to television zapping. Far from this concerns (many of them radically nostalgic), Johnson (1999) understands that the link is the first meaningful punctuation form to emerge after centuries.

At first, however, one must recall that there are two basic types of links: associative and structural. The former are “clickable words embedded in continuous text” (Obendorf and

Weinreich, 2003, p. 736), connecting that text to other information, inside the same page or in different sites. The structural links, on the other hand, are not embedded in paragraphs, but present in exposed locations, being used to indicate navigational structures. It can be said that the latter has faced stylistic (animation, sounds, flying menus, etc.) and functional progress. However, much of these enhancements have aimed to give further editorial control to the page owner: such as scripts that open the destination-page in a new browser window, with determined width and height and possibly without status bar, navigation buttons or address bar. On the other hand, associative links on the Web are still (with rare exceptions) **unidirectional vectors**, and link creation remains normally on the hands of who has access to the server, to the code and knows HTML (or any other more sophisticated language) .

Although several new technologies have been created for online collaboration, many barriers are still present in hypertext systems, limiting the interactant's intervention and edition of texts. Because of this, one's associative and creative personal reading does not reflect upon the text itself (which could inspire future readers). Acknowledging such a gap, this paper proposes a new concept for hypertextual linking and introduces a technological implementation that may facilitate the collective writing of hypertexts.

3. OPEN HYPERTEXTS AND THE POLITICS OF LINKS

The possibility of collective creation of links is a political issue. However, since the Web's first years, mechanisms have been developed to prevent the interference of Web surfers. On the other hand, Landow (1997), in his discussion on the politics of access, has suggested two questions that are particularly important for this paper: **Who can make links? Who decides what is linked?**

Actually, Johnson-Eilola (1988) states that even though the Web is normally described as a collaborative hypertext, the majority of Web sites treat hypertext in a very conservative way. Johnson (1999), unsatisfied with the obedient persecuting of links, asks for the possibility of any Web surfer to create his own personal associative trails. Johnson's remark is inspired by the pioneer Memex proposal, published by Vannevar Bush in 1945. In his exposition—a fundamental root in hypertext discussions—Bush did not only think about the creation of personal paths connecting information, but also considered the possibility of sharing those trails with friends. Normally, however, Web surfers follow links created by the programmers of the visited sites. Indeed, no reading is ever the same. Specifically on the Web, surfers create (“write”) their own reading paths by choosing which lexias they want to read (or not), by clicking on certain links. But how can a person share with others the mental connections he made with texts read before?

Although it is not correct to say that the “writing while reading” practice (Chartier, 2002) is already common on the Web, in the late 1990s some projects pursued technologies that could permit editorial intervention in Web pages created by other people. In 1999, Third

Voice released a software that allowed anyone to leave annotations (like “Post-it” notes) within any Web page. The system did not last long and was accused of promoting “Web graffiti”. Microsoft Smart Tags, an open hypermedia linking system in Internet Explorer, was planned to be released with Windows XP. It would dynamically turn certain words in a site into hyperlinks to related information and products: the static text of a Web page could be “personalized at read time” (Hugues and Carr, 2002). However, Microsoft declined releasing the technology after heavy criticism from the media and competitors on the company’s control over the content that Smart Tags would add. Web annotation, however, has recently received special attention from the World Wide Web Consortium. The Annotea project has been working on new ways of enhancing collaboration through Web annotations and bookmarks, based on metadata and Semantic Web standards. By using a plug-in (such as Anozilla for Mozilla) or W3C's browser Amaya, Web surfers may read and write external remarks that are stored in an annotation server.

With a different objective, Wiki systems aim to foster collaborative writing. Participants may write and change any text. Hence, nobody owns any text within the Wiki system: they belong to the community. Interestingly, a link may be created to a page that yet doesn’t exist—the system automatically creates that empty page and asks visitors to add content to it.

This brief review aimed to show some of the efforts in creating open hypertext systems that permit the addition of new links (not planned by the programmer) and to allow people not just to visit Web pages, but also to interfere in the page (with the original author’s agreement). This paper wants to describe the Co-link project, which also has those objectives, and attempts to: a) permit any participant (not a content provider, like in Smart Tags) to create new links inside the texts (not in a side panel, like in Annotea); b) foster cooperation between Web surfers (who do not need to know HTML) and the sharing of trails among associated readings; allow the free inclusion of multiple destinations (co-links) to a same link; c) assure that participants will not need to install any new software or plug-in, and that the system will work with common browsers.

