

Spatiotemporal Metaphors and Internet Technologies

Vlad Tanasescu

Knowledge Media Institute (KMi), The Open University, United Kingdom
v.tanasescu@open.ac.uk, vladtn@gmail.com

Abstract. Metaphors are used to describe the Internet, comparing it to a ‘library’, a ‘highway’, a ‘web’, stating that it brings us ‘closer’ and applying various other notions of *distance*, *shape*, *size*, *movement*, *orientation* and *navigation* to it. I describe the metaphoric process and its spatiotemporal aspects, and argue that, in order to explain its dynamics, a framework based on processes with variable identities is preferable to one of static entities with fixed attributes.

1 Introduction

Some statements, such as ‘Socrates is a man’, are either true or false, while others – ‘Socrates corrupts the minds of the youth of Athens’ – need context and values to be interpreted. Metaphors however, such as Romeo’s ‘Juliet is the sun’, seem to follow a different interpretation scheme: there isn’t any world in which Romeo’s statement can be true, although it cannot be qualified as false. Metaphors are often dismissed as pure linguistic constructions, as ‘poetic’, for the benefit of more ‘objective’ statements describing what Juliet ‘really’ is. Literary theory may be taking metaphors too ‘seriously’ as pointed by Black (quoting Nowottny) [1]:

Current criticism often takes metaphor *au grand sérieux*, as a peephole on the nature of transcendental reality, a prime means by which the imagination can see into the life of things.

However, outside of any literary context, while learning or trying to make sense of new environments novices often make use of, possibly *wrong*, metaphors (e.g. ‘the Internet as a bowl of spaghetti’ [2]), while more elaborate metaphors help progress in various scientific domains such as mathematics [3], physics [4] or economics [5]. Finally, the most successful metaphors are formalised to become *models*, such as the Rutherford-Bohr model of the atom based on the solar system. Metaphors are ubiquitous and effective, not only in literary texts but in everyday life [6], therefore on what grounds should they be dismissed?

Alongside the epistemological suspicion – metaphors are just a nice way of talking about things but do not carry any truth –, metaphors are also subject to ontological doubt. Indeed, it is commonly accepted that relations have a well-defined domain and a given range, and that Juliet’s warmth, distance, or

centrality in Romeo's life have nothing to do with what the sun is or does. This doubt casts a shadow on modern approaches in which metaphors are taken seriously in an epistemological way, as conceptual constructions originating in a transfer between a *source* and a *target* domain, but in which the nature of what is exchanged is uncertain: not linked to conceptual elements themselves but to lower level image schemata originating in the embodied nature of the human mind [3]. The ontological integrity of the source and target domains is therefore never at risk: in no way is Juliet somehow becoming the sun by virtue of the metaphorical transfer, even if Romeo's perception of her is radically different from a person he is not in love with, as is ours after hearing that statement.

In this paper I argue that metaphors are both epistemologically relevant and ontologically justified: they allow to constitute different entities, rather than to present known ones in new garments. I will first describe metaphors in general, then link them to processes and to Processual Spacetime, a conceptual model that emphasizes processes and the temporal aspects of the environment. Then I will discuss various spatiotemporal metaphors that are often applied to the Internet.

2 The Metaphorical Process

2.1 Metaphors and Analogies

A metaphor is a figure of speech by which something is described in terms of something else ([7], p. 507). Expressions that use figurative language can be called metaphorical but the term *metaphor* is specifically used to describe an implicit comparison, e.g. 'the Internet *is* a haystack'. Metaphorical expressions where an explicit comparison is made using comparative words of the language are called *similes* ([7], p. 830) (e.g. 'the Internet *is like* a haystack'). *Analogy* is sometimes used as synonym for metaphor but may also qualify partial similes where the relation between source and target is made explicit (e.g. 'looking for something on the Internet is like trying to find a needle in a haystack'). *Allegories* are narratives, often of some length, that stand for something else ([7], pp. 20-23).

