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# 3 Digital Ecosystem and Language

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## Introduction

This chapter introduces to the role of language and communication in digital ecosystems research and application. It will highlight the potential of linguistics (and communication studies) as a binding theoretical framework for the intrinsically interdisciplinary field of digital ecosystems. Key aspects of language and communication will be discussed firstly on a macro-level in order to sketch the demarcation lines of the theoretical framework, and secondly, on a micro-level, depicting some examples for the application of methodologies and theories from linguistics and communication studies. The key approach of this chapter is to regard language (diversity) as predominant and challenging feature of digital ecosystems.

## Digital Ecosystems and Language Concepts

The scientific field of ecolinguistics combines several sciences such as anthropology, ethology, or social science and is concerned with the inter-relationship of language users with their environment. It focuses for example on dialects, language varieties, and technical languages. One example is the analysis of language as a tool to establish communities or even to solve conflicts between different communities. Ecolinguistics thus regards language as a system which inherits the potential to create as well as define a specific notion of Umwelt (environment).

Any digital environment can be defined as an abstract concept which is not part of our real world in a strict sense of interpretation. This means that we define digital environments by ourselves, including its components, rules, and social aspects. The act of defining is based on language, and the words we use in order to depict certain concepts of a digital environment. Reflecting on linguistic determinism which claims that language shapes thoughts, most certainly provides a point of departure with strong restrictions if we would refer exclusively to Wittgenstein (1981): “The limits of my language mean the limits of my world” (proposition 5.6), or “Whereof one cannot speak, thereof one must be silent.” (proposition 7). Sapir and Whorf however propose a different starting point by claiming that individuals experienced the world based on the words they possess (Kay & Kempton, 1984). This hypothesis implies that:

- a. the world is perceived differently by each individual,

- b. a socio-cultural dimension plays an important role because natural languages as arbitrary systems are also shaped by socio-cultural backgrounds,
- c. an abstract concept such as digital environment inherits a multitude of different “worlds” according to the defintory “words” which are used by a group of individuals in order to depict that abstract concept.

Switching to a Gramscian mode and asking what kind of “intellettuale organico” (Gipper, 1992) we would have to imagine as participants or inhabitants of digital environments, we can state that all participants are ‘always already’ linguists as they all (may it be computer scientists, natural scientistis, organisational designers, or social scientists) shape and form environment(s) (Umwelten) by means of their linguistic abilities.

At this point, it should be emphasized that this chapter does not head towards another debate on the reliability of linguistic determinism and its accompanying hypotheses and paradigms (however, it should be noted that recent studies of Peter Gordon (2004) investigating the language of a tribe of hunter-gatherers in Brazil, Pirahã, provide favourable input for the hypothesis of linguistic determinism), but rather reflect upon the conceptual and linguistic diversity of digital ecosystems and introduce different corresponding methodologies.

## Language Diversity

The foregoing part discussed language as predominant tool to define abstract concepts such as digital ecosystems. It also discussed the diversity of defining concepts based on each individual’s language register/potential and usage. Focussing on the key approach of this chapter (“language diversity as predominant and challenging feature of digital ecosystems”) we will now touch on language diversity from a socio-cultural and evolutionary point of view.

## Socio-Cultural Language Diversity

Digital ecosystems, particularly the European digital ecosystems’ concept<sup>1</sup> that supports SMEs and regional development, focuses on four key principle groups of stakeholders in the European Knowledge Economy: Small and medium-sized enterprises (SMEs) represented by their associations, the European software and knowledge-based service industry, the research community participating in currently funded FP6 projects, and regional/local decision makers represented by their catalyts and agencies (Dini et alii, 2005). In order to analyse and discuss socio-cultural language diversity, we will emphasize on the two groups ‘SMEs’ and the ‘research community’. Language and communication is intrinsically interwoven with our beliefs, desires, and intentions (BDI) of and about the world. The BDI structure of our two examples differs strongly when it comes to define desired potentials of the Digital Ecosystem and services to be provided by one particular framework. SMEs face distinct economic, legal, and social circumstances than researchers employed at universities (for example) which is catalysed in their specific BDI structures. This in turn influences the primary associations and approaches when participating in the Digital Ecosystem. Therefore, we cannot simply speak of a value chain ‘researcher to end-user’ when there is no common ground in terms of BDI for the digital ecosystem.

However, ‘diversity’ can be seen as a fruitful component for any ecosystem, as it is claimed to enhance and foster the robustness of a system towards environmental stress and influence<sup>2</sup>. Language diversity (and correspondingly the multiple BDI structures) then has to be preserved in the Digital Ecosystem instead of finding a common language for all actors. This includes the diversity of the different socio-cultural backgrounds, being for example domain specific languages (different expertise and focal interests), cultural beliefs and etiquette (collaboration and interdisciplinary work), economic and legal contexts (infrastructure and organisational issues), which are all expressed in specific communication practices and acts.

## Evolutionary Language (and) Diversity

The mere preservation of the aforementioned language diversity in the Digital Ecosystem could jeopardize the collaborative processes within the ecosystem, as the different “communication practices” and BDI structures hamper the interdisciplinary understanding and collaboration. Collaboration represents another vital variable for the Digital Ecosystem regarding the vision and concept of a European Knowledge Economy (Dini et alii, 2005).

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1) Hereinafter called Digital Ecosystem.

2) As the term „digital ecosystem” was inspired by biological ecosystems, the authors refer in this argument to the field of biodiversity.