4. CO-LINK TECHNOLOGY

Co-link system (the prefix “co” stands for “cooperative”), conceived by Alex Primo and programmed by Ricardo Araújo, was developed to allow any interactant to create, change and delete new associative links in a text and/or add new destinations to a link already available (creating, thus, a **multidirectional** link). Actually, other projects (Martin and Ashman, 2002; Moore, Stewart, Martin, Brailsford, and Ashman, 2004) have worked with “multi-headed links” (one to many). Co-link has a different implementation and is focused on the collective creation of links within a document, creating shared contextualized paths.

Co-link project (<http://www.co-link.org>), in its present form, works with a mySQL

database through a PHP interface. It can thus be used with any server that supports those technologies. The interaction with Web surfers occurs through HTML and Javascript. In short, the process works as follows. Initially, a text is added to the database. The text's links may be edited through two interaction modes: “visualization” and “inclusion of links”. While using the “inclusion of links” mode—that is accessed after the “include new link” option is selected—, one may choose a word to turn it into a new link. The conversion of a word into a link happens just after it is clicked and the participant includes an initial co-link. If more than one person tries to turn the same word into a link, the systems chooses one of the requests and transparently permits the participants to add their own co-links. In the “visualization” mode, the text is rendered as a HTML document. The special tags created by the system are converted to common HTML tags, associated to Javascript code that triggers the opening of a menu. This menu calls the database in order to retrieve and show the co-links associated to that tag. From this menu it is possible to follow a co-link, add new co-links or edit available co-links.

The process of creating a new link adds special tags to that word and updates the code while it is saved in the database. Co-links have individual entries in the database and are related to the identification tags of the links they are associated with. Each co-link is saved with information (name and e-mail) about the person that created it, a brief description about that destination, and data about the date and hour of the co-link creation and its last modification.

In the “visualization” mode, after a link is clicked, a small menu opens at the side of that word with a list of directions (co-links) and an option to add a new co-link (Figure 1). Thus, clicking on a link does not discharge the automatic loading of a specified page. Instead, a menu of one or more associated readings is presented to the interactant, multiplying the navigational possibilities. While Web links are traditionally configured as unidirectional vectors, they can now become multidirectional. In other words, many directions can be chosen from the same link.

If the user clicks “add new co-link” option, in the co-links menu, the interactant is prompted to inform a URL, its description, his name and e-mail address (Figure 2). After these information are saved, the new destination inserted will be shown as an option in the co-links menu (at the end of the list), the next time the same link is selected. The name and e-mail of that collaborator can be known by clicking on the magnifying glass icon, beside the co-link description. Clicking on the same icon, one can edit all the available information or even delete a co-link. This last option could be useful to eliminate co-links that are understood as not being contextualized, pertinent or that are offensive.

Figure 1: Co-links menu**Figure 2: Editing a co-link**

5. POSSIBLE IMPACTS OF CO-LINKS TECHNOLOGY ADOPTION

It is supposed that this system could be of particular interest to educational and research projects and to the so-called virtual communities. In educational settings co-links could be used to aid cooperative processes called by Johnson-Eilola (1998) as “writing with fragments”. This methodology could contribute to stimulate students to research and register information found on Web — thus promoting group activity and collective writing. And, in scientific processes, co-links could help research groups to produce a document with various digital references, facilitating the organization of relevant sources. Furthermore, when the final draft is published on the Web, it could be opened to the public include new references, motivating the continuation of the study among that community (maintaining, however, the integrity of the article published elsewhere). Moreover, a future inclusion of co-links technology in blogs and virtual community sites, for example, could help groups to find suggestions of trails on their shared interests, created by their peers. This could call for even more participation of those group members (which already happen in commentary windows in blogs).

On the other hand, even though the large and growing number of links and people interfering on their creation could be positive in the sense of promoting a higher association between existing pages on the Web — hence making the Web topology even denser—, negative effects may also emerge. Listening to Dreyfus’ (2001) criticisms on the difficulty of indexing information on the Web (compared to the library culture), it might be said that a Web surfer would have more work searching for an information, since the number of links to follow would be larger. The openness of Web pages to the addition of new links and co-links could also suffer from the work of robots automatically inserting links to commercial sites. On the other hand, commercial sites would most probably not be interested in adopting the Co-link system, as they might not be willing to open their pages to visitors intervention, preferring to maintain total control over their pages’ texts and outgoing links.

