



## Ecolinguistics: the state of the art and future horizons



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### ABSTRACT

In this article we do two things: in the first half, we trace the emergence and development of ecological linguistics, or ecolinguistics, from the early 1970s. Having contrasted the ecological endeavour with the form-based traditions of 20th century linguistics, we discern four particular ways in which the ecology of language has been conceptualised: as a *symbolic* ecology (Section 2), a *natural* ecology (Section 3), a *sociocultural* ecology (Section 4), and a *cognitive* ecology (Section 5). These four approaches are described and discussed in detail. In the second half of the state of the art, we outline future horizons for the discipline. The foundation for this outline is our plea for a unified ecological language science (Section 6). This unified program pursues a *naturalised* agenda in the language sciences by exploring the ecological embeddedness of language and linguistic interaction (Section 7). In particular, this section presents the extended ecology hypothesis as one possible way of understanding ecolinguistics as a naturalised science of language. Having presented this view, we argue that it can place the four different traditions mentioned within a unified ecolinguistic framework (Section 8). This framework includes a naturalised foundation for those concerns that characterise the ecolinguistic enterprise, e.g. the exploitation of natural resources, empowerment of marginalized social groups, and the peaceful coexistence of languages and cultures in multicultural communities. In the conclusion (Section 9), we call for further interaction between ecological schools and traditions.

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### 1. Why linguistics needs ecology

If one day you find yourself lost while hiking in an unknown forest, desert or wasteland, your survival very much depends on your ability to interpret the terrain. In such a situation, most people make the rational choice of moving in a straight line, thus optimizing the probability of reaching the edge of the unknown, re-entering a safer habitat. However, if you do not have landmarks to govern you, you will, literally, most probably end up “walking straight into circles” (Souman et al., 2009). This is a remarkable feature of human anatomy: if you try to walk a straight line, you end up walking in circles. Souman et al. explain that “veering from a straight course is the result of accumulating noise in the sensorimotor system, which, without an external directional reference to recalibrate the subjective straight ahead, may cause people to walk in circles” (Souman et al., 2009).

The language scientist in the early 21st century is in a situation similar to that of hikers lost in the wasteland. The idea of science as a uni-directional movement towards more coherent theories, better methods, deeper insights, grander visions and human progress is largely a myth. When Saussure, Hjelmslev and Chomsky, along with their 20th century successors, attempted to delimit a language *system* – respectively denoted *la langue* (Saussure, 1916/1972), the system (Hjelmslev,

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1943, 1961), and (linguistic) competence (Chomsky, 1965)<sup>1</sup> – they lost sight of what people actually *do* with language. Though they were all magnificent thinkers of their time, Saussure's, Hjelmslev's and Chomsky's projects threw linguistics into a large-scale sensory deprivation experiment that eradicated the discipline's "external landmarks." While this eradication has allowed for the appearance of progress in the field, the trajectory marked out by walking in the intellectual desert of form-based linguistics displays closed-loop circularity. So, in spite of being 75 years old, the puzzle posed by Malinowski reads as if it had been formulated today:

The dilemma of contemporary linguistics has important implications. It really means the decision as to whether the science of language will become primarily an empirical study, carried out on living human beings within the context of their practical activities, or whether it will remain largely confined to deductive arguments, consisting of speculation based on written or printed evidence alone.

(Malinowski, 1936: 172)

What the lost trekker in the desert needs to escape endless circling, is a new orientation towards nature's life-giving landmarks: the Sun and the stars that spread light, a river that flows towards the sea, or indeed a building or fence that bears witness to the presence of human beings. If we stick with the metaphor, linguistics also needs a sign of the powers that bring language to life – and life to language.

For the last few decades, ecological linguists have addressed this daunting task: they have sought to re-orientate linguistics to "external landmarks" that could lead the language wanderer from the structural wasteland into a fertile terrain of human activity, saturated by language, interactivity and co-existence. For four decades ecolinguists have been guided by the recognition that both hikers and linguists are poorly served when they ignore the ecological terrain within which they move. For a quarter of a century, a key figure in this development has been Alwin Fill (Fill, 1993, 1996; Fill and Mühlhäusler, 2001; cf. Kettemann and Penz, 2000; Döring et al., 2008), who has built important conceptual bridges between the original vision of an ecology of language and the contemporary movement of ecolinguistics.<sup>2</sup>

The first step towards an ecological approach to language was taken when Haugen in 1970 defined "language ecology" as "the study of interactions between any given language and its environment" (Haugen, 1972: 225; 2001: 57; cf. Eliasson and Jahr, 1997). Looking beyond merely describing the (so-called) circumstantial factors of language ("X is a language in the Y family, spoken by Z million speakers in Southern W"), Haugen set out to understand how such factors impact language, and how language feeds back on the social and psychological surroundings of language. In the words of Blackledge, "Haugen saw the value of the language ecology model in the requirement to describe not only the social and psychological situation of a language, but also the effect of this situation on the language itself" (Blackledge, 2008: 27).

Paradoxically, while Haugen took a new ecological direction in linguistics, he also opened up a conceptual problem that has haunted its practitioners for decades: while it is relatively straightforward to delimit a single biological being's ecology, i.e. more or less the habitat that it covers during its lifetime, it is not at all obvious what a language's environment might be. Due to this indeterminacy, very different approaches to language ecology have seen the light of the day since Haugen. In the history of ecolinguistics, we identify four strands that differ in how they interpret what the environment of (a) language is:

- Language exists in a *symbolic* ecology: this approach investigates the co-existence of languages or 'symbol systems' within a given area.
- Language exists in a *natural* ecology: this approach investigates how language relates to the biological and ecosystemic surroundings (topography, climate, fauna, flora, etc.).
- Language exists in a *sociocultural* ecology: this approach investigates how language relates to the social and cultural forces that shape the conditions of speakers and speech communities.
- Language exists in a *cognitive* ecology: this approach investigates how language is enabled by the dynamics between biological organisms and their environment, focusing on those cognitive capacities that give rise to organisms' flexible, adaptive behaviour.

The distinction is not to be taken as a rigid either/or-separation of different ecologies. First, the ecology of language is not reducible to mere symbol systems, social groups, physical/biological surroundings, or cognitive contents. In Leo van Lier's words, "The environment includes all physical, social and symbolic affordances that provide grounds for activity" (van Lier, 2004: 4f.). Rather, our distinction captures different *perspectives* on the environment of language: each provides a figure-ground constellation that focuses on one ecological dimension while not, of course, denying the importance of the others.

In the state of the art part of this article, these four dimensions of environment organize our description of the ecolinguistic state of the art: in Section 2, we present approaches that focus on the symbolic ecology of language; in Section 3, we present approaches that focus on the natural ecology of language; in Section 4, we present approaches that describe the sociocultural ecology of language; and in Section 5, we present approaches that focus on the cognitive ecology of language.

<sup>1</sup> The pursuit of the language system unfolded as an attempt to identify the homogenous aspects of language: Saussure considered the homogenous system a social fact, while Chomsky took an individualist and mentalist approach ("I-language"). Hjelmslev was even more radical in that he approached the homogeneity of language in an almost Galilean way, i.e. as an abstract, quasi-mathematical web of sign relations.

<sup>2</sup> For a historical overview (see Garner, 2004; Döring and Nerlich, 2005; Couto, 2007, 2013).

In the second part of the article, the future horizons, we outline a unified framework of ecolinguistics (Section 6) which builds on a naturalised view on language (Section 7) and points toward a redefinition of ecolinguistics (Section 8).

