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A Novel Tool for the Study of Social Media Narratives

Abstract

The study of social media discourses requires alternative methods to traditional narratology. We propose a tool that can be used in this promising area of research. We explain blending in metaphor and mathematical communication, showing how the latter can be extended to social media. The underlying idea is that style describes how the parts of a narrative are blended into the whole.

Keywords

Social Media Narratives, Style, Discourse Analysis, Conceptual Blending, Metaphor

Introduction

The future of freedom of speech is entwined with social media. The digital flow of information has radically changed how we communicate, for better and worse. Social media platforms allow their users to construct and promote narratives that may or may not serve the truth. Usually, these narratives are interactive, meaning that other users can add replies, comments, "likes," upvotes, and other responses. The study of such narratives requires new methods not provided by traditional narratology. We introduce a tool that can be used in this promising area of research.

This paper is the first in a series of works serving as an introduction to our research project. In future papers, we shall present and evaluate techniques for studying narratives in social media, paying particular attention to

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how they deal with social issues. These techniques will include protocol analysis, conversation analysis, interaction analysis, and the (already widely used) discourse analysis.

Why is a New Theory Needed?

Technological progress has raised new issues, such as sharing and narrative representation across media. Unfortunately, most studies of social media narratives still follow traditional approaches which cannot handle these. This approach happens because they were developed mainly to analyse verbal structures and content, based mainly on discourse analysis.

We shall suggest a tool that can be used towards a theoretical framework for studying narratives within interactive media in general and social networks in particular.

An effective way to study such narratives would have significant implications for communication strategies because it would help make users more aware of fake information—by, for example, providing better tools for reputation management.

Particular emphasis needs to be given to the discourse styles in social media narratives. Our point of departure will be the paper "Style as a Choice of Blending Principles" by Goguen and Harrell (2004).

More specifically, we claim that the narratology of social media would benefit by using ideas from (Stefaneas and Vandoulakis 2012, 2013, 2014). These works study how mathematicians collaborate to prove theorems using the web. Such collaboration has close similarities with social media narratives so that these studies can provide valuable insights.

Planning and the Administrator

The administrator is a key difference between social media narratives and other kinds of narratives. Twitter, for example, has administrators who can suspend or ban users' accounts, as do Wordpress.com and other blogging platforms. In addition, users often act as lower-level administrators: blocking unwanted replies to tweets or deciding not to publish comments about their blog posts.

The existence of an administrator leads to the idea that there is underlying planning implemented via the administrator, according to the Terms of Service of each platform. This idea means that planning in social media narratives should be studied extensively and integrated into any new theory.

As it happens, the structure of planning discourse has already been studied in linguistics by Goguen and Linde (Linde 1986, Goguen and Linde 1983). However, to our knowledge, it has not been studied in the context of social media. This lack is unfortunate because planning is crucial if we want to develop an improved way to evaluate online narratives. In particular, the study of planning will help us collect data about social media use. Social media is so vast that human evaluation of narratives is time-consuming at best and impossible at worst. If we can computerise such evaluation, it will provide faster, better, and more rigorous data collection.

Computational Narratology

Our starting point is this passage from "Style as a Choice of Blending Principles" (Goguen and Harrell 2004, §3):

> A significant finding is that the optimality principles posed in (Fauconnier & Turner 2002) do not work for generating some poetic metaphors. As a result, we suggest a much broader view of blending principles in Section 3.5, under which different works may be controlled by different principles; for example, the choice of domains for themes, imagery, local knowledge, etc. is considered a blending principle, because these domains contribute to both the conceptual and structural blends that constitute the work. We then explore the idea that style may be determined by such principles.

At this stage, the passage will mean very little to most readers. However, the core idea is that the style of a text—in the broadest sense, including blog posts, Twitter threads, and so on—is, in effect, a set of parameters that determine how the parts of the text are blended. It is this that we want to apply to social media.

By "blending," we mean something akin to the way that the meanings of the words "house" and "boat" get blended to derive the meaning of "houseboat." Indeed, according to Goguen, blending such concepts to make new concepts is an essential cognitive operation. Metaphor is one case of its use.