Hence, this paper suggests that Co-link technology let readers encounter former visitor’s associative trails and motivates them to offer new associations. These contributions could form a collective memory of certain groups in a digital form, coming closer to what Casalegno (2001) calls *Living Memory*. According to him, a collective memory is formed when a group may access information that would otherwise be individual. This type of activity is of great interest as it offers to the community the registration and recuperation of associative trails, contributing for the social construction of knowledge.

It is now important to recall that Bolter (2001) states that links “remediate” summaries and indexes. According to this author, remediation happens when “a newer medium takes the place of an older one, borrowing and reorganizing the characteristics of writing in the older medium and reforming its cultural space” (p. 23). Bolter suggests that portals such as Yahoo! are digital remediations of summaries (presenting a topical organization), while search engines allow the instantaneous and personalized production of indexes. With co-links, it could then be argued, a group of people could produce something like micro-

summaries or micro-indexes. These activities, however, would be created by different interactants, in an organized way (by a group of researchers, for example) or not (loose suggestions by Web surfers who never come back to that page). It could also be said that co-links produce a remediation of the practice of writing “common places notebooks”, described by Chartier (2002). But, instead of producing just a digital version of those notebooks, the Co-link system lets the remissions made by different people be shared among them, and with people they don’t even know.

Yet, it can be suggested that co-links could let one go beyond the individual, anonymous and silent reading, in the direction foreseen by Chartier (2002). That author argues for digital ways to multiply the occasions of verbal manifestation around the written patrimony and the intellectual and aesthetical creation. This paper understands that Co-link technology might contribute for a “**noisy reading**”, in the sense that it allows readers to manifest and register their mental associations, when viewing the text.

6. THE CO-TEXT PROJECT

In order to test and analyze the possible uses of this technology, the educational environment was chosen for this experiment. For this reason, the Co-Text project was created. The aim was to study the interaction between two groups, which were geographically distant, while constructing a collective text using Co-link technology. These two groups were created at Fabico/UFRGS (Information Science and Communications College, Federal University of Rio Grande do Sul), in Porto Alegre, and at ECOS/UCPel (Communications School, Catholic University of Pelotas), in Pelotas. The groups were composed by graduate and undergraduate students with the purpose of being a cyberculture study group.

The two groups started working in November of 2003. Their first objective was to read selected papers presented at the “Informational Technologies of Communication and Society” Work Group from Compós Congresses. Each week one text was assigned for discussion. All participants were asked to read and discuss the papers during the meetings in each city. One member of each group was responsible to write a synopsis about the week’s paper and publish it online. After that, they started to write a collective text based on the discussions and the debates. During this stage, students were encouraged to read everything that was written, and edit any part that they thought needed revising. Finally, they were asked to include co-links in the collaborative text (first linking to the synopsis they had written, and later to other related sites). For this intent, they should search for Web pages that could extend the discussion in the text (which was already a motivation for further research). It is yet important to report that all interaction between the groups was mediated by computer programs, such as a discussion list, a weblog, a Wiki page and after a while, the collective text page using Co-link technology.

7. DISCUSSION

Although the project asked both groups to interact using computer tools, the interaction between them was lower than expected. The groups interacted more in the face-to-face meetings than on the Internet. That is, the interaction between members of each group was much higher than the interactions between the groups from Porto Alegre and Pelotas. The weblog was supposed to be used for discussions about the papers and reports on the experience of writing collectively. However, not many posts were published and commented. The greatest part of the communication between participants occurred through the discussion list. Until July 9th, 2004, 334 e-mails were sent, 75,7% from the Porto Alegre group and 24,3% from the Pelotas Group. The greatest part of the messages exchanged were about the meetings' time and agenda, announcements of new synopsis published on the site, changes on the collective text and news on the media concerning themes discussed during the meetings, etc.

Two systems were used for the creation of the collective text and the paper synopsis. First, a Wiki system was used to write the synopsis and reviews of the texts (until the Co-link program was ready). There were 16 synopsis written in the Wiki site, 56,2% by the Porto Alegre group and 43,8% by the Pelotas group. As soon as the Co-link technology was finished (which also allowed participants to include, delete and change texts), all the texts were transferred to the Co-Links site.