## 2. The symbolic ecology of language

If one understands the environment of a language as other languages, one identifies a *symbolic ecology*, a dimension of ecosystemic interactions between symbolic entities. This approach played an active role in the early days of the discipline. For instance, the first to explicitly link language and ecology were the American linguists, Carl and Florence Marie Voegelin who studied Native American languages. As linguists in the tradition of Boas and Sapir, the Voegelins were preoccupied with the relation between language and culture in the Southwest of the United States. In a paper entitled “Languages of the world: native America” (1964: 2), they wrote of an ‘inter-language’ and an ‘intra-language’ ecology and suggested that “in linguistic ecology, one begins not with a particular language but with a particular area, not with selective attention to a few languages but with comprehensive attention to all the languages in the area” (Voegelin and Voegelin, 1964; quoted after Haugen, 2001: 59). Like the Voegelins, Haugen understood the concept of language ecology as a symbolic ecology:

Part of [a language’s] ecology is therefore psychological: its interaction with other languages in the minds of bi- and multilingual speakers. Another part of its ecology is sociological: its interaction with the society in which it functions as a medium of communication. The ecology of a language is determined primarily by the people who learn it, use it, and transmit it to others.

(Haugen, 2001: 57)

It is the idea of languages co-existing and interacting in an inter-language ecology in a given geographical area that leads to the view that language has a *symbolic ecology*. The approach is widespread in contemporary work on how multiple languages co-exist in a geographical area or social institution. A representative picture of this field of research appears in volume 9 of the recent *Encyclopedia of Language and Education* (2nd ed., 2008). The volume has the title *Ecology of language*, and is edited by Creese, Martin and Hornberger. This volume contains five chapters where “the language ecology of...” appear in the title, and another four chapters exhibit the words “the ecology(/ies) of...” The co-existence of languages is today an important field of research, one generally pursued under the rubric of ‘language ecology’, rather than ‘ecolinguistics’.

Another line of investigation derived from the work of the Voegelins and Haugen is the study of topics that include language shift, code-switching, pidginization and creolization. This owes greatly to Haugen; thus, the prime empirical basis for his work was a first hand view of how Norwegian gave way to the influence of American English in immigrant communities. Haugen noticed how an “immigrant language” developed from a state of bilingualism through “*switching* or *alternation* among languages” (2001: 64; italics by Haugen). These experiences led Haugen to investigate processes that took place in the minds of speakers and thus affected the community and its culture, cf. the distinction between the social and psychological parts of language ecology.

Another ecological research tradition that also can be attributed to the work of Haugen and the Voegelins is the research on the risk of extinction which looms large for very many languages. This concern is currently shared by many linguists, whether they use an ecological framework or not. Topics like language diversity, language endangerment, language survival, language death and language revitalization flourish, as testified by numerous publications (e.g. Crystal, 2000; Hagège, 2000; Harrison, 2007; Nettle and Romaine, 2000). These ecolinguistic studies gain their coherence, above all, through their emphasis on *diversity*: “If diversity is a prerequisite for successful humanity, then the preservation of linguistic diversity is essential, for language lies at the heart of what it means to be human” (Crystal, 2000: 33f.). As noted by Norman Denison, this axiological move was not *comme il faut* in linguistics in the 1970s and 1980s, a time which was “still characterised by a hard-headed, unsentimental, value-neutral approach to developments in language and languages” (Denison, 1982/2001: 77). However, proponents of linguistic diversity found a powerful rhetorical precursor in arguments that praise *biological* diversity. The resulting debates generated a set of metaphors that give conceptual structure to the field, e.g. in terms of language diversity, endangerment, death and revitalization. Applying such bio-ecological terms, the field lends itself to an ecological approach. Haugen was actually the first to realize this and to compare the endangerment and loss of languages with that of biological species. In doing so, Haugen was arguably under the influence of the Norwegian philosopher and deep ecologist, Arne Næss.

This line of thought was taken up by numerous ecolinguists. For instance, Norman Denison compared endangered languages with endangered species such as the sperm-whale, and Hale (Hale, 1992; quoted in Crystal, 2000: 34) maintains that “just as the extinction of any animal species diminishes our world, so does the extinction of any language.” Likewise, William Mackey, in “the Ecology of Language Shift” (Mackey, 1980: 34), compares a struggle for bio-resources in nature with a similar struggle for languages. It is this metaphorical transfer from biological diversity to linguistic diversity that has been a main impetus for the development of this strand of ecolinguistics (cf. Fill and Steffensen, 2013).

In an Australian and Pacific context, Peter Mühlhäusler (1995, 1996, 2003) has contributed with numerous studies on pidginization and creolization using an ecolinguistic frame, and Salikoko S. Mufwene (2001) has contributed much by emphasising the evolutionary dimension of these phenomena. In a European context, Krier (1996) and Bastardas-Boada (2003, 2013) emphasised the connection between biological and linguistic diversity by calling attention to the necessity of “linguistic sustainability.” In so doing, Bastardas-Boada drew on the 1987 *Brundtland Report* (“Our Common Future,” published by

the United Nations World Commission on Environment and Development and Oxford University Press), which was influential in placing environmental issues on the political agenda – a move that has not yet been matched in relation to linguistic diversity.

These recent ecolinguists stand out from their mid 20th century predecessors in that, above all, they explicitly and emphatically link their linguistic concerns with a political agenda. They argue that the symbolic ecology of language is primarily a matter of micro and macro political processes. One of the clearest and most insistent examples of how language ecology is transferred into a political discussion is work on linguistic human rights and language rights (for an overview, see Skuttnabb-Kangas and Phillipson, 2008). This work ranges from the sociological view that individuals and groups have a right to speak and receive education in their own language to the view that languages have a “legal personality” with certain rights, in the same way as individuals and groups and peoples can have rights” (Skuttnabb-Kangas and Phillipson, 2008: 11). This work has been criticized (e.g. by Edwards, 2001, 2002, 2008; Pennycook, 2004) for a lack of “disinterested scholarship” (Edwards, 2008: 17) and alleged “rejection of a conspiratorial ideology—by another ideology” (Edwards, 2008). However, while flawed scholarship is rightly rejected, there is no *a priori* case that scholarship can or should be disinterested. As noted in Fill and Steffensen (2013), ecolinguists (e.g. Døør and Bang, 2002) identify *medicine* as a field of research that is inherently and axiologically *engaged* in that it aspires to enhance human life. Nonetheless, one can rightfully object to Skuttnabb-Kangas’ and Phillipson’s argument that

[i]t is unhelpful to denounce the existence of concepts like language or mother tongue as social constructs with little or no basis in reality, [...]. If (socio-)linguists claim that languages and mother tongues do not exist, how can one legislate for them?

(Skuttnabb-Kangas and Phillipson, 2008: 10f.)

If linguists have sound theoretical and empirical reasons to regard the concept of ‘a language’ as a folk construct, and thus reject essentialist views of what language is, they cannot ignore these reasons merely because they do not fit the political agenda of the language rights movement. The same concern surfaces in Blommaert (2004: 62): “Criticizing the linguistic rights paradigm is not a rejection of linguistic rights, nor a denial of the problems motivating the idea. It is what it is: a critique of scholarly practices.”

### 3. The natural ecology of language

Whether one is inclined towards the view that language is primarily a cognitive capacity (language as ‘competence’) or towards the view that it is primarily a medium for social communication (language as ‘performance’), one cannot deny that it exists in a *material* world. Language is dependent on the natural habitat of language users, and that reason alone warrants considering the natural ecology of language. The relation between language and the natural ecology is infinitely complex, and the danger of (greedy) reductionism looms over an ecolinguist who dares to investigate the interactions between language and its natural ecology. A century ago, Edward Sapir already saw that “in actual society even the simplest environmental influence is either supported or transformed by social forces” (Sapir, 1912/2001: 13). This led Sapir to suggest that “any attempt to consider even the simplest element of culture as due solely to the influence of [natural] environment must be termed misleading” (Sapir, 1912/2001).