However, it has broader uses. Such uses lead to the idea of style as a set of parameters that determine how the parts of the text are blended. We shall trace the ideas that led to this notion and then explain how it defines the style.

We shall also show how Stefaneas and Vandoulakis applied this to collaboration between mathematicians, particularly mathematicians proving theorems and collaborating via the web.

We show too that there are close similarities between this mathematical collaboration and social media.

Finally, we suggest that because of these similarities, methods from the study of such collaboration—in particular, the idea of style as a type of blending —can also be used in studying social media, especially in classifying and explaining the way that many different kinds of narrative can emerge from the same series of events.

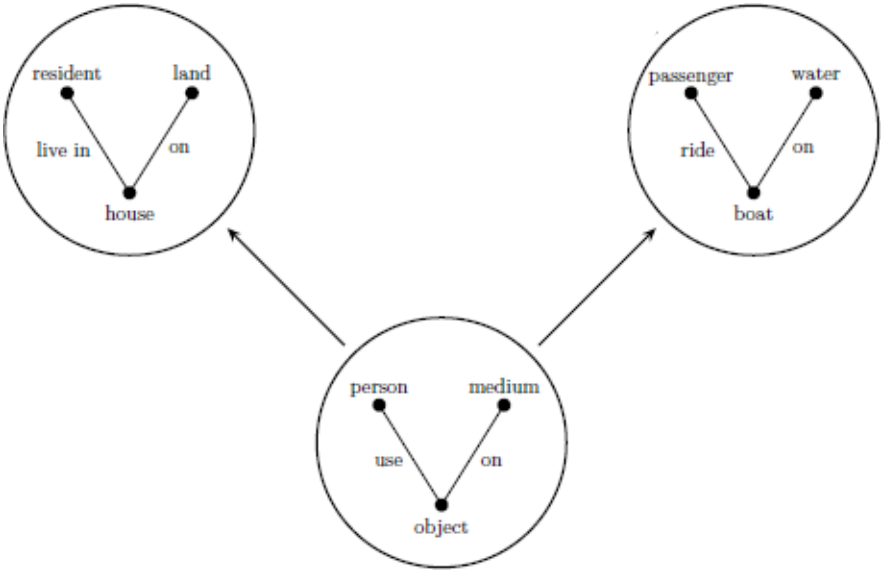
To summarise, the progression of ideas in the paper is:

1. A metaphor is a blend between two conceptual domains. How its meaning is derived by blending.
2. There can be many possible blends, i.e., interpretations of a metaphor. We need principles for choosing the best—"optimal"—blends.
3. A digression into the intellectual contributions to blending theory and suggestions for further reading.
4. How the optimality principles work.
5. Different optimality principles may be needed for unconventional blends in poetry and social media.
6. Similarities between web-based mathematical communication and social media.
7. Style as a choice of blending principles.
8. Application to mathematical communication.
9. Application to social media.

How Blending Explains a Metaphor

Let us look first, therefore, at how blending explains metaphor. We shall use Goguen's classic "houseboat" example (Goguen and Harrell 2004, §2.3). The point of the example is to show how the word "houseboat" gets its meaning from the meanings of "house" and "boat."

Consider the diagram below:



Each circle represents a "conceptual space" in this diagram: a small network of concepts built temporarily by the mind as it tries to understand an utterance. The nodes (dots) in the networks denote entities, and the edges (lines between them) denote assertions that certain relations hold between them.