These distinctions are relevant to the field of literary criticism but at a conceptual level a continuum can be found. There is some consensus that a metaphor constitutes a mapping between a 'source' (e.g. celestial bodies) and a 'target' (e.g. people) domain [6]. However the mapping is never complete or fully explicit as even 'pure' metaphors do not entail all the characteristics of the source domain (solar eruptions should not apply to Juliet), while precise analogies do not forbid the implicit association of other characteristics from the target domain to the source one. Therefore analogies, similes and metaphors, in that order, attribute an increasingly large set of attributes from the target domain to the source. Moreover this transfer is bidirectional, as source and target can often be exchanged. Another unifying aspect of metaphorical expressions is simply that they can be understood [8]. Indeed metaphors such as 'the Internet is a library' make sense almost instantly whilst 'failed' metaphors such as 'the Internet is a bluet' or 'a chair is like a syllogism' fail [1].

Hence the continuum is found by recognizing that metaphors can be understood without difficulty, and by ordering metaphorical expressions according to the completeness of the mapping between the source and target domain: metaphors and similes involve a full mapping while analogies are more constrained, and fail when the target resists this attribution. The task now becomes to understand what exactly is transferred, and how this transfer occurs.

2.2 Metaphors and Processual Spacetime

Contemporary work on ontologies assume that the real can be conceptualized as *classes of things*: conceptual bricks are well defined entities that can be further particularized according to a hierarchy of classes, by the addition of properties. In this object-oriented framework, metaphors are relations between attributes of preexisting concepts. The set of possible mappings is finite, and one fails to explain how metaphors may reveal something new about the world, and make disciplines progress. Grounding a theory of metaphor on a static conceptual model can lead to surprising conclusions. For example, that statements such as ‘she is in the flower of youth’, ‘he is a late bloomer’, ‘he is withering fast’ or king Lear’s ‘ripeness is all’ reveal basic ‘conceptual metaphors’, i.e. common mappings used in a given culture, and that, – since entities (here, plants and people) are predefined –, one of the fundamental metaphors of western culture is ‘People are Plants’ [6].

Hierarchic ontologies have been criticised both in philosophical and scientific contexts, which led to the exploratory use of alternative knowledge representation paradigms. I have described this issue and proposed an alternative conceptual model as an attempt to reconcile these paradigms [9]. By considering *processes* as a fundamental concept some of the difficulties disappear. Indeed, if there seems to be a cultural tendency to compare people to plants, one person’s life can also be linked to the rising and setting of the sun or to any other similar process. Vegetal life is an ubiquitous example of growth and decay but it is the process itself that constitutes the semantic ground of the metaphor. Focus on the process explains how metaphors can ‘die’, becoming so ingrained in culture that the source domain is forgotten. In this sense, plants can themselves fit in the target domain of a metaphor (‘a rose is like a young child’), as metaphors are often bidirectional. Stating that entities are ultimately processes, introduces movement, and the notion that what is recognized as stable is only the perceptible product of processes continuously acting to keep it together. Processual entities may occupy space, but they always require time, making the temporal dimension non optional, and Processual Spacetime (PST) is that ‘vast interconnected manifold of process’ unfolding in space and time ([10] p. 94). As processes focus on some aspect of the environment, i.e. on other processes, transforming a region rather than another, a particular region of spacetime is particularised for a given process, achieving some level of *identification*. We have called the process of identification of processes by other processes a *difference* to stress the fact that something appears as an object and starts making sense only when it appears as distinct from the environment. *Things*, in this nominalistic model,

are salient processes, differences, and are determined by the particular processes that constitute the context, for example by the task at hand (e.g. the cabinet maker has many names for wood qualities), and object properties become *powers* or *affordances*, i.e. are only the way they affect the surrounding processes.

