Puzzling our way through Wittgenstein, Metaphors, and Technology

Introduction

Recent events around Facebook and Cambridge Analytica have once again led to a surge of popular pieces in the media that emphasize the importance of the humanities and especially philosophy for a healthy society. But how do we, as philosophers and researchers, actually make the transition out of the philosopher's armchair into an impactful position at the cutting edge of technology next to creators, builders, and engineers? A big question indeed, that I want to explore in this paper, by focussing on two particular cases. In this essay, I am investigating how Ludwig Wittgenstein's legacy might be interpreted and used as a practical framework to not only understand but also build and create technology. In his book *The Social Construction of What?* Ian Hacking tries to avoid discussing what he calls "elevator words" — semantically vague words such as "truth", "fact", or "reality". In a similar vein, I am hoping to make a tiny step out of my armchair by replacing the elevator word of technology with a concrete piece of software and connecting it to the concrete philosophical ideas that I am introducing. Wittgenstein and OKM are two tiles of different jigsaw puzzles, namely those called "theory" and "practice" and in this explorative piece, I am hoping to present two additional theories that I believe to be interlocking pieces which enable us to assemble the resulting puzzle merging both theory and practice.

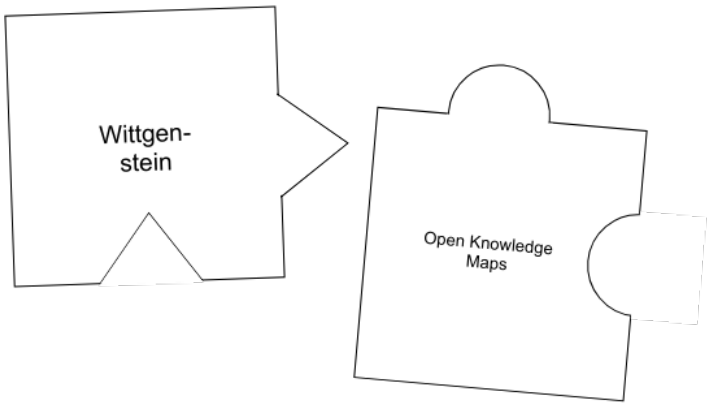

Figure 1: "Bridging the gap" — Connecting these two pieces from two different sets "theory" and "practice"

Without a doubt, Wittgenstein's work is still incredibly rich (as the ever-growing list of new interpretations and readings show) but as Figure 1 exemplifies the challenge at hand requires us to find very particular tiles with special connectors. These particular connections in Wittgenstein's work are (1) his ideas about metaphors and (2) a technological interpretation of his well-known *language games*. Specifically, I will discuss the central role that metaphors play in his work and consequently introduce *conceptual metaphor theory* (Lakoff & Johnson, 2003) as a practical framework to analyse metaphors in our cognition. Mark Coeckelbergh's (2017) *technology games* will similarly serve as a framework to understand technology in Wittgensteinian terms and help to understand social, historical, and cultural challenges. After introducing the two connecting pieces of this puzzle, I will talk about the fourth tile on the table — Open Knowledge Maps (openknowledgemaps.org), a visual knowledge discovery tool and academic search engine (Kraker et al, 2016). Finally, I will elaborate how both *conceptual metaphor theory* and *technology games* serve as connecting pieces between Wittgenstein's philosophy and OKM.

Piece 1: Wittgenstein

As previously mentioned, Wittgenstein's work is not a blank sheet in the world of philosophy. In this piece, I am by no means presenting a new interpretation of his work. Rather, I want to elaborate on the idea of using Wittgenstein to bridge the infamous gap between theory and practice with a concrete example. How can one actually understand and eventually build tools, instead of adding another piece of the puzzle called "theory"? Part of the answer is what Read (2007) calls a successful "application" of Wittgenstein. He suggests three criteria to differentiate between successfully applying Wittgensteinian and, so-called, pseudo-applications (Read, 2007, p.135):

1. moving beyond exegesis,
2. extending Wittgenstein's insights or taking them to domains where he did not particularly focus,
3. taking in a domain of thought or life that is of some moment beyond the academy

(1) While the exegesis of Wittgenstein might be fruitful and enjoyable undertaking, I am specifically looking for individual, fitting pieces in his work which interconnect with the knowledge discovery system OKM. (2) Modern scholarly communication is technology-driven and the Web 2.0 has fundamentally changed the way humans communicate. Not only did Wittgenstein not focus on the Web 2.0, but the very advent of today's technology might have been unforeseeable for that generation. (3) Well aware of the fact that OKM's main users are academics of all kinds, the project still remains a rather non-academic undertaking that aims to create a piece of technology that provides quick and easy access to scientific knowledge, rather than contributing to the vast projects known as science or philosophy.