No area of ecolinguistics demands more caution than the investigation of language–nature relations. Nevertheless, the natural ecology was the focus of ‘ecolinguistics’ when the term was first applied by the French ecolinguist Claude Hagège. In his book *L’homme de paroles* (Hagège, 1985, pp. 146f.), Hagège referred to *l’écologie linguistique* as the (future) study of how ‘natural’ phenomena, like topographical characteristics, relations between humans, other organisms and cosmic phenomena, are integrated into languages and cultures. Evidently, Hagège draw on the array of Sapir-Whorfian studies that point to an intimate connection (though not necessarily a determinist relation) between linguistic structure and how human beings conceive their natural environment. For example, Alexander Kravchenko points to “the importance of indexicals for the vertical dimension in the languages of mountainous peoples such as the Caucasians” (Kravchenko, 2007b). The studies performed by the Adelaide-based group led by Peter Mühlhäusler make an important contribution by mapping the linguistic ecology of the Pacific Region (e.g. Mühlhäusler, 1995, 1996; Nash, 2013; Nash and Mühlhäusler, 2012, 2013). The empirical site thus enables ecological linguists to study processes which, in most other regions of the world, have a millennia-long history; by contrast, in the Pacific, they have taken the scale of 200–300 years.

While adjacent disciplines have given such topics as how topography has influenced language serious attention in the last couple of decades (e.g. Mark et al., 2011; Nash, 2013; Nash and Mühlhäusler, 2012), ecolinguistics has shown no inclination to ask such questions. This lack of interest is surprising because such studies overtly concern the language–environment relation, which has generally been the main focus in ecolinguistics since the early 1990s. Thus, this period has witnessed an increased interest in how language relates to the natural ecology, but from a radically different point of view: rather than examine how ‘natural’ phenomena are integrated into languages and cultures, as Hagège proposed, many contemporary ecolinguists prefer to ask how language affects natural phenomena in the human environment. Do linguistic patterns, literally, affect the survival and wellbeing of the human species as well as other species on Earth?

This development owes much to the rise of the environmental movement as inspired by, amongst other things, Rachel Carson’s landmark publication *Silent Spring* (Carson, 1962). This, together with the *Brundtland Report* a quarter of a century

later and other testimonies to the state of the planet, gave modern Western societies a sense of the devastating implications of mankind's conduct in its natural habitats. It also raised awareness that profound changes need to be made in how we inhabit our planetary home.

A key thinker in developing what Fill et al. (2002) call the *eco-critical approach* in ecolinguistics is, again, Peter Mühlhäusler. Through extensive fieldwork on links between linguistic and biological diversity (Mühlhäusler, 1995, 1996, 1998, 2003; Harré et al., 1999), Mühlhäusler has developed an ecolinguistic approach that links the ecology of language with a critique of the linguistic practices that lead to the degradation of the natural environment. Mühlhäusler has thus shown that the symbolic and the natural ecology of language are intimately connected. Sudden changes in the symbolic ecology, for instance when colonial English dispelled native languages in Australia and the Pacific, are interwoven with drastic and irreversible changes in how human inhabitants use and abuse their environment. Ecosystems with a millennia-long history of coupling between humans and their natural ecology are suddenly disturbed. Mühlhäusler's contribution to ecolinguistics has inspired many environmentally concerned linguists to study how linguistic practices have contributed to the current ecological crisis, and this work laid the ground for the 'critical turn' of ecolinguistics in the 1990s.

Another important impetus for the 'critical turn' in ecolinguistics was Michael Halliday's keynote paper "New Ways of Meaning: the Challenge to Applied Linguistics," given at the 9th world conference of applied linguistics in 1990.<sup>3</sup> In this paper, Halliday famously claimed that "classism, growthism, destruction of species, pollution and the like [...] are not just problems for the biologists and physicists. They are problems for the applied linguistic community as well" (Halliday, 2001: 199). At the same conference, Frans Verhagen organized a number of meetings (cf. Verhagen, 1991, 2000) which led to the foundation of a scientific committee on Language and Ecology under the auspices of AILA.

While a considerable number of eco-critical ecolinguists draw on Critical Discourse Analysis (Fairclough, 1989) when analysing texts about ecological problems, Halliday maintained that unecological ideas and ideologies are embedded in, not only texts on environmental issues, but also in the grammar of language. It is thus possible to distinguish two tendencies within the eco-critical paradigm: one seeks to reveal unecological elements in the language system (the 'grammar'), while the other investigates how texts deal with environmental problems. As an example of the former, Halliday discusses Whorf's point that the grammar of English

makes a categorial distinction between two kinds of entity: those that occur in units, and are *countable* in the grammar, and those that occur in the mass and are *uncountable*. [...] Our grammar (though not the grammar of human language as such) construes *air* and *water* and *soil*, and also *coal* and *iron* and *oil*, as 'unbounded'. That is, as existing without limit. In the horizons of the first farmers, and the first miners, they did. We know that such resources are finite. But the grammar presents them as if the only source of restriction was the way we ourselves quantify them: a *barrel of oil*, a *seam of coal*, a *reservoir of water* and so on – as if they in themselves were inexhaustible.

(Halliday, 2001: 194; italics by Halliday)

To Halliday, grammar is "a theory of experience; a theory that is born of action, and therefore serves as a guide to action, as a metalanguage by which we live" (Halliday, 2001: 195). It is for this very reason that we can analyse and criticize the language of written texts about the environment. In his terms, they manifest themselves as textual actions that embody our "theory of experience." While evading further discussion of linguistic relativism, Halliday subscribes to the view that people are "Construing experience through meaning" (the title of Halliday and Matthiessen, 1999).

The basic argument of such work is that there is a dissonance between experiential structures represented in language and how "the real world" appears, independently of linguistic representation. A famous example is Andrew Goatly's 1996 paper, eloquently entitled: "Green Grammar and Grammatical Metaphor, or Language and Myth of Power, or Metaphors We Die By." In this paper, Goatly takes the position that, from an ecological point of view, ordinary language is quite inadequate to represent the world. For instance, the grammar of transitivity supports a "billiard ball model" of reality, in which the world is occupied by separate entities that each has a definite territory in spacetime (cf. the critique of this view in Steffensen and Cowley, 2010). This is, more or less, the ontology posited by Newtonian physics, now superseded by Einsteinian models. Goatly argues that many grammatical descriptions – for instance grammatical distinctions between Participants and Circumstances, Agent and Affected, and Processes and Things (Goatly, 1996/2001: 213) – are incongruent with Lovelock's (1988) Gaia theory. Goatly sees a need to replace such grammatical models with more 'consonant' grammars which make use of nominalization, grammatical metaphors and ergativity. In this way, Goatly argues against the Newtonian ideology of the triumph of technology, and in favour of a new world-view which does not "exploit an inert Nature" (1996/2001: 223). This world-view, he maintains, should be supported by a new grammar.

Halliday's and Goatly's Sapir-Whorf-like approach is well-suited for raising awareness about the ways we use language. However, the downside of this is that overemphasis on language downplays the biophysical reality of ecological issues. Following Susan George, "There are no ecological problems, only the social and political problems that invariably underlie and cause ecological damage" (George, 1990: 225; quoted after Alexander, 1996: 139). Thus, if we look too narrowly on lexicogrammar, we might overlook what human beings *do*. This is the focus of the more text-oriented part of ecolinguistics. A notable proponent of this approach is Richard Alexander (e.g. Alexander, 1996, 2000, 2008, 2009; see also Alexander and Stibbe,

<sup>3</sup> The paper was printed several times and commented on by a number of authors (see, for instance, Fill, 2001: 48; Mühlhäusler, 2003: 35, 87–90; Couto, 2007: 338; Steffensen, 2007: 6).

2013). For instance, he made a critical analysis of a 1997 speech given by John Browne, the CEO of BP (formerly British Petroleum) from 1995 to 2007 (Alexander, 2000). Linking methods from Halliday's Systemic-Functional Linguistics and Critical Discourse Analysis, with corpus linguistics, Alexander demonstrates that "On the surface BP appears to be facing the issue [i.e. climate change] directly and indeed altruistically" (Alexander, 2000: 175). However, he offers evidence that "Marketization is the true message behind the speech" (Alexander, 2000: 185).