There were internal and external problems during the creation of the collective text. The first problem happened between the groups. Because of misinterpretations about some e-mail messages and harsh commentaries in the discussion list, much of the interaction among the groups was compromised. Some students criticized texts written on the site, which caused others to feel offended and decided not to write anymore. Some were even afraid of posting new texts, fearing the reaction of others.

Computer mediated interaction lacks some important non-verbal cues, which facilitates misunderstandings. As Watzlawick, Beavin and Jackson (1967) argue — working on Bateson's ideas —, human communication is composed by two parts: order and report. The report is the information itself, or “what I want to say”. The order is information about the information, that is, “how you should understand what I want to say”. Communication over the Internet lacks much of order non-verbal cues. Although sometimes people create conventions to fill that gap (like emoticons, for example), that was not sufficient to prevent the conflict. As the participants from different cities did not know each other (and did not have much time to learn how others behaved and expressed themselves over the Net), some criticisms about the written text was understood as personal attacks. This motivated a competition between the groups, but also fostered participants of a same group to get closer to each other.

Another internal problem was caused by the limitation of the technology in its present form. First, the system was not able to do automatic backups, neither log a history file,

which caused some problems (which will be later commented). Second, there were compatibility issues. Some participants reported that the co-link menu would not show beside the link in their browsers (appearing on top of the webpage, which was not always apparent).

There were also external problems during the collective writing. In July, when the text was almost ready, a vandal deleted several paragraphs and co-links in the site. The reaction was quick. While some students started to reconstruct what had been lost, another member (unaware of what had happened) sent an angry e-mail to the list, asking for an explanation about why some texts he had written were totally deleted.

In order to understand the student's perceptions of the whole collaborative process, they were asked to answer a questionnaire about their experience. What follows is a discussion about their feedback.

The questionnaire had five open questions. The first question asked the students to evaluate the process, telling which were the advantages and disadvantages perceived during the project. Most of the students reported the difficulty of being part of a collective writing process. "It is necessary to learn to let others change your text", said student H. The most cited advantage was the fact that everyone could be an author and change the text. "You have a variety of ideas from one group and not from one head", said student D.

Actually, the conflict that took place on the discussion list did motivate the fine tuning of the text, although the flames exchanged in the discussion list created some hard feelings between some members of the groups. It is important to observe that most of this variety of ideas mentioned by the students was attributed to Co-link technology, since it creates "a way to collaborate in the discussions", said C. Student H adds that co-links "instigate research in the Web, which means that with the possibility of creating several trails in one link, the author/reader of the text feels motivated to look for more connections on the subject".

The second question was about the experience of creating co-links. Most of the students answered that it was fun and interesting, pointing out that it was an experience of sharing knowledge. On the other hand, one student said that sometimes too many links could make the text confusing. Yet, it's important to observe that Co-link technology helped the students to seek more connections, to walk in different trails. The answers also emphasized collaborative authorship. F, for example, saw Co-link technology as a form of "shared control and immediate correction", in the sense that a broken link could be quickly corrected by any author/reader of the text. It is also important to mention that the exercise of interfering in someone's work is also an exercise of respect, as G commented, and responsibility, according to B. However, the perception of interference in a colleague's work as an intrusive act, shows how strong the author's paradigm is among some of the participants. The understanding that no one possesses the text (only the group

does) is not an easy task.

In the third question, students were expected to suggest what were the strong and weak characteristics of the new technology developed. Most of them cited the lack of a chronological log as the most significant weak point (as explained before). The most cited strong point was the possibility of continually add more information and links. However, it is important to observe that more information does not necessarily mean more or better knowledge. Too many links, as said before, may generate confusion. On the other hand, co-links created by different Web surfers could help other readers to discover new sources and different points-of-view. Participation and cooperation could then foster the learning process.

Almost all criticisms were focused in technological problems, in an attempt to improve the project. However, the participants highlighted the possibility of one single link progressively receive new destinations (co-links). As G said, “the strong points match the main objective of the technology, that is, allowing the multiplication of associative trails from one single link”. The responsibility of creating and editing links was also cited by C, who explained that “the text belongs to everybody and any error or accomplishment (in a limited perspective, of course) is everybody’s”.

