

Metaphors to die for: Digital transformation for learning and work

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Abstract

It seems completely natural for most people to communicate online by making a video call with a camera located close to their terminal, but this is just one of the possible setups and it might not be the best one. In this article, we suggest that the widespread acceptance and use of metaphors from the physical world into software applications has been neglecting the main advantages of digital media. Since the early 1970s and for the next fifty years, the most popular interactive systems have employed metaphors from the physical world as the main user interface for humans. We analyse the case of the desktop graphical user interface, through the lens of the remediation and the metaphors theories. Our findings have significant implications in the case of teleconferencing systems, which have been employed in learning and remote work. Instead of real-time video-conferencing, we suggest that sparse synchronous collaboration through digital artifacts is a more productive direction for teleconferencing. In particular, further research should examine real-time collaboration with metaphors adopted from multiplayer role-playing tabletop games and videogames.

Keywords: digital transformation, learning, documents, software, simulation, videoconference

- The essence of metaphor is understanding and experiencing one kind of thing in terms of another. Lakoff and Johnson [1980]

Your desktop computer is a metaphor of your physical desk

In the 1970s, a rather small group of individuals in few companies at Silicon Valley discovered that metaphors were an effective way to make computers accessible to novice users. Indeed, user interface designers at Xerox PARC while working with managerial secretaries and publishers of books created the desktop metaphor, which regards a desktop computer as a metaphor for a real desk. In this way, a word processing application operates on files that represent printed pages. Nevertheless, the computer itself has no requirement for a document to represent printed pages. On the other hand, people do have requirements and they prefer new things, such as digital documents, to operate like familiar things, such as printed pages. Unfortunately, our collective preference for metaphors are not optimal in the long run when a new tool or medium is significantly different from the old. As a matter of fact, we are currently trapped into digital documents that simulate physical paper, without the benefits of neither physical paper, nor digital document. In other words, our

preference for simple metaphors has resulted in the worst of both worlds, digital and physical. Even worse is the fact that we remain content, because we do not know any better.

There is nothing wrong with usability or with the human trait to think in metaphors, but it is not beneficial to consider new technological systems only in terms of existing media and behaviors. For example, the popularity of the desktop graphical user interface could be attributed to usability benefits for novice or infrequent users, but this is detrimental to expert performance (Engelbart [1962]). Moreover, there might be government policies and commercial interests that have facilitated the establishment of particular user interfaces for computers. For example, as soon as an organization requires a certification in Microsoft Office, then the respective skills are considered as part of job specifications and college curricula. Then, any new organization should choose that particular software just because there is an established certification program in place. Therefore, the dominance of particular metaphors might be explained by a vicious circle rather than their suitability for people and tasks. For example, it is common sense that the workflow of publishing houses, which was the particular use case of the desktop metaphor might not be suitable or even compatible with other organizations. Therefore, we need to examine the nature of computers, as well as the nature of teleconferencing tasks, in order to propose suitable metaphors for the case of distance learning.

Virtual communities and communities of interest with regard to technologies have been running since the late 1970s. Until the recent emergence and wide popularity of social media, the early virtual communities were only considered as absolutely virtual, hence the name, and suitable mostly for improvisation. The improvisations regarded mostly roles, as well as narrative with a fictional nature, again something unreal (Turkle [2011]). During the same period, communities of interest formed around several technologies, such as home video games, and the unix operating system (Rheingold [1993]). Those communities met in person in order to work on software, while located in the same physical space. Therefore, online communication might have a virtual nature but a community can only be real in reality. In addition to a sensible definition for the quality of digital media, we need to consider its overall feasibility by examining particular human activities in depth. There are several activities of well defined transactional nature, such as buying a ticket for an event, or for transportation, which are very compatible with the nature of digital computers. On the other hand, there is wealth of worthwhile human values that we might not want to represent with bits and bytes. For example, organizational culture, collaboration, creativity, and mentoring are all considered to have a social nature that is not possible to be expressed through a machine. Of course, digital media have the potential to augment human and social intelligence (Engelbart [1962]), as long as we employ them to augment rather than to

simulate the physical and social environment.

Tools or media?