Critical expositions of the discursive framing employed by industrial interests blossom in ecolinguistics. Among the topics in this line of work is the ozone debate (Gerbig, 1996, 1997, 2000), the outbreak of Foot and Mouth Disease and BSE in the UK (Döring, 2005, 2008), vegetarian discourse (Marko, 2000), whale-friendly discourse (Marko, 2002) and health communication (Lindø and Simonsen, 2002). A linguistic focus point in this body of work is that of *metaphor*. For instance, Martin Döring shows how metaphors used in media discourse that describes the Oder flood disaster in 1997 contributed to construct the process of German Reunification (Döring, 2002: 254), and Stibbe and Zunino (2008) investigate the metaphors used in describing "biodiversity" to explore its social construction in modern environmental discourse (cf. Döring and Zunino, 2013).

Somewhere between the langue-oriented and the parole-oriented approach in ecolinguistics, we find critical examinations of texts ('parole') that claim to represent the language system ('langue'). For instance, Reinhard Heuberger has in several articles (Heuberger, 2003, 2007) demonstrated the anthropocentrism of dictionaries that define animals chiefly in relation to their usefulness for humans. Likewise, Wilhelm Trampe (1991, 2002) critically investigates the vocabulary of industrial agriculture to show links between, on the one hand, linguistic reification, concealment of facts and euphemism and, on the other, the ecological crisis.

Trampe's work is of particular interest in that it makes a double connection to the natural ecology: not only does the object of his study relate to the natural ecology of language, but he also contributes to the theoretical enterprise of the so-called *Bielefeld School* (Finke, 1996, 2000, 2001, 2008, 2013; Trampe, 1990, 1996; Strohner, 1991, 1996). This enterprise endeavours to model language as part of a larger *language world system* (a concept coined by Finke) by re-conceptualizing the intricate connections between language and the world. Accordingly, it thus counters both the (formalist) attempt to ignore context, and the (functionalist) attempt to reify context as a static backdrop to linguistic functions (cf. Finke, 1996: 28). The premise of this work is that "Informational processes determine the complex structure and the permanent dynamics of ecological systems in the same way as energetical and material processes" (Trampe, 1996: 73). This leads to the recognition of important ecological processes in human language, and by so doing, the approach discards the nature-culture dualism of European thought. This is also evident in how the approach incorporates insights from cultural ecology (Finke, 1996, 2001). Thus, the theory of language world systems presents a unified model of human life as co-determined by both its natural and cultural ecology:

Language, traditionally often seen as part of culture and not of nature, is in fact a linking system between both realms. It preserves many natural features up to the present day that must be investigated by the methods of different natural sciences: its acoustic dimension, its physiological relations and its neurobiological base, for instance. But in other respects, it exhibits typical cultural achievements which must be considered in the light of typical methods of the cultural sciences and the humanities: its historical dimension, its interpretative openness, its aesthetic and poetic potentials, to mention just a few.

(Finke, 2008: 75)

Indeed, it is even hypothesised (originally in Finke, 1996) that language is the *missing link* between the nature and culture. It is, so to speak, "a living fossil, i.e. a mediating structural link" (Finke, 2001: 88) between human nature and the cultural world. Not only does the position resonate with similar viewpoints in the so-called Distributed Language movement (e.g. Cowley, 2007a, 2011a,c, 2013; Steffensen, 2011; Thibault, 2011; Steffensen et al., 2010), but Finke's and Trampe's work has also been developed in relation to the economic, social and political implications of this perspective.

A position that resembles the Bielefeld school is that of the *Odense school* (Bang and Døør, 1996, 2007; Døør and Bang, 1996, 2002; Steffensen, 2007). Both began from a preoccupation with questions relating to philosophy of science. Prominently, both schools explicate their contribution to ecolinguistics, first and foremost, by offering a way of reconceptualising science. Finke (1996: 31) explicitly criticizes the majority of researchers for being, at best, implicit and opaque and, at worst, outright conservative in their scientific practice. Bang and Døør concur:

Science or scientific praxis is nothing more or less than a particular historical, social praxis and part of a specific socio-cultural order. Different cultures create different forms of science and every dominant scientific praxis organizes its people and problems in ways and by means that aim at the same ends as the culture as a whole.

(Døør and Bang, 2002: 415)

They argue that the "present scientific praxis is dialectically determined by modern capitalist culture" (Døør and Bang, 2002: 416), one that is characterised by a specific mode of production (Marx' *Produktionsweise*) that erodes ecological balance by promoting economic growth that lacks long-term ecological sustainability. Like Finke, they call for an ecological, or dialectical, philosophy of science that informs the language sciences.

Whereas the Bielefeld school takes a more (eco)systemic starting point, the Odense school bases its explanatory models in both Marxist and non-Western models of dialectics, e.g. Buddhist philosophy (for a fuller account, see Bang and Døør, 2007: 37–42; Steffensen, 2007). A dialectical approach emphasises how *relata* are inter-connected, inter-dependent and inter-active. In their linguistic theorising, Bang and Døør use the model to describe relations between speakers, between author

and readers, between cultures, and between text and context. The text–context dialectics are modelled as part of a complex method of *deixis analysis* (cf. Bang and Døør, 2007: 87–168), which has been used in critical, feminist, and ecolinguistic studies. The wide range of texts analysed include philosophical texts, fictional texts and EEC acts. For instance, the analysis of EEC acts on organic farming (Bang and Døør, 2007: 212–217) brings the dialectical enterprise into the heart of ecolinguistics: on the one hand, the approach has developed an ecologically informed philosophy of science, and on the other hand, it has applied the ecolinguistic method to texts that function as indicators of the ecological crisis of (late) modern capitalism. In both respects, the school resembles the Bielefeld school, and the contribution of Bang and Trampe (2013) shows the potential for dialogue between these two traditions.

Two other remarkable contributors who – like the Bielefeld school and the Odense school – have developed a theoretically sophisticated linguistic approach are Adam Makkai (1992, 1996) and Mark Garner (2004, 2013).

#### 4. The sociocultural ecology of language

The two previous sections have clarified that studying the symbolic and the natural ecology of language cannot be separated from how sociocultural factors impact on language in various contexts. Sapir's previously quoted insight that “even the simplest environmental influence is either supported or transformed by social forces” (Sapir, 1912/2001: 13), can be complemented by Adrian Blackledge's: “Relationships between languages and their speakers, and language and societal structures, are subject to their social, political and historical contexts” (Blackledge, 2008: 27).

When one focuses on the sociocultural ecology of language, one sees human (linguistic) interaction that both constitutes and is constituted by larger social and societal structures that include institutions, economic processes and sociocultural resources. However, the study of language in interaction, and the study of how interaction relates to social and societal issues, unites applied linguistics, sociolinguistics, anthropological linguistics, conversation analysis, many strands of discourse analysis, and many other scientific enterprises. It can hardly be claimed that all of these are ecological studies. To do so would dilute the term ‘ecological’ to characterising all non-formalist linguistics. Rather, one can ask: what makes the study of human interaction ‘ecological’? Leo van Lier offers a negative strategy for addressing this question:

Sociolinguistics, pragmatics, the sociology of language, and discourse analysis are [...] philosophically very different [from ecological linguistics], because they start out from a selection or system of rules and therefore address only one tiny corner of the ecology.

(van Lier, 2002: 145)

However, the negative argument is not enough, and looking closely, we find two positive strategies for pursuing an ecological approach to language.