According to these three points, I am attempting to sketch a Wittgensteinian framework to build and understand technology, which reaches beyond theory and the academy. Furthermore, and most importantly, Read emphasises the importance of seeking 'the same kind of thing' that Wittgenstein tried to do with his work, viz., "puncturing delusions that we are prone to, and helping us to attain peace with regard to our words" (Read, 2007,p.134).

Translating this goal into the domain of OKM, i.e. modern scholarly communication, means to create solutions that resolve the delusions and misunderstandings of communication.

Piece 2: Open Knowledge Maps

At this point, practice and application are still vague in their meaning, i.e., *elevator words* in Hacking's (2001) terms which are "blunted lances with which philosophical mobs charge each other the eternal jousting of ideas", waiting to be filled with things from a world beyond the academy. In what follows, I want to briefly introduce OKM, our piece from the "practice" puzzle.

Figure 2: Screenshot of the overview of research for "philosophy of technology"

OKM is a visual knowledge discovery tool that provides an overview of a research field based on available metadata and abstracts of relevant articles. The full technical implementation and code are openly available (Kraker et al., 2017). The authors furthermore have published a piece about currently implemented as well as planned features (Kraker, Kittel and Enkhbayar, 2016). While the basic search functionality resembles other standard academic search engines, the results are presented in an interactive form which the authors call *knowledge map*. These knowledge maps consist of individual items (publications) and topic bubbles which are calculated based on the available metadata abstracts of the items (see fig. 2). The concept of knowledge maps is reminiscent of Rosch's *prototypes* (Rosch,

1988) or Wittgenstein's *family resemblance* (Wittgenstein, 1953), which is one of the reasons why I initially started to look into Wittgenstein's work as a theoretical foundation.

We have now successfully replaced an "elevator word" by a concrete piece of technology. We can finally reformulate the previous question as: How can we bridge the gap between Wittgenstein and Open Knowledge Maps?

Connecting "theory" and "practice"

In this section, I want to introduce Lakoff and Johnson's *conceptual metaphor theory* and the recent take on Wittgenstein as a philosopher of technology by Mark Coeckelbergh (2017). The former is a well-known theory among philosophers of mind and provides the vocabulary needed to describe parallels between Wittgenstein and the mechanics of OKM. The latter provides a framework to understand technology in terms of its use, introducing a social, historical, and cultural dimension to technology. An interesting difference between these two is the role that Wittgenstein's philosophy played in their conception. While Lakoff and Johnson did practically ignore Wittgenstein despite mentioning other relevant contemporaries of his (Peters, 2015), Coeckelbergh very consciously takes a place in the previously mentioned long line of new interpretations of Wittgenstein. Nevertheless, I am primarily focused on their contributions to solving the puzzle of Wittgenstein ("theory") and Open Knowledge Maps ("practice").

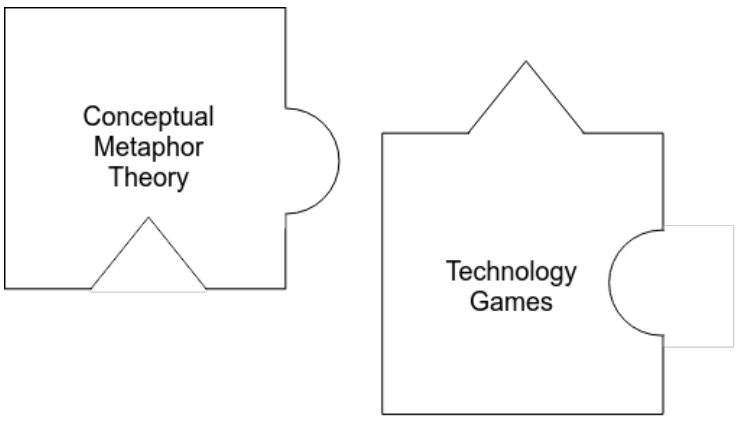

Figure 3: Two pieces that connect "theory" and "practice"