There is a widespread fallacy that considers computers only as tools. The tool fallacy is only made worse by the semiotics and the etymology of the word computer, which refers to a tool for making calculations. Although calculation has indeed been a worthwhile use of computers, a publishing system, a video game console, and a video-conference system are media, not tools (Licklider [1960]). As soon as we consider computers as media, there is one more pitfall to avoid, which considers new media as a simulation of old media. According to the remediation theory (Bolter and Grusin [2000]), the first television productions were actually radio productions with a static image. Moreover, the first books out from the printing press were huge versions of the bible with a font resembling handwriting. It took a generation before producers and publishers started broadcasting and printing works and formats compatible with the respective medium. Accordingly, a document on a computer screen fell into the pitfall of simulating physical paper. Similarly, synchronous online learning also made the exact same mistake by simulating lectures through realtime videoconferencing.

Ideally, the employment of digital tools and digital media should only be performed in reality (Papert [1980]) in a collaborative environment (Engelbart [1962]). Nevertheless, assuming that there is no alternative (e.g., pandemic, remote place, etc), digital media might be employed by following some principles. For example, a lecture might be more effective if it is professionally recorded and shared for perpetual viewing as well as dynamic navigation, which is not feasible with a physical lecture (Ramo [1958]). Although distance learning requires an increased balance towards asynchronous media, there are also opportunities for synchronous remote learning. Indeed, computers are an excellent platform for shared representation of human action (Laurel [2013]). Role-playing tabletop games consider small groups of players (usually 2-5), who have to collaborate in order to perform an evolving set of tasks, which are outlined in a master book and adapted in real-time by an experienced player, ie the teacher. In this way, synchronous digital learning is based on representations of human actions in a mediated environment, which might be completely fictional. Then, the teacher and the students are present and perform in a virtual world through their avatars. For example, they collaborate on a software project through Github, or simply edit together a report in a shared document. For this purpose, we need novel digital platforms that afford digital representations of human presence and action, depending on the discipline (e.g., physics).

Video teleconference as the new normal

Digital representations should emphasize the unique strengths of digital media and empower augmented ways of new thinking, rather than simulate previous practices. For example, digital documents should track versions and visually link to references and quotes (Nelson [1974]), instead of facilitating multiple identical copies with unidirectional links. In the same way, online communication should be either asynchronous or sparsely synchronous (Ramo [1958]) and leverage the use of avatars and reputation. Unfortunately, the majority of online communication is based on the real-time transmission of the voice and of the face of the participants, which seems natural, but it is neither the main strength of the medium, nor suitable for people. Humans are very sensitive to real-time voice, which should be in-sync with the lips, and they are also sensitive to eye contact, which should be direct, otherwise it is a signal of distraction (Lanier [2001]). Moreover, it has been established that even elaborate highly immersive virtual environments do not provide convincing simulations of reality (Slater and Wilbur [1997]), at least not in the long term. Therefore, audiovisual transmissions are suitable mostly when they are pre-recorded and asynchronous. Ideally, a video lecture should be professionally produced, while a video message should be rather short and personal. Of course, people can get used to videoconferencing in realtime, just like they have become used to digital documents as simulations of physical ones. Then, those people will consider simulation as the new normal and any alternative as unsuitable or even forbidden.

Although we have very limited experience in alternative manifestations of digital media that avoid the simulation of previous media, we do have one great example. Videogames have followed an almost parallel history to the desktop metaphor. For example, videogame avatars, skills, goals, scores, etc could be linked to learning objectives. In this way, final exams become a relic of the past and continuous assessment takes first stage, in complement to qualitative observations and assessments by peers and mentors. Videogame creators develop original multimedia assets and interactive software (game mechanics), especially for brand new genres of videogames. On the other hand, desktop and mobile computer application developers have implicitly inherited a monstrous legacy, such as files, folders, operating system, and even applications themselves (Kay [2005]). This conceptual legacy has become so pervasive in everyday life, as well as in development workflows, as it has become impossible to consider alternatives. Therefore, it is highly unlikely that new digital media are created by existing computer application developers. High quality learning media will only be created by small groups of people who are both computer and learning literate, which means free from the existing and dominant computer and learning legacies.