In this worldview, what is transferred between a source and a target domain are identifiable subprocesses, i.e. differences, identifiable ways of doing things and ways in which things act. This includes affordances, which can be transferred from context to context, justifying the possibility of separating a characteristic from its original carrier and its *transfer* by the metaphorical process. Metaphors used in human-computer interaction have rejected photorealistic models (of a desktop for example) to use more abstract ones only keeping essential processual aspects [11]. Only differences, identifiable processes, are transposed from one context to another and 'Juliet is the sun' because she radiates, is maybe set as a center around which Romeo revolves, providing him with life and energy. Moreover, we understand this metaphor only because Juliet herself is involved in the more extended process (or context) of being loved by Romeo, of which we are aware. Indeed, as processes only superficially support identity, via differentiation, it is not surprising that metaphorical processes do not display a crisp limit, and that the number of processual elements transferred from a source to a target domain in the metaphorical process is variable.

As mentioned before, taking processes as ontological grounding has an influence on the nature of the notion(s) of space, and hence, on the spatiotemporal nature of metaphors.

2.3 The Spacetime of Metaphors

Debate about the nature of space and time is ongoing but there is a consensus that space and time may be presented in two interrelated *flavours* (cf. [12], chap. 2). One is the space commonly considered in science, *absolute* (or *global*), while the other is *private*, or *subjective*. Subjective space is spacetime from the point of view of an agent – here a process – while global space can be equated with the multidimensional manifold in which all activity occurs, or processes unfold. Subjective space has characteristics related to *activity*: for example distances are perceived depending on the effort needed to reach the destination [13]. This space is also essential to Gibson's affordances, which are the opportunities that are offered by the environment [14]. The characteristics of global space are well known, nevertheless a reminder of the distinction between the two can be useful (cf. table 1 adapted from [15] p.139):

Since in PST a metaphor is the transposition of processual elements from one context to another, spatiotemporal metaphors become the attribution of any process' characteristic space, even when its description is explicit. As an example the following analogies, from Sun Tzu ([16] p.37), in which the description of processes entails spatiotemporal notions:

Water shapes its course according to the nature of the ground over which it flows; the soldier works out his victory in relation to the foe whom he is facing.

Table 1. Public and private space

Public space	Private space
Geometrical space.	Lived space.
Homogeneous, no center.	Personal, process centered.
Pure extension.	Orientation (up/down, right/left).
4-dimensional multiplicity of positions.	Remoteness/nearness of objects, regions and places.
Measurement of distance.	Degree of availability.

Therefore, just as water retains no constant shape, so in warfare there are no constant conditions.

Processes develop their private spacetime, in which they unfold. Even when not as obvious as in the previous example, spacetime cannot be dissociated from processes, and therefore from experience, and if the spatial dimension is absent the temporal one remains, hence every metaphor has spatiotemporal characteristics. Whether implicit or explicit, the spatiotemporal elements that contribute to the ground of a metaphor may involve notions of *distance*, *shape*, *size*, *movement*, *orientation*, *navigation*, etc. This list is not exhaustive since differences may change their meaning according to the processes involved, and entail different spaces (1D, 2D, 3D, discrete, continuous, finite, infinite) or temporalities (linear, cyclic, discrete, continuous, finite, infinite).

The word ‘metaphor’ – from the Greek *metaphorá*, ‘carried from one place to another’ – itself has a spatial meaning. Metaphors present new differences, identifying processual elements in a supposedly known larger process: in Juliet we acknowledge her warmth, her centrality and these processes become a part of our world as they start *making sense* for us. In the case of the Internet, a ‘virtual’ space, the nature of processes experiences little change, allowing the metaphorical process to operate.

3 Spaciotemporal Internet Metaphors

With a better understanding of the spacetime of metaphors, Internet metaphors indeed become easier to approach. There is now a clear meaning to stating that the Internet is ‘big’, or that it makes us feel ‘closer’, as it constitutes a direct reference to the particular spacetime of the process described or implied. In the next sections, I am going to analyse in the context of the Internet the spatial characteristics previously described: *distance*, *shape*, *size*, *movement*, *orientation* and *navigation*.