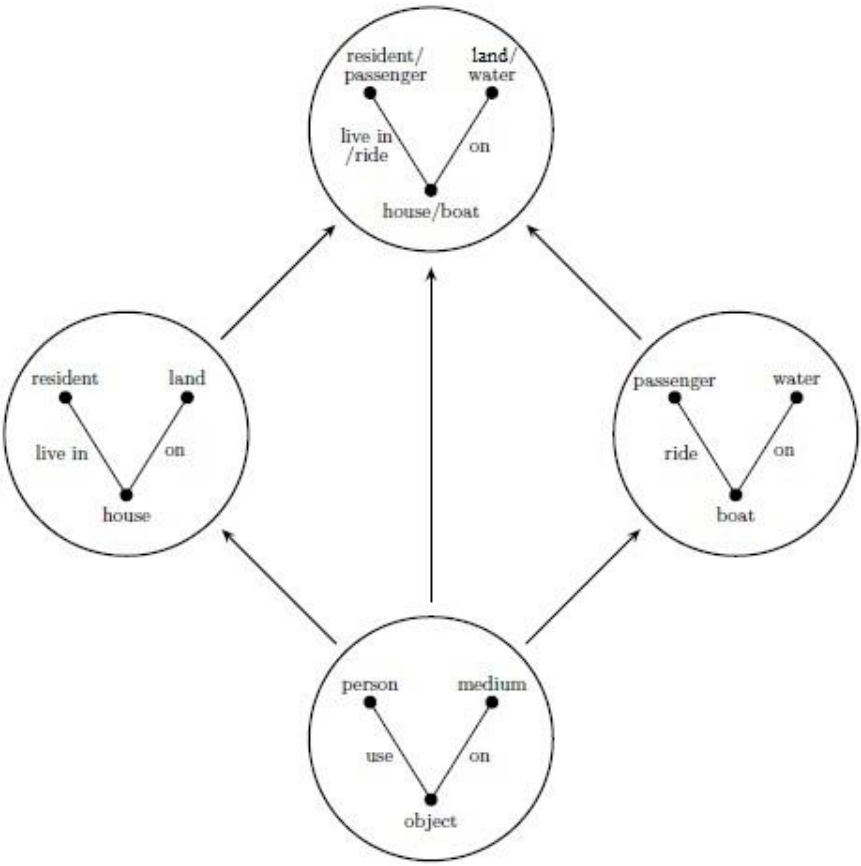
For example, the left-hand line in the left-hand circle represents the entities "resident" and "house" and the assertion that "residents live in houses." Similarly, the right-hand line in the same circle represents "house" and "land" and the assertion that "houses stand on land." The left-hand line in the right-hand circle represents the assertion that "passengers ride on boats." Of course, these simple diagrams do not capture the full subtlety of the words' meanings: no formalisation ever can. However, we do not claim that they do; we are merely using them to model what we consider essential aspects of metaphor.

The two top circles are *inputs* to the process of understanding. One is a conceptual space describing houses as in the previous paragraph, and the other is a conceptual space describing boats.

The bottom circle is an *intermediate stage*. It is a "generic space" built from the inputs and specifies what they have in common. Thus, consider the left-hand lines in the top circles. They represent the relations "residents live in houses" and "passengers ride on boats"; what these have in common is that "people use objects."

"People use objects" may not seem to say very much. However, boats and houses are far apart, semantically speaking. So are passengers and residents, and the relations "ride" and "live in." So, they have little in common, and "people use objects" is the best we can do. However, the generic space is not particularly interesting anyway. What interests us is the *output* from this process, the blend space. We shall explain this now.

To do this, we add a fourth circle:



We then map each entity and relation in the generic space to the corresponding item in the left-hand circle and then to the blend space; we also map to the corresponding item in the right-hand circle, and then to the blend space. This mapping gives us the pairings that are shown in the top circle: "house/boat," "live in/ride," "resident/passenger," "on/on," and "land/water."

The blended space now *almost* gives us the meaning of "houseboat," an object that is both a boat and a house, with a person who is both a resident and a passenger. One problem is that the blend says it is on both land and water. In fact, of course, houseboats work only on water, which is why we blued out "land" in the top circle. We deal with this problem below.

Blending is Partial

As Goguen and Harrell (2004) point out, this is not the only possible blend. They list others in their §2.3. These include a second blend that means "boathouse," where the boat "lives" in the house. Interestingly, this is an example of the literary technique of personification, whereby an object is considered a person. We shall return to this later when we discuss typecasting.

A third possible blend is similar in structure but has the house riding in the boat rather than the boat living in the house. Goguen and Harrell add real examples of this, as when a boat is used to carry prefabricated houses to an island.

However, a fourth is an amphibious recreational vehicle that can travel over both land and water and that one can live in.

A fifth blend has an even less familiar meaning: a livable boat carrying livable boats.