Another factor which contributes to the communication diversity is added by the tools we use when collaborating in the Digital Ecosystem. Information and communication technology, or computers as the most common interface to digital environments, are symbol processing machines based on a binary system i.e. formal languages (algorithms) in order to process natural languages. The computer as a formal language entity allows us to juxtapose the language diversity “dilemma” for a short glimpse by concentrating on a common formal language approach. This is being realized by the Digital Business Ecosystem (DBE) Integrated Project (IP) in terms of intensive work on a Business Modelling Language (BML) for integrated services, or by the Opaals Network of Excellence (NoE) which deals with the development of a formal language called Semantics of Business Vocabulary and Rules (SBVR). However, this juxtaposition cannot be dealt with as a successful solution, as the development of formal languages for knowledge creation, processing and consecutive services within the Digital Ecosystem has a strong evolutionary character due to the underlying concepts and paradigms of the Ecosystem. Thus, the evolutionary formal language approach has to take into account the underlying socio-cultural factors in order to be successful in terms of collaboratively developing the formal language and in terms of acceptance of the new language including the resulting service potentials and applications.

More precisely, on the back-end level of our formal language production we are faced with collaboration issues and community building challenges. Both DBE and Opaals consist of a dispersed multicultural network of researchers which have to collaborate on the given task. Additionally, based on experience from prior work within DBE, Opaals aims to integrate interdisciplinary findings into the overall development process, which means that the dispersed multicultural network consists of researchers from different domains, each carrying its own set of domain specific language, communication practice and BDI structure.

On the front-end level we have the SMEs and regional/local decision makers represented by their catalysts and agencies. One key conclusion which derived from a Digital Ecosystems Cluster workshop in 2005 is the demand for global solutions with a local input and sector approach. This means that the socio-cultural (including socio-economic) diversity factor must be taken into consideration regarding the end users. It also refers to linguistic characteristics of the front-end and interface design, as language is a key denominator for group and community building.

An evolutionary language approach in terms of an advanced linguistic theory framework has to encompass both, the engines of formal languages and the gestalts and geometries of situated meaning. ‘Evolutionary’ also in terms of the inherent variable of dynamics and process, reflecting ongoing work in Opaals where communities of knowledge creation and processing are about to arise, constitute, and re-constitute themselves in an recurrent, autopoietic process.

## Approaches

In the foregoing parts of this chapter we have tried to emphasise the dominant and vital role of language and communication within the Digital Ecosystem. We will now introduce social science approaches to research and application within the Digital Ecosystem Cluster.

## Community Building

In order to build a ‘new’ community inside the Digital Ecosystem we have to understand the communities which are meant to participate. As mentioned before, these communities bring their own BDI structures, communication and work practices, and experience/expert knowledge which should be regarded as an important asset within the new Digital Ecosystem. In order to understand them and to build a new cooperative network, we have to analyse these inherent and inherited characteristics, which can be carried out by means of social network analysis. We can focus then on social relationships regarding language/communication usage when collaborating.

The language focus enables us to understand better :

- a. organisational structures in terms of hierarchies, relationships, etc. (this would refer to the field of Critical Discourse Analysis);
- b. hermeneutics which in this case aims to account for the interaction between human action and socio-economic and technical structures;
- c. the different register of each community, i.e. establishing a first and tentative lexicon (database) of domain specific key terminology which can serve as an important input for formal language development (e.g. SBVR).

# Knowledge Structures

Actor network theory (ANT) provides the necessary tools in order to analyse (among other aspects) knowledge and knowledge structures, which represent an important part of the Digital Ecosystem. ANT provides the necessary methodological framework to analyse such abstract and at the same time socially situated conceptual artefact as 'knowledge' in its relation to technology and community networks.

'Knowledge' can be considered as being highly embedded in a complex web of relationships and dependencies, it is inseparable from our working practices. According to Hanseth, who suggests a community-of-practice approach to knowledge: "[P]ractices are based on specific tools and technologies, organizing structures, various kinds of institutions, and other important factors. Knowledge is also dependent upon, and tied to, the context within which its epistemic culture and machinery is produced [...]" (Hanseth, 2004: 110). Understanding communities thus is a key to understand knowledge structures and production processes.

## Advanced Automaton Approach

To conclude this chapter, we would like to shift our focus from language diversity as predominant and challenging feature of digital ecosystems to language as productive automaton within the Digital Ecosystem. An advanced automaton approach does not only state the constitutive role of language and communication practices in (digital) communities, but also propagates a practical, output-driven focus on language. Regarding the various communicative actions inside our Digital Ecosystem, we should analyse how we can manufacture those actions into any kind of communicative output (i.e. text, audio, video). Discussions on different tools for collaborative work are a necessary point of departure. However, addressing language itself as an automaton provides an additional and useful perspective. Language as automaton means that we can define the recurrent and constituting structures of different text genres across different disciplines or scientific domains, such as scientific article, deliverable, report, etc. This analytic mode can be stretched from a macro-level (overall text structure) to a micro-level, i.e. considering domain specific key terminology. Integrated into a manufacturing process inside the Digital Ecosystem this can help to increase the visible knowledge output (naturally, focussing on qualitative aspects) of the ecosystem and to foster the interdisciplinary community development inside the ecosystem by means of developing an analytic approach to cross-disciplinary publishing.

The advanced automaton approach certainly reflects an ambitious goal that combines a wide range of scientific domains, such as textlinguistics, sociolinguistics, computational linguistics, and computer science. However, research activities in the DBE cluster provide both expertise and associated research foci for a seedbed of an advanced and holistic notion of language and communication.

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