Piece 2: Conceptual Metaphor Theory

A central theme in Wittgenstein's work is metaphors — either as an object of investigation or as a philosophical and investigative method to convey his messages to his readers. Despite his elaborate use of metaphors, according to Wittgenstein, the cause for the profound confusions caused by our words are misleading metaphors and analogies. Gill (1979)

skillfully summarises Wittgenstein's thoughts regarding the function and role of metaphors across the *Tractatus*, *Philosophical Investigations*, and *On Certainty*:

> "Not only does he maintain that metaphoric expression runs deeper than propositional expression, but his method of presentation is itself metaphorical in nature. In a word, he doesn't present 'knock-down, drag-out arguments' for his view, because his view is that such arguments do not cut deep enough." (Gill, 1979, p.284)

Most readers of Wittgenstein are familiar with these deep-cutting metaphors that he loves to use in his prose. If one takes Wittgenstein's opinion about the epistemic value of metaphors into account, one can see that this style of writing is intended to be more than just elaborate and figurative speech. Rather, Wittgenstein tries to appeal to the foundation of our experience with the metaphoric mode "as it constitutes the heart of everyday speech because it is at the practical level of existence that we are closest to the bedrock of our form of life" (ibid., p.284). Gill thus concludes that any abstract thought consists of and must be evaluated by metaphors.

Despite accounting such a fundamental role to metaphors in our language and existence, Wittgenstein never set out to construct a systematic theory of metaphors. In contrast, George Lakoff and Mark Johnson wrote extensively about the cognitive function and workings of metaphors. They argue that metaphors structure our everyday experience and accordingly those "metaphors we live by" are more than simple linguistic expressions. It is interesting to note that the authors only mention Wittgenstein once; a brief acknowledgement of the concept of family resemblance. This limited recognition and investigation of Wittgenstein's work is also addressed by Rogers (2015), while Martins (2010) notes that a fundamental difference between Wittgenstein and Lakoff and Johnson might be regarding the aim of philosophy. In *Philosophy in the Flesh* Lakoff and Johnson (1999, p.4) pose the question if one could take these findings "about the nature of mind and constructed philosophy anew?". An idea that doesn't go well with Wittgenstein's thought, who, in his earlier writings, suggests that philosophy is like a ladder. The successful practitioner "must, so to speak, throw away the ladder after he has climbed up it" (Wittgenstein, 1994, 6.54). Nevertheless, while they may disagree about the nature of philosophy, both theories seem to place metaphors at a central location within the human existence.

The reason why I am introducing Lakoff & Johnson is that their systematic and detailed account of the mechanics of our metaphoric understanding might give some hints on how to overcome the problems that the same metaphors cause in modern scholarly communication.

> "Because so many of the concepts that are important to us are either abstract or not clearly delineated in our experience (the emotions, ideas, time, etc.), we need to get a grasp on them by means of other concepts that we understand in clearer terms (spatial orientations, objects, etc.)" (Lakoff & Johnson 1980, 115).

In their seminal work *Metaphors we live by* Lakoff & Johnson (2003) then continue to further classify the kind of metaphors that our mind deploys:

1. Structural Metaphors use one concept to structure another concept. Lakoff & Johnson use the example of 'argument as war' to illustrate the metaphorical structures that we use in our everyday language.
2. Orientational Metaphors exploit the fact that humans are physical beings with a certain orientation and direction in space. Concepts are put into relation to each other using orientations based on our experience (e.g., up/down as upright bipedal beings, in/out as our physical bodies are distinct from the outer environment).
3. Ontological Metaphors are finally those metaphors that help to understand our experiences in terms of other objects and substances. This mode of thought is again based inour very experience as physical beings. A special kind of ontological metaphor that the authors bring up is the container metaphor which is specified by their attribution of a territory or boundary.

According to the

authors

all metaphors have a grounding in our physical and cultural experience. An important detail as the embedding of our most basic mode of cognition, the metaphoric mode, in our culture makes our cognition itself a socially rooted one. This is compatible with Wittgenstein's notion of language-games and forms of life. They further note that purely intellectual concepts such as concepts in scientific theories are almost always based on metaphors with a physical/cultural basis (Lakoff & Johnson, 2003, p.19).