Finally, a sixth blend gives a boat used on land for a house.

All six blends have in common: they only partly blend the two input spaces. The blend that we discussed with our diagrams, meaning "houseboat," throws away the attempted pairing of "land" with "water." The second blend, meaning "boathouse," described in some detail by Goguen and Harrell, throws away several mappings, as they explain. Working through the others will show that they discard mappings too.

This demonstration implies that we need principles for choosing the best blends. Some blends will be too weak; the ultimate case does not pair any items between the two input spaces. At the other extreme, blends that pair up too many items can lead to impossibilities, as a "houseboat" would have done if it had paired "land" with "water." We need blends that sit in-between "optimal" blends.

Intellectual Contributions to Blending Theory

Before discussing how to choose optimal blends, we should indicate the intellectual history and makeup of blending theory. One strand in its development is a branch of mathematics called category theory. This develop-

ment manifests itself in the diagrams above because they are a particular case of a category-theoretic construction called "colimit." Goguen, inspired by category theory and general systems theory, showed a general mathematical tool for assembling systems from their components. In this case, the systems are conceptual spaces.

Category theory also inspired "algebraic semiotics," which we refer to in the next section. This theory deepens the treatment above by mathematising the notion of semiotic sign systems and mappings between them. The details are too mathematical for this paper but are discussed in (Goguen and Harrell 2004). An excellent and relatively non-mathematical summary has been written by (Joncas 2020).

Goguen has carried the formalisation of information integration even further (Goguen 2004), basing it on the theory of institutions (Goguen and Burstall 1992), an abstract theory about logical systems that originated from work on specifying computer programs. His approach unifies and generalises several other approaches to information, including Barwise and Seligman's information flow, Wille's formal, conceptual analysis, Sowa's lattices of theories, and Gärdenfors' conceptual spaces.

Finally, we should mention Gilles Fauconnier and Mark Turner. Their papers, several of which we cite in the bibliography, are easy to read and do not require mathematics. Goguen's ideas on blending are in part an experiment in formalising Fauconnier and Turner's conceptual blending theory. This aimed to explain the metaphor, analogy, and non-compositionality of adjective meanings, amongst other literary and linguistic phenomena.

Finding Optimal Blends

Let us now return to finding optimal blends. We said that we need principles for doing so. Goguen and Harrell suggest a few and demonstrate them (Goguen and Harrell 2005, §2.8). One is "commutativity." In a diamond diagram such as that above, a mapping from the generic space to the blend space has two parts: its left-hand path and its right-hand path. It is commutative if both paths map the entity or relation in the generic space to the same entity in the blend space. The more commutative mappings a blend has, the better it is. Informally, this is because it uses more of the information provided.

Another principle involves "typecasting": mapping one entity or relation to another that is incompatible. Mapping a boat to a vehicle is fine because one is a special case of the other. However, mapping a boat to a person involves typecasting because a boat is not and cannot be a person. The "boat-

house" blend from the last section, but one does this: as we mentioned there, it personifies the boat in order that it can "live" in the boathouse. The more typecast mappings a blend has, the worse it is. Informally, this is because it forces together incompatible kinds of meaning, thereby misusing more of the information provided.

Optimality in Poetry and Social Media

Goguen and Harrell (2004) describe how they extended blending to poetry, writing a system that generated poetic narratives. This system led to their view of style as blending principles, to which we return below. However, it also showed that optimality principles such as those above are not always suitable. Thus, in §3.4, they quote "Walking Around," a poem by Pablo Neruda on the weariness induced by consumerism. Amongst other metaphors, this contains the phrase "water of beginning and ashes," which combines entities of a very different type. Neruda's phrase "swan of felt" is less drastic but still requires typecasting. Goguen and Harrell suggest that such examples show that typecasting should sometimes be valued positively rather than negatively.

We believe this will be important in applying blending to social media. Some blends will be primarily factual, as when a health expert analogises the spread of COVID-19 through the air by analogy with cigarette smoke or perfume. However, some will be creative, artistic, poetic, aiming to surprise their unexpectedness. These will require different blending principles.