In addition to videogames, there is a growing number of digi-

tal media that are suitable for distributed learning and work. The main common attribute among these tools is that they are symmetrical rather than hierarchical. For example, the Internet Relay Chat (IRC) system allows the flexible creation of new channels, where participants meet and chat in small groups in a relaxed time-frame. Moreover, the Mumble audio server supports multiple channels and facilitates audio as an overlay of any application. In this way, we can discuss (not lecture!) with others in a small group, while at the same time interacting in a shared application, such as a document, or Github, all in real-time. Of course, this is only an example of adapting existing media to the new practices. Ideally, we need to develop new media that genuinely facilitate distributed collaboration, just like early books had to distance themselves from the bible both in terms of content and format before reaching its potential as a new medium. Assuming that communication is at least as significant as literature, then we should simply reject simulations of the past and shape by ourselves the media we use for learning and work.

The myth and the perils of digital transformation

It has already been widely established that digital transformation is by definition good, at least in comparison to its analog predecessor. This myth of digital supremacy is actually a fallacy in many domains. During the late 1990s, a new digital music format became very popular thanks to digital music compression and to the early growth of internet services that facilitated (mostly illegal) music file sharing. The MP3 music file format (Sterne [2012]) had quickly become a widely accepted technical standard for users and music distributors. At the same time, the wide acceptance of MP3 created a new norm for what is acceptable audio quality. In other words, the majority of people and especially those who had not been exposed to alternatives, such as high quality recordings on vinyl as reproduced by high fidelity analog amplifiers, considered MP3 recordings to be very good. We can safely predict that as soon as realite videoconference practices become pervasive, then the majority of people will consider them as the standard way of operation for learning and work. Then, there will be limited opportunity for improvement for at least one (lost) generation.

During the early 2020s, a pandemic has pushed learning and working online. Remote work and distance learning have been well established practices with several decades of practice, but the majority of the newcomers chose to follow the path of least resistance rather than the most effective. As a matter of fact, the choices of that majority has established defacto what is considered to be the *new normal*, without much consideration for alternatives, not to speak of quality. Therefore, the most possible outcome of the ongoing digital transformation is to settle for a lower standard of online learning and to consider that as very good, since we did not provide any chance

to seriously consider any alternative. Of course, video lectures (live or recorded) are just fine for well defined knowledge and skills, such as coding or using desktop and web applications. Indeed, major companies such as Google and Microsoft are offering or sponsoring online courses that facilitate the establishment of their services. Since those services are usually a job description requirement it becomes almost impossible to consider alternative learning methods or employment opportunities, because there is an overlap between the two. Therefore, the main issue is to decide what is the nature of the learning quality that we want to have. Is it skills for ephemeral and meaningless jobs (Graeber [2019]) or is it better ways of thinking (Engelbart [1962]) about the major issues of our (current and upcoming) times? As far as the dominant practices of the majority of learning and employment organizations are concerned, it seems that we have already made a choice.

Digital learning and remote work seems to provide an equal opportunity of access to education and jobs, but it comes with a cost. The risk of settling for a lower standard of learning is not the only threat, since it is not the first time that we settle for an inferior digital medium, remember digital documents? The real threat for the participants of synchronous video lectures is that they consider the realtime videoconferencing as the gold standard and the alternatives as niche or eccentric solutions, just like the work of Douglas Engelbart, or Ted Nelson had been portrayed in the past. The adoption of poor simulations for documents has facilitated significant side effects in areas such as intellectual property and misinformation, which, in turn, had significant economic and political effects, still felt nowadays (Lanier [2014]). Then, the adoption of videoconferencing for learning is going to have side effects in the respective areas, such as the quality of thinking and culture. Most notably, the adoption of weak learning tools and methods will facilitate only knowledge and skills transfer, thus neglecting the core purpose of the university, which is a (real) community of teachers and scholars. If history repeats itself (as a farce), then the most probable outcome will be a redefinition of words, such as learning and work, in order to mean something less humane.

- By removing from the duties of the teacher those tasks which can be done as well or better by machines the teacher is elevated to those tasks requiring the superior intelligence and sensitivity of a trained human being. Ramo [1958]

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