The fourth question was an evaluation of the collaborative work between the groups. Respondents said that there was a lack of interaction between the members of the two cities. Probably, the occurrence of face-to-face meetings diminished the interest of the participants in interacting through the communication tools (blog with commentaries and discussion list). Student A supposes that the groups did not interact much because they did not meet personally. On the other hand, the discussion list could have been better used to bridge that gap. However, most of the messages exchanged dealt with administrative issues, “in order to resolve immediate problems”, reported C. Some students understood that mediators could have had a more active role during the debates. In fact, group coordinators (besides writing messages about the group activities) preferred to let the students free to discuss, interfering only when the conflict was getting too heated. That may have been an error, as the conflict was not resolved by the participants themselves. H concludes that the use of the blog and the Wiki system was not fully explored, and the participation in the online debates was not very active. Because of that, H said that the collective construction was harmed by the weak use of the communication tools.

Finally, the last question was about the possible uses of the technology. The respondents agreed that the educational and research fields would be the primordial beneficiaries. Student D answered that the tool could facilitate the collective construction of knowledge. E added that the technology could promote the retrieval of scientific information. Respondent F added that the Co-link system could be used not only with scientific texts, but also with journalistic ones. Actually, much of the feedback match the project’s main objective, as the technology was developed aiming educational and

research environments.

8. CONCLUSIONS

After a reflection about the politics of links, this paper introduced Co-link technology. This system aims to allow any Web surfer to create, modify and remove multidirectional links. The project was actually conceived to surpass the unidirectional characteristic of common Web links and to facilitate the participatory creation of hypertextual structures (even if participants do not know HTML).

Interactants may use the technology to share information paths, and help other readers find new connections—a process that reminds Bush's Memex proposal. With the adoption of this technology, a hypertext can record the creative and associative links made by the visitors during their reading. The creation of co-links within the text being read permits contextualized linking (differently from a list of suggested links or a blogroll). In this sense, the technology can be understood as a remediation of *marginalia* (annotations done on the margins of books, reminding the reader of other related texts).

Moreover, Co-link technology may contribute for the social construction of knowledge, as participants share with others the information that they have gathered in the Web. The system also facilitates the creation of a collective memory of a group, showing all the trails the members have found, as proposed in Casalegno's (2001) *Living Memory Project*. We also understand that the creation of co-links during read time creates what we call a "noisy reading": Web surfers may comment and annotate the mental associations they make to other texts, while viewing the Web page.

Co-link technology can contribute for what Landow (1997) calls the blurring of the frontier between reader and writer in Web. The author's power would be shared with the page visitors, as an invitation to collaboration. Taking this for granted, and considering Johnson's (1999) argument that hypertext follows a centrifugal path — pushing readers away—, it could be now suggested that Co-link technology could stimulate a **centripetal movement**, attracting surfers to include new pointers to the webpage.

This paper also discussed the Co-text project. At first, the experiment aimed just to test the creation of co-links by two study groups, after a collective text had been written in a Wiki system. However, in order to permit students to include co-links while they were creating the cooperative hypertext, the functionality for writing collectively was added to the Co-link system. The experiment showed that the cooperative construction of a hypertext is not a trivial process. Nevertheless, the results demonstrated that cooperation does not mean the absence of conflict and even competition. Thus, "cooperation" should not be essentialized, thought of as consensual linear process.

The final hypertext produced by the groups ended as a good compilation of all the papers studied by them. The multidirectional links added extend the reading experience, as they

point to the original papers, to their synopsis (written also by the groups) and to related sites on the Web. Even though the participants report difficulties to write together a single piece (fighting against the single-authored paradigm), they showed their best efforts to produce a coherent argumentation. Even links and co-links were checked and sometimes corrected by the participants.

Finally, Johnson-Eilola (1998, p. 31) states that in educational environments connections to other readings are rarely valued by educators:

On one hand, we insist that writing is social and that texts are not unified, bounded objects; on the other hand, we require our students to write single-voiced texts (even when they write in groups their texts aren't supposed to sound disjointed or as though they were written by committee); we grade those objects by what they contain rather than what they connect. Except for unique circumstances, such as writing annotated bibliographies, we estimate a text's value not according to the information it gathers and arranges but by what the writer *adds*. We need to learn to reverse this approach or at least to correct the imbalance.

We believe that Co-link technology may contribute for what Johnson-Eilola calls "writing with fragments", motivating students to search and share trails to information on the Internet. The focus on individuality and production could thus shift to collaboration and connection.

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