One is to return to the original Haugenian view of language ecology and focus on multilingual settings for human interaction and, especially, educational contexts.<sup>4</sup> This applies, for example, to the work of Haarmann (1980, 1986), and also to Nancy Hornberger's (2003a) edited *Continua of Biliteracy: An Ecological Framework for Educational Policy, Research, and Practice in Multilingual Settings*. Hornberger (2003b: 320) explicitly views the ecological approach as metaphorical (“the ecology metaphor”) and as providing an ideological framework for language planning and language policy that serves to promote the benefits of multilingual communities (Hornberger, 2003b: 323).

The other strategy for developing an ecological approach to human interaction in its sociocultural ecology is explicitly to build on methods used in fields where practice is already ecological. This is exemplified by Leather and van Dam in their introduction to the edited volume on *Ecology of Language Acquisition*: “The premise that most clearly characterizes an ecological approach to language acquisition is that language behaviour always involves more than can be captured in any single frame or script” (Leather and van Dam, 2003b: 13).

While the Haugenian approach of, say, Hornberger emphasises the complexities of multilingual reality, the latter emphasises theoretical and methodological complexity. Unsurprisingly, the field of (first or second) language acquisition/learning/socialization has become the arena where the two approaches intersect. Thus, if one takes a mono-lingual, mono-cultural and mono-logical approach to the study of language, one is tempted to ignore the complexities of human interaction by appealing to an inner linguistic competence. In contrast, when one considers human beings engaged across linguistic, cultural, political and personal barriers, one cannot sustain the illusion that interaction boils down to the informational meaning exchange of symbolic representations.

In her introduction to the edited volume *Language acquisition and language socialization – ecological perspectives* (Kramsch, 2002a), Claire Kramsch convincingly argues that this change in perspective is “prompted by two recent developments on the larger geopolitical scene: globalization and multicultural education” (Kramsch, 2002b: 3); these two developments are, of course, related in that the former has led to massive human migrations that have in turn created a need for the latter (cf. Kramsch, 2002b: 4). Complex reality calls for complex theorising. Or in van Lier's words: “Ecology is [...] a complex and messy field of study about a complex and messy reality” (van Lier, 2002: 145).

<sup>4</sup> The recent decade or so has witnessed a plenitude of publications within the area of “ecological language acquisition/learning/socialization,” (cf. e.g. Kramsch, 2002a; Hornberger, 2003a; Leather and van Dam, 2003a; van Lier, 2004; Creese et al., 2008; Verspoor et al., 2011). For a further overview (see Kramsch and Steffensen, 2008).

If ecology in general is messy, then the situation for ecological linguistics is yet more complex – especially for the socio-cultural ecology of language. The backdrop of the messiness can be traced to a plethora of theoretical roots. Thus, one can discern such roots as Peircian semiotics (e.g. van Lier, 2002, 2004), Bakhtinian dialogism (e.g. Fettes, 2003), Vygotskian psychology (e.g. Lantolf, 2000) and Merleau-Pontian, Schutzian and Goffmannian phenomenology (e.g. Kramsch, 2002b). Since none of these are strictly ecological, their influence extends across traditions of applied, interactional and educational linguistics. However, we also meet theories that rarely appear in linguistics – and very rarely outside ecological linguistics. One of these theories stands out, namely *ecological psychology* (cf. Gibson, 1979/1986; Reed, 1996).

Ecological psychology emerged in the 1960s and 1970s as a reaction to traditional cognitive psychology that favoured a representational model of perception. Following Descartes, human beings were said to perceive the surrounding world by creating inner, symbolic representations. The founder of ecological psychology, James Gibson, rejected such representationalist views in favour of *direct perception*. Whereas traditional cognitive science had heralded an Aristotelian view of perception as the unearthing of the qualities of perceived objects, Gibson's approach was action-based: "what we perceive when we look at objects are their affordances, not their qualities. [...] The meaning is observed before the substance and surface, the colour and form, are seen as such" (Gibson, 1979/1986: 134). According to this view, the cat does not see the sill (i.e. a flat, middle-sized piece of wood in front of the window), but rather an opportunity for a relaxing place to absorb solar radiation. To the cat, the main quality of the sill is its lying-on-and-relax'ability. Gibson proposed the word *affordance* to capture such opportunities: "The *affordances* of the environment are what it *offers* the animal, what it *provides* or *furnishes* for good or ill" (Gibson, 1979/1986: 127). As the example indicates, affordances "have to be measured *relative to the animal*" (Gibson, 1979/1986): the sill does not normally afford lying-on'ness for human beings and elephants (or flies and mosquitoes, for that sake). In a manner that holds much promise for a theory of language and semiosis, Gibson demonstrates that this approach to perception is a radical break from traditional cognitive views:

Perhaps the composition and layout of surfaces *constitute* what they afford. If so, to perceive them is to perceive what they afford. This is a radical hypothesis, for it implies that the "values" and "meanings" of things in the environment can be directly perceived. Moreover, it would explain the sense in which values and meanings are external to the perceiver. (Gibson, 1979/1986)

From this brief recapitulation of Gibson's psychology of perception, three especially relevant insights stand out for the socio-cultural ecology of language. In the area of language acquisition, these have all been discussed by Leo van Lier (2002, 2003, 2004, 2008). The first insight is that Gibson's approach is emphatically *relational*:

Information about the self accompanies information about the environment, and the two are inseparable. [...] Perception has two poles, the subjective and the objective, and information is available to specify both. One perceives the environment and coperceives oneself. (Gibson, 1979/1986: 126)

For the ecological linguist this has important implications on how language is to be conceived. Thus, just as we normally ascribe our visual capacities to our eyes, linguists have for centuries relied on an *a priori* delineation of language (cf. Steffensen, 2011). However, the consequence of a relational approach to perception is that what we perceive does not just depend on eyes but, rather, on the perceiver's whole-bodied achievement: when we hear a noise and turn our head, perhaps move towards the source of the sound, we set up a *visual system* that comprises eyes, ears, head, neck, and legs, i.e. the whole body. Similarly, as shown by van Lier (2008: 54f.), when we engage in language, we move bodily and mentally in a sociocultural state space. We hear sounds, and sometimes we hear them as wordings (cf. Cowley, 2011c), but at the same time we observe lips, hands, faces and bodies, not to mention the full environmental array. Language is whole-bodied, multisensory, and deeply intertwined with what we do (Thibault, 2011). In van Lier's terms: "In addition to the multisensory nature of language perception, we must tie perception to the realm of action. [...] language perception occurs in a context of activity and interactivity" (van Lier, 2008: 55). The logical consequence of this tenet in Gibsonian thought is that there are "no such things as linguistic data" (Cowley, 2007b: 577); there are only *data*, and it takes an all too hasty semiocentric view to turn these into *linguistic data*. As Saussure noted, "c'est le point de vue qui créé l'objet" (Saussure, 1916/1972: 23).

Second, it follows from Gibson's approach that what an object affords varies, not just between species, but also between individuals, and between situations. To the infant, a spoon may be an affordance for swinging and throwing, and only later for eating. Likewise, the person who 'learns', 'acquires' or 'comes into' (Toolan, 2003: 123) language, be it his/hers first, second or *n*th, might appropriate it in portions, focusing on, say, lexical items in a foreign language, while ignoring specific prosodic features, depending on first language prosody. van Lier (2004, 2008) correctly links this dimension of Gibson's psychology to Vygotsky's developmental psychology. The crucial point is that learning or developing creates an individual trajectory that does not reduce to pre-set stages or parameters.