Piece 3: Technology Games

Coeckelbergh identifies a variety of potentially fruitful points of departure for an investigation of Wittgenstein's understanding of language and the philosophy of technology, but focuses on a very specific case: He suggests to reverse the famous metaphor of language as a toolbox (Wittgenstein, 1953, §11) and think about technology in terms of Wittgenstein's philosophy of language, understood as a tool. What seems to be starting off as a mundane use-oriented understanding of technology — as Coeckelbergh notes others have also proposed similar ideas (e.g., Ihde, 1990; Franssen and Koller, 2016) — is then further developed into an interesting account of technology grounded in what he calls *technology games.*

This embedding of technology in a cultural, social, and historical context proves to have an additional advantage as Coeckelbergh continues to extend Wittgenstein's notion of grammar to a surface grammar and depth grammar of technology. While the surface grammar can be understood as the immediate syntax of technology usage (i.e., instructions on how to use an appliance), the depth grammar refers to those rules which are not easily expressed or recorded by looking at individual cases of technology or its usage. Rather one has to take the pre-existing activities and technologies into account. Coeckelbergh gives the example of a social robot which comes with the basic operating instructions needed to use it. But to fully grasp the usage of such a robot is to grasp the "deeper" grammar which is grounded in the social rules and forms of life. The "social" robot would not be much of a social technology

if "social games" wouldn't be part of our human existence:

> "The technology grammar is related to wider social and cultural grammars, which clearly have a normative dimension. Like our use of language, our use of technology enters and follows a river-bed that was already there before us and before our particular use." (Coeckelbergh, 2017, p.13)

I want to further use the concepts of surface and depth grammar of technology to examine the confusions that are brought about by technology. Unsurprisingly wrong instructions or faulty execution can lead to confusion when technology is used. Syntactical errors in the surface grammar of technology are those mistakes and bugs in technology which can be spotted by a systematic comparison of the ideal and actual state. On the other hand, the confusion caused by the depth grammar of technology are more subtle and harder to spot. A user interface designed for a Japanese audience might be confusing to the European user simply because of the different reading directions. Similarly, technology and its design might be historically influenced, e.g., the concept of pagination, which makes sense in the case of static written text (printed books, standard PDFs) but can equally be confusing in other cases (eBook readers that reflow the text based on screen and font size). Coeckerlbergh's concept of *technology games* constitute a novel and potentially very useful tool to capture the kinds of confusions that might arise from technology and its use.

Coeckelbergh (2017, p.15) identifies three tasks for a "Wittgensteinian holistic, transcendental, and critical phenomenology and hermeneutics of technology": (1) disclose both surface and depth grammar of technology, (2) reveal the normativity of those technology grammars, and (3) make us aware of the active, "game-changing" nature of technology and forsake the idea of the neutral tool. Coeckelbergh concludes that "thinking about technology is also thinking about the ways we do things, and ultimately about our world and an entire form of life."

It is interesting to note that while this way of thinking might be novel in the context of the philosophy of technology, engineers and designers have adopted a similar way of thinking and conceiving technology many years ago. User-centric design, soft ergonomics, or human-computer interaction are a few examples of technology design strategies that were immensely popularised by works such as *User Centered System Design: New perspectives on human-computer interaction* (Donald and Draper, 1986) or the more recent *Designing with the mind in mind: simple guide to understanding user interface design guidelines* (Johnson, 2010). Awareness for the cultural, social, and historical embedding of users of technology have been part of software development and engineering for some time and an extensive investigation of interface design strategies might be an interesting future task in the context of *technology games*.

Assembling the puzzle

Four pieces have been laid out and what remains to do is the assemblage. Wittgenstein has been introduced as the piece originating from the "theory". Keeping the criteria of a real application of Wittgenstein (Read, 2007) in mind I have set out to apply his ideas to Open Knowledge Maps ("practice").