Similarities between Web-Based Collaborative Mathematics and Social Media

In the beginning, we quoted an excerpt from (Goguen and Harrell 2004, §3). The significant part was this (our italics):

> [...] the choice of domains for themes, imagery, local knowledge, etc., is considered a blending principle, because these domains contribute to both the conceptual and structural blends that constitute the work. *We then explore the idea that style may be determined by such principles.*

In other words, style is a set of parameters defining what is blended with what. Different choices of parameters give different styles. We claim that the narratology of social media would benefit by using these ideas as further developed by (Stefaneas and Vandoulakis 2012, 2013, 2014). Stefaneas and

Vandoulakis study how mathematicians collaborate to prove theorems using the web. So, we shall now show how such collaboration is similar to social media.

Imagine a social media platform called Prover: like Twitter, but where tweets—"preets"—can be any length and carry mathematical symbols. A group of mathematicians is collaborating over it to prove a tricky theorem about (say) how rapidly the area of polygons grows as you increase the number of edges. Each lives somewhere different, so they can only communicate via a Prover.

Our mathematicians all have excellent visual imaginations, so supplement their preets with graphs, sketches of geometric shapes, and so on. When someone preets an image, a collaborator will often open it in a drawing program, draw on it, and send back the result. Collaboration becomes a dance of electronic Post-it® notes.

Style as a Choice of Blending Principles

Now let us return to (Stefaneas and Vandoulakis 2014). They define a mathematician's style, in effect, as a *meta-code*. The style determines the individual mode of integration (selection, combination, blending) of concepts into the narrative structure of a proof. In other words, it controls blending: it is a particular choice of blending principles.

So, styles act as tunable parameters. To help our intuitions, we can visualise them as knobs on a radio. Each knob controls *what* gets blended, *how much* of it gets blended, and *whether* it gets blended at all. The knobs control in which way. The communicator, we shall assume, wants their communication, and hence the way it blends its components, to be optimal somehow.

Application to Mathematical Communication

For example, consider Stefaneas and Vandoulakis' comparison between mathematicians Michael Spivak and Aleksandr Kurosh on the one hand and the Bourbakists (Barany 2021) on the other hand. The Bourbakists are notoriously formal; they have eschewed images, whereas Spivak uses images plentifully to help their readers' intuitions.

Moreover, Spivak and Kurosh use narratives from the history of mathematics to optimise an efficient transfer of knowledge, whereas the Bourbakists optimise for purity. By purity, we mean that images are abandoned

because they may convey unintended intuitions and not convey the correct intuition to every reader. Therefore, to minimise contamination with unintended information, the Bourbakists avoid them.

For example, at a different level, we could analyse Spivak's images themselves. Which visual concepts do they blend with which mathematical ones to "pump" intuition from the latter, via the former, to the reader's mind?

Application to Social Media

How might these ideas transpose from collaborative proving to social media? In our view, the style of a social media narrative can also be defined as a *meta-code.* As with mathematical communication, the style determines the integration mode (selection, combination, blending) of concepts into a narrative.

We shall take Twitter as an example. Some users accompany the text in their tweets with images: in current internet culture, these are often "memes" (Kariko and Anasih 2019): pictures, usually found rather than made by the user, bearing short ironic or humorous captions. Other users eschew memes, and some may think them frivolous; some may not know how to find them. At any rate, one stylistic parameter is whether memes are present or absent.

A different kind of blend, but at the same level, is what we might call blending with links. Reputable users will, we hope, provide sources for facts that they cite. This citation can often be done by pasting in a link and is particularly important when facts are controversial or have life-or-death consequences. Topical examples include information about how COVID-19 is transmitted, its severity, the effectiveness of masks, and vaccination safety. So this determines another stylistic parameter.

At a lower, more detailed level, we can ask which kinds of images those who accompany their tweets with images get used. Few users accompany their tweets with images they have drawn themselves, and many use memes. However, are there different kinds of memes? We can look at how the caption on a meme can blend with the picture, using the same methods we use to analyse how mathematical images blend the visual with the mathematical. Moreover, are there different ways that memes can blend with the text in a tweet? We can look at that too.

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