Third, we point to the importance of *value* and *meaning* in Gibson's psychology. Although Gibson's psychology is strictly realist, his theory of affordances rests on concepts that are compatible with work in the humanities. Paraphrasing Bateson (1972: 459), an affordance can be seen as a "difference that makes a difference," or more specifically: a difference in the environment that makes a difference to an organism. In other words, an environmental structure acquires a specific value or meaning *when* it makes a difference to the organism. Given its temporality, "the organism" is neither a silent observer nor a purely semiotic interactor; rather, it is a living being engaged in its environment: "Affordances are meaningful ways of relating to the environment through perception-in-action" (van Lier, 2002: 147). As van Lier points out, this insight can



reshape our understanding of semiotic activity because “the notion of affordance is related to *meaning potential* (Halliday, 1978)” (van Lier, 2004: 92). Concurring with van Lier, in an ecology of meaning the various aspects of what we call language do not *mean anything per se*. Rather, they are affordances for the interpersonal co-creation of meaning; they carry a meaning potential that can be exploited when we interact. This semiotic interpretation of Gibson is extensively developed by van Lier (2004) who thus convincingly integrates a number of seemingly separate theories within a socioculturally inclined ecological linguistics, including “Gibson’s ecological theory of perception, Peirce’s theory of signs, and Bakhtin’s theory of language [...] [and] Vygotsky’s theory of mental development” (van Lier, 2002: 151).

## 5. The cognitive ecology of language

Next to the sociocultural adaptation of Gibson’s theory, another Gibsonian approach to language has flourished, mainly in the US. This tradition has a stronger psychological affiliation, and it is more experimental than van Lier’s. Among the most prominent proponents are Carol Fowler, Bert Hodges and Guy van Orden; a representative overview can be found in two special issues of *Ecological Psychology* (Hodges and Fowler, 2010, 2011).<sup>5</sup>

As the editors of these Special issues emphasise, the Gibsonian tradition of ecological psychology is eminently well-suited for studying language both because it is embedded in dynamical systems theory and also because it recognises the necessity of “investigating systems that encompass more than one human perceiver–actor” (Fowler and Hodges, 2011: 149). Both are obvious prerequisites for a theory that aspires to understand and explain the intricacies of human linguistic interaction.

One example of this line of research is Bert Hodges’ ecological approach to social psychology. In a number of studies (Hodges, 2007a,b, 2009, 2013; Hodges and Baron, 1992, 2007; Hodges and Geyer, 2006), he has shown how in multiple contexts (carrying, driving, negotiating, and conversing), human behaviour is constrained by ecosystemic values. Since these act as boundary conditions on ecosystemic activity, human (inter)activity *realizes values*. In recent years, Hodges has developed this line of thought in a direction that leads towards a Gibsonian-inspired ecological linguistics and ecological pragmatics (cf. Hodges, 2013). A main insight from this development is that the various values that constrain human interaction create tensions and frustrations. We live “on the edge of chaos,” as we strive to balance various concerns and aspirations. Far from regarding this as negative, we should “remind ourselves that frustration is another name for the ongoing balance between collapsing into chaos or into the rigidity of functional fixedness” (Fowler and Hodges, 2011: 154). The research of Hodges – like that of others adopting this ecological approach to language – is based in the experimental tradition. Such experimental methods are met with wariness by many ecological linguists who consider the laboratory setting to lack the necessary ecological validity to produce non-reductionist accounts of human interaction. Nonetheless experimental work on language has generated much valuable knowledge about human interaction. For instance, in the 1970s, it showed that speech perception is a whole-bodied achievement: when subjects hear the syllable [ba] while seeing lips uttering [ga], an inter-sensory interference gave rise to them perceiving a [da]! This so-called McGurk effect (McGurk and MacDonald, 1976) demonstrates dependence on whole bodies – not isolated speech organs or language modules. Importantly, such a result could not have been achieved *in vivo* or by observation methods. At the same time, experimental methods may provide a heuristic for observing human interaction *in vivo*. Paradoxically, proponents of ecological *in vivo* methods sometimes forget that the real-life arena of linguistic interaction also produced what most ecological linguists consider to be blatantly false claims about language. These include, for instance, the folk view that language codes and transmits mental representations which for most people appears to be consistent with everyday experiences of using language. To counter such misconceptions, much can be gained from experimental rigour, as ecological–experimental methods may lead to a fruitful reconsideration of the interplay between small-scale and large-scale dynamics of human interaction (cf. Steffensen, 2012).

In investigating the organism’s action–perception cycles in the environment, Gibson’s ecological psychology falls prey to a dualist ontological assumption, in that it evokes a two-system model: the organism is one system, and the environment is another system, and the relation between the two systems is such that the one (the organism) is placed ‘in’ the other (the environment) in a way where the two systems interact.

However, there are alternatives to such viewpoints. An example is Timo Järvillehto’s (1998, 2009) *systemic psychology* which studies the Organism–Environment System as a single, undividable whole. The theory holds that “in any functional sense organism and environment are inseparable and form only one unitary system” (Järvillehto, 1998: 329).<sup>6</sup> A related move towards more systemic, monistic, or holistic approaches appears in newer versions of systems theory such as: Chaos and Complexity Theory, or C/CT (cf. Larsen-Freeman and Cameron, 2008), Complex Adaptive Systems Theory, or CAS (cf. Holland, 1995) and Nonlinear Dynamical Systems Theory, or NDS (cf. Guastello et al., 2009).<sup>7</sup> In applied linguistics, especially in the field of second language acquisition and socialization (cf. Kramsch and Steffensen, 2008), complexity-based models of language and interaction are now flourishing. Complexity theory reveals that language is poorly modelled as a linear causal process. Thus, the Chomskyan idea that the observable phenomena of language (E-language) are caused by neural-based symbolic computations of inner language (I-language) is replaced by appeal to non-linear dynamics. For instance, when we engage in verbal activity, we integrate the fast timescales of synaptic activity and interbodily dynamics (bodily and vocal gestures) with the longer, slower

<sup>5</sup> A sequel third special issue has been published as Hodges et al. (2012).

<sup>6</sup> The linguistic implications of systemic psychology are traced in Steffensen (2008).

<sup>7</sup> The many names attached to the field partly testify to the various disciplinary roots of the field; for instance, Nonlinear Dynamical Systems Theory has its roots in mathematics, whereas many contributors to Complexity Theory work in biology and physics.

timescales of sociocultural dynamics (e.g. the logics of the arena in which we engage in social interactions) and the historical resources of social and symbolic patterns and norms (Thibault, 2011; Steffensen, 2011). Thus, saying that language is *caused* by brains, or microsocial norms, or human interactions, or phenomenological experiences, is an unwarranted reduction of a multifaceted reality. In a complex reality, brains, bodies, interactions, social norms, external artifacts and sociocultural resources all function as *enabling conditions* that we draw on as, in Cowley's (2011c) terms, we take a *language stance*: when we learn to hear vocalisations as wordings we become embroiled in social reality. However, we do not cease to live as biological beings. Though 'words' contribute to our environmental manoeuvring – as physical, emotional and ethical yardsticks and landmarks – we still draw on the interbodily dynamics that shape human co-existence. Cowley (2011b: 6) thus emphasises that language is *symbiotic*: it is both symbolic *and* dynamic (cf. Rączaszek-Leonardi, 2009). For ecological linguists, therefore, the task is to investigate the dynamics of how human beings integrate symbolic structures into the dynamics of their ecosystemic existence. Cowley (2011c: 188), following Gibson (1979/1986), explains this phenomenon by pointing to the human capacity for *discrepant awareness*: just as we can see coloured smears of acryl on canvas as both coloured smears of acryl on canvas and as a pipe, so can we hear organically produced human vocalisations as both sounds and words. Only the naïve realist sees a real 'pipe' and hears a real 'word'. Human infants know of no words, but as they gain from experience of interactional coupling with caregivers, they learn to do so.

A complex model also discards the idea that language acquisition is a matter of setting linguistic parameters (Chomsky, 1981), or building abstract models of syntactic and semantic structures. Rather, we depend on a *rich memory* of linguistic (and indeed non-linguistic) activity. This has been demonstrated for both phonetic memory (e.g. Port and Leary, 2005; Port, 2010) and its syntactic counterpart (Dąbrowska, 2010). In short, language emerges as human beings self-organize as social actors (or persons). There is no (need for) a universal master-plan of linguistic structure because, paraphrasing Markoš et al. (2009), language is its own designer.