3.1 Distance

What does it mean that the Internet, the Web, and online Social Networks bring people and things ‘closer’? Proximity in private space is mostly *at-handness* and a result of the way entities are made available to a process. Following Heidegger,

‘when something is close by, this means that it is within the range of what is proximally ready-to-hand for circumspection.’([17] p. 142). In the early days of mobile telephony, before appropriate social practices were developed, the feeling of servitude that accompanied those that had to carry a mobile phone could be traced to this ‘at-handness’. Electronic devices can therefore create presence by carrying processes over large geographic distances. In a conceptual model based on processes, the difference between virtual and physical presence not essential but only of degree: what and how many processes are present in a given environment, and how do they compare. Hence, for example, emoticons in Instant Messaging are not only fanciful add-ons but a means of conveying mood information, an expressive process, between participants, alongside the exchange of semantic content using text. Google stating ‘And now, we’re back’ after a system or network failure is justified: one’s presence is indeed reflected in virtual space, radiating from physical process to distant points in spacetime through virtual channels, achieving synchronous and asynchronous (tele-)presence [18].¹

3.2 Shape and Size

The relation between private and global space is mostly of exploratory nature as processes constitute a point of view through their private spaces, and need reorientation to encompass different aspects of the environment, in order to act in it. The Internet acts as such an environment by not providing its content all at once, but revealing it in chunks that limit its perception while at the same time allowing it to be processed. By exploring web pages, connecting to servers and filtering data, the agents discover the particular shape of the Internet, which differs from any conception of an ‘absolute’ one. In this sense, the Internet can be compared to an information ‘highway’ when accessing a page or a server allows agents to gather a large amount of input or up-to-date information in little time, or it can be compared to a ‘spaghetti dish’ when only small quantities of input can be gathered on particularly convoluted ways. When the Internet is considered as a whole, however, it becomes ‘abstract’, reflecting the relation of subjective and global spaces. Therefore websites can be ‘large’ or ‘small’, and the Internet itself ‘big’, even if no absolute measure or mathematical distance has been defined on it.

3.3 Movement

Movement is the exploration of the spacetime manifold. In this sense, movement must not only be understood relatively to absolute space, as the evolution of point based objects, but should also include the transformations operated by local processes in their immediate environment. Physical movements in mathematical space are themselves formalized metaphors, i.e. models, of this more fundamental movement which is the manifestation of a process’ activity. In this

¹ asynchronous tele-presence can even extend after the death of an individual, cf. the ‘Immortal Computing’ patent filed by Microsoft [19]

sense, the ‘web as a library’ metaphor makes sense, not only because documents are available but also as it involves ‘browsing’, ‘searching’, moving from regions to another in order to reach documents, etc. Moreover, for abstract or even physical exchanges, of information or of goods, the quasi instantaneous speed allowed by the Internet is a valid alternative to physical movement (to go and ‘get’ a book for example) and therefore indeed tightens the world, as already suggested above.

3.4 Orientation and navigation

Orientation and navigation represent the possibility for processes to direct their movement in spacetime according to ‘goals’. Orientation involves a temporal perception, a partial and fuzzy vision of past and future private spaces, which corresponds to the cognitive operations of memory and planning. In virtual space orientation occurs when agents are presented with choices such as following a given hyperlink, or connecting to a given server in a p2p network. Choosing a direction brings them to a ‘place’, e.g. a page or a network, in which different affordances are presented. ‘Navigation’ is orientation in an environment to reach a target, which also applies to virtual spaces.

4 Conclusion

I have shown that, given the appropriate worldview, metaphors, whether in a poetic or scientific context can acquire a more precise meaning, which is both epistemologically valid (i.e. provides useful and veridic information about the world), and ontologically sound (as an application of differences). Metaphors have been shown useful not only as ‘descriptions’ that alleviate cognitive operations but as concrete opportunities of subprocess discovery, and I believe that future applications can benefit of this redefinition, by having a ground to actively investigate processual elements from a source domain before applying it to a target, i.e. by taking metaphors *seriously*.

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