Metaphors at work in Open Knowledge Maps

The most salient feature of OKM is how information is presented. Papers are grouped into bubbles of similar content and the user can further explore individual bubbles to see more details. In their paper (Kraker, Kittel, and Enkhbayar; 2016), the developers argue that this visualization comes with cognitive benefits as the mental workload is lowered by leveraging different levels of abstraction. Additionally, I argue, that the true benefit in terms of the cognitive load is due to the metaphoric structure of the knowledge maps. Let us break down the interface and its mechanics using Lakoff and Johnson's *conceptual metaphor theory*. We usually think of research disciplines and fields as container metaphors (e.g., "to be IN the social sciences") and similarly the bubbles serve as containers for specific papers. Users can dive into a bubble or research field to explore the elements within. Several orientational metaphors are at work when the proximity of bubbles are indicating the topical relatedness and the introduction of layers (the authors are proposing nesting several layers of topics as a future feature) also fit our natural understanding of research fields as sub- and supercategories. Finally, another structural metaphor is already pointed out by the creators and the name of the tool, namely that of maps and cartography. Humans use maps to navigate space; they can either serve to orientate one in both new and familiar regions and by varying the amount of detail a map can either give an overview of a continent or meticulously describe the alleys of Palermo. Furthermore, it is interesting to point out that the maps produced by OKM are not to be understood as static, objectively true snapshots of the world. While the common understanding and usage of cartographic maps might rely on such an assumption it is important to remember that every two-dimensional map is a projection of a three-dimensional sphere that introduces distortions. If the cartographic metaphor is be taken serious, knowledge maps will take on various projections of concepts depending on the interest and purpose of the user.

The hidden depth grammar of Open Knowledge Maps

As Coeckelbergh pointed out, it is the task of technology games to reveal the hidden depth grammars of technology. While the fundamental mechanics of OKM can be seemingly easy to understand in terms of metaphors, technology games urge us to further question the surface and depth grammars at work. As previously discussed, the metaphor of navigating a map is at work when someone uses OKM to navigate a conceptual knowledge space. But what about the historical, social, and cultural dimensions of navigating with a map? Navigating the seas was a daunting if not impossible task before the introduction of the Mercator projection which finally allowed for the preservation of angles and directions on maps. The meaning, usage, role, and worth of maps changed fundamentally at that point in history. At the same time, as the most common map projection, it is often criticized for over-representing north-western countries. We can see that the apparently simple metaphor

of a map already comes loaded with a variety of social, historical, and cultural contexts that need be considered in the case of OKM.

Thinking about OKM in terms of surface and depth grammars can help to understand how and why we practice certain things we do. Why do we traditionally use lists (i.e., Google Scholar and other search engines) instead of bubbles to visualize search results? Which concepts and results are shown to the users and why and maybe even more importantly, which are not displayed and why not? Can users with limited internet connectivity equally access knowledge maps? This list of questions will grow as soon as OKM is understood in terms of its use, its surface grammars, and depth grammars.

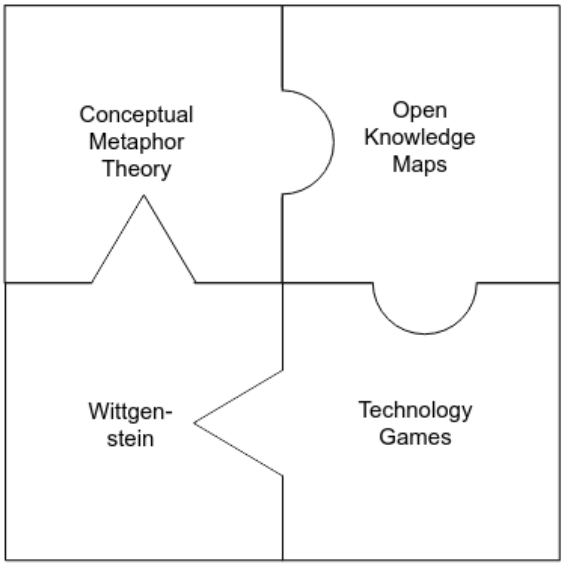

Figure 4: The final assembled puzzle. A bridge between Wittgenstein and Open Knowledge Maps.

The final assembled puzzle shows how a theoretical framework inspired by Wittgenstein's philosophy of mind and technology can be used to understand technology and its use. Open Knowledge Maps served as an example that utilizes metaphors to visualize scientific concepts and findings, while the concept of technology games provides a framework to create technology that considers the historical, social, and cultural context of it.

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