Ecological systems, living systems (as human beings, organisms, and cells) and most culturally crafted systems (e.g. social structures, economies, alphabets and the internet) can be modelled by complexity theory. This describes how human behaviour (including linguistic behaviour) meshes with larger societal, cultural and natural structures. As this is also the aspiration of ecologically, ecological and complexity theoretical models fall naturally, and complementarily, within ecological linguistics. Both approaches aspire to study complex systems in a larger context, i.e. they strive to understand a given phenomenon by investigating its *modus vivendi* in a larger whole. Although, the concepts of *whole* and *wholeness* are sometimes questioned as "metaphysical notions transcending the boundaries of science" (von Bertalanffy, 1972: xviii), this is not the case for models that use complexity theory. As with ecological models, its tools enable us to deal with such wholes in a controlled and explicit way. In other words, they permit a holistic science that does not indulge in excessive mysticism.

In applied linguistics, complexity theory is mainly used metaphorically. As argued by Larsen-Freeman and Cameron:

we need to understand complexity, and thus complex systems, as the source domain of our metaphor/analogy in order to create meaningful and valid mappings on to problem spaces in applied linguistics.

(Larsen-Freeman and Cameron, 2008: 25)

On the one hand, one can lament that applied linguistics lacks the mathematical rigour provided by complexity theory. On the other, one can point to the observation of the founding father of systems theory, Ludwig von Bertalanffy:

Models in ordinary language therefore have their place in systems theory. The system idea retains its value even where it cannot be formulated mathematically, or remains a 'guiding idea' rather than being a mathematical construct.

(von Bertalanffy, 1968: 24)

The evolutionist Stephen Gould concurs with Bertalanffy. In his view, to achieve intellectual progress, "We must have access to the right metaphor, not only to the requisite information" (Gould, 1985: 151; quoted in Kramsch, 2002b: 1).

Somewhere between lament and optimism, one can take a middle path where, for the purposes of applied linguistics, one acknowledges the limitations of the complex systems theory. Indeed, the main limitation of the complexity model is the same as its main strength, namely its plasticity which allows it to model ontologically very different realms. The weakness is that it is difficult to specify *what* one is modelling. Given a set of assumptions and idealizations, even ontologically unreal phenomena lend themselves to complex modelling. For instance, in what is considered the first use of complex models in linguistics (Larsen-Freeman, 1997), a traditional understanding of language as consisting of phonology, morphology, syntax, semantics and pragmatics is reproduced:

As is true of other dynamic nonlinear systems, language is also complex. It satisfies both criteria of complexity: first, it is composed of many different subsystems: phonology, morphology, lexicon, syntax, semantics, pragmatics. Second, the subsystems are interdependent. A change in any one of them can result in a change in the others [...].

(Larsen-Freeman, 1997: 149)

For the last quarter of a century such ontological assumptions have been disputed (cf. Harris, 1981; Fettes, 2003). But by coding a data set in a way that conforms to this traditional linguistic departmentalization, these constructs enter the model, and thus "the model shows" that these are indeed aspects of a complex linguistic reality. Alternatively, one can creep up on language from behind, in Cowley's (pers. comm.) words, e.g. by making the simpler assumption that when we study language, the only given phenomenon is human activity. In de Boer's (2001) words: "Language is a perfect example of a complex dynamic system [...]. *The interacting elements are the individual language users*" (de Boer, 2001: 30; emphasis added).

## 6. Towards a unified ecological language science

The previous sections have offered an overview of various answers to the foundational questions in ecolinguistics, viz. “what is the ecology of language?” and “how does language relate to its ecology?” From this exposition, one thing leaps out: the field is so vast and various that one can doubt there is a unified domain at all. If one adopts the metaphor that SCIENTIFIC DISCIPLINES ARE TERRITORIES, ecolinguistics appears more like an archipelago than a continent. Hitherto, it has developed through insulated scientific programs that offer different views on both the language ecology and the theories and methods that are most appropriate for study. The variety is not just conceptual: from a sociological point of view, one is struck by lack of interaction between schools that combine language and ecology. Rather than lamenting this state of affairs, this section will explore the potential for future coherence. And rather than building conceptual bridges, we will explore the Sea of Interconnectedness that binds the insulated projects together in what can be conceived of as a unified ecological language science, or a coherent scientific ecosystem.

In Fill's (2001) classic paper, “Ecolinguistics – state of the art 1998,” he distinguished ‘metaphorical’ and ‘non-metaphorical’ uses of ‘ecology’. In the former, “‘ecology’ is applied metaphorically to ‘language(s) in an environment’” (Fill, 2001: 43), and in the latter “‘ecology’ is understood in a biological sense; the role of language in the development and aggravation of environmental [...] problems is investigated” (Fill, 2001). These two positions were related to the scientific projects of Haugen (1972) and Halliday (1990), respectively. While Fill presented the positions as “complementary rather than mutually exclusive” (Fill, 2001: 43), Steffensen (2007: 8) argued that there were “convincing theoretical and practical reasons to abandon it.” This section synthesises the two views: rather than argue for the peaceful coexistence of Haugenian/Hallidayan views, we seek to dissolve the antithesis within a unified ecological language science.

Our starting point is the simple observation that it is hard to focus on two things at once. As shown in studies of figure-ground perception (e.g. Rubin's vase), making any given phenomenon the figure under consideration leads an observer to treat the rest of the field as background. In ecolinguistics, scientific pursuit of an intellectually satisfying answer to, “what is the ecology of language?” has prevented the discipline, with a few notable exceptions, from addressing the less noticeable question, “what is language?”

To counter this bias, we reformulate Fill's distinction between a metaphorical and a non-metaphorical use of the term *ecology* (Fill, 2001: 43). What is needed, we suggest, is to distinguish metaphorical and a non-metaphorical uses of, not ‘ecology’, but ‘language’. We suggest that the majority of present day linguistics, including most ecolinguistic positions, relies on a metaphorical conceptualisation of language. Simply, this conceptualisation takes for granted that, corresponding to our idea of language, there exists a phenomenon of language. This is the case in classical, 20th century form-oriented linguistics as represented, for example, by the work of Louis Hjelmslev:

Linguistics must attempt to grasp language, not as a conglomerate of non-linguistic (e.g. physical, physio-logical, psychological, logical, sociological) phenomena, but as a self-sufficient totality, a structure *sui generis*. Only in this way can language in itself be subjected to scientific treatment [...]

(Hjelmslev, 1961: 5f.)

Remarkably, the same tenets appear in functional and usage-based theories that include seminal work in social semiotics and discourse analysis:

The internal organization of natural language can best be explained in the light of the social functions which language has evolved to serve. Language is as it is because of what it has to do.

(Halliday, 2003: 309)

The analysis of discourse is, necessarily, the analysis of language in use. As such, it cannot be restricted to the description of linguistic forms independent of the purposes or functions which those forms are designed to serve in human affairs.

(Brown and Yule, 1983: 1)

In seeking to understand social reality, both positions posit that there is indeed an ‘it’ that ‘does’ something ‘purposeful’ in ‘human affairs’, an entity that can be termed either ‘language’ or ‘discourse’. Accordingly, both form-oriented (Saussure, Hjelmslev, Chomsky, etc.) and usage-based traditions (Halliday, Brown and Yule, etc.) adopt a dualist assumption that ‘language use’ is separable from ‘language’. The contrast arises in that in form-oriented tradition, models are defended by an *axiological dualism*: language ought to be investigated (in itself), and language use can be safely ignored. Conversely, usage-based traditions supplement their models with an *axiological interactionism*: Language and language use interact, and the object of linguistics is these interactions. In Steffensen (2011: 193) this view is traced to the assumption that language is a unified, coherent whole made up of several smaller parts, systems, building blocks, etc. On this monolithic view, we can know language X, and since language X can be known, it is code-like (Love, 2004). Whether language is traced to a psychological or sociological substrate, the view is justified by the assumption that language X can appear in either speech or writing. As has been powerfully argued by numerous scholars (most notably, Harris, 1981; Love, 2004, 2007; Kravchenko, 2007a; Linell, 2005; Port, 2010), this view builds on a *written language bias* (cf. Linell, 2005) that has spread from ancient Greek practices of learning writing (cf. Steffensen, 2004) to linguistics, and from there into a layman view on language. Since the monolithic view separates ‘language’ from ‘non-language’ it inexorably leads to the widely held linguistic view that our

idea of language corresponds to a phenomenon of language. This is what we call the metaphorical conceptualisation of language: it is conceived as-if it were an entity in itself; it is reified.

In an ecolinguistic context, a metaphorical concept of language has severe repercussions. Although striving to integrate biological and ecological concepts, the object of the discipline comes to be defined in a purely symbolic way, i.e. as a cultural artefact that facilitates communication. Rejecting the biomorphic metaphors of the 19th century (cf. Pennycook, 2004), ecolinguists often subscribe to the view that “language is not a natural product, but a social convention which does not ‘live’ like an organism” (Jung, 2001: 272). Such a purely symbolic definition of language as a cultural artefact that facilitates communication inherently denies or ignores the very naturalness of language. Particularly in the study of how language relates to the natural ecology, the field is trapped in a ‘paradox of aboutness’: language is *about* nature, but is not *of* nature. Despite the usual claims that the ecological world view “is completely different from the scientific or rational one inherited from Descartes and some of his contemporaries” (van Lier, 2004: 3), the mainstream ecolinguistic view on language has never escaped from a residual Cartesianism: ecology is nature, language is culture, and man is a cultural being that exploits nature.

But there is an alternative. Just as we have such concepts as ‘Andromeda’, ‘Cassiopeia’, ‘Lyra’ and ‘Orion’ – which refer to a human idea of constellations as perceived from an earthly perspective – we can view our idea of ‘language’ as like a constellation: it projects a phenomenological orderliness to a plenitude of disparate phenomena whose only shared properties arise from human activity. The idea of language as a metaphorical construct arose in parallel in the work of Linell (summed up in Linell, 2009) and in integrational linguistics (cf. Harris, 1981, 1990; Love, 1990, 2004, 2007). Harris argues that “linguistics does not need to postulate the existence of language as part of its theoretical apparatus” (Harris, 1990: 45).<sup>8</sup> In Steffensen’s (2011: 204) watchword, “If you want to learn about language, forget about language!” Though sadly ignored in mainstream ecolinguistics, many integrational insights enrich the field (e.g. in Mühlhäusler, 2003; Toolan, 2003; Pennycook, 2004). Pennycook (2004: 234) even dubs Mühlhäusler’s work an “integrational ecological paradigm.”

Having abandoned the myths and metaphors of traditional linguistics, we turn to a non-metaphorical conceptualisation of language. However tempting, it is not viable to eschew the language metaphor merely by taking recourse to what Hjelmslev dismissed, i.e. to see language as a “a conglomerate of [...] physical, physio-logical, psychological, logical, sociological” phenomena. First, such an approach would turn the language sciences into an inter-disciplinary patchwork of more or less (in)compatible viewpoints. No-one will deny that language has physical, psychological and sociological dimensions, and each of these viewpoints may gain some *descriptive* adequacy. None, however, can yield *explanatory* adequacy. The reason is simple: even if each viewpoint gives rise to explanatory models, no larger framework can integrate these theoretical perspectives. Thus, if we investigate a certain vowel change, we can describe its physical, psychological and sociological dimensions. Furthermore, the linguistic physicist, psychologist and sociologist may even provide partial explanations: a given vowel change may maximise the acoustic differences in the vowel space, it may occur as a psychological reinterpretation of speech input, and it may index group membership. However, to integrate such explanations, a larger theoretical framework is required. Second, each and any scientific discipline preoccupied with the human existence is fraught with tacit assumptions on language. In the succinct words of Paul Thibault (pers. comm.), “everyone is a linguist, everyone has some folk-theoretical ideas about language that assist them in their languaging.” As Saussure and Hjelmslev had already emphasised, other disciplines often have a “purely pragmatic interest in language” (Thibault, pers. comm.), i.e. language becomes little more than a tool for the exteriorisation and exchange of ideas. Such a bias will be reproduced in an approach to language that is grounded in these disciplines. For this reason, there is a danger that linguistic theory will be saturated with a misleading conceptualisation of language. Therefore, to develop a coherent, ecological view on language, while we keep in mind that ‘language’ does not identify a unified phenomenon, we need to pursue a *naturalised language view* and a *naturalised language science*. In Section 7, we outline one approach to a naturalised language view, and in Section 8, we show what this view offers to a unified discipline of ecolinguistics.

## 7. A naturalised view on language

A naturalised language science strives to reject both the extreme of ontological essentialism (i.e. the view that there is an ontologically real phenomenon of ‘language’) and that of ontological epiphenomenalism (i.e. the view that the phenomenological experience of ‘using language’ is a phantasm, contingent on the natural reality). It does so by identifying “a middle path between reducing language to biology and treating language without recurrence to biology” (Steffensen, 2011: 204).

One model for this approach is the *Extended Ecology Hypothesis* (EEH), as presented in Steffensen (2009, 2011).<sup>9</sup> The EEH states that the human ecology is extended by integrating value and meaning into ecological structures (including ourselves and each other). As a consequence, it is argued that the human ecology has become deeply and irreducibly *sense-saturated*. The term

<sup>8</sup> Obviously, “If there is no such object, it is difficult to evade the conclusion that modern linguistics has been based upon a myth” (Harris, 1990: 45).

<sup>9</sup> The hypothesis relates to, but dismisses, both Richard Dawkins’s (1982) biological theory of the extended phenotype and Andy Clark’s (2008) cognitive theory of the extended mind. Both these approaches are inherently bio-centric: Dawkins uses the concept of the extended phenotype (e.g. the spider that produces a web to extend its catchment area) to argue in favour of his Selfish Gene model, and it thus rests on a mono-directional trajectory where an inner genetic core expands its domain, first within the body, since beyond it. Likewise, Clark’s model of the extended mind (i.e. the idea that external resources are recruited as parts of human cognition) is equally organism-centred: “the organism (and within the organism, the brain/CNS) remains the core and currently the most active element” (Clark, 2008: 139). In contrast, an ecological model of extension does not claim that the individual body, brain or gene is the centre of extensional processes.

'sense-saturated' implies that our very ecological being in a given socio-ecological environment is meshed with semiotic processes and, as a result, the human ecology is constrained by virtual and historical structures. Rather than treating semiotic processes as adhering to an independent realm, an ecological approach sees language (our sense making potential *par excellence*) as a species-specific way of regulating real-time metabolic activity, or *interactivity*, to recycle van Lier's (2008: 55) expression. Interestingly, this claim resonates with how recent work in cognitive science (Kirsh, 1997; Vallée-Tourangeau et al., 2011; Cowley and Vallée-Tourangeau, 2013; Steffensen, 2013) tracks human thinking to interactivity, defined as "sense-saturated coordination that contributes to human action" (Steffensen, 2013). Accordingly, there is no principled way of distinguishing verbal interaction from other forms of human behaviour: both control complex action–perception cycles (van Lier, 2008: 55) by modulating our interbodily behaviour and attention to extend our range of perceptual and executive behaviour. Thus, because we live through sense-saturated interactivity in an extended ecology, humans have a vastly amplified adaptivity, flexibility, and organization. In everyday human practices, therefore, people show unparalleled modes of co-ordination, cooperation, and collaboration.

With these comments we are at the core of the ecology of language. In the extended ecology view, language is not an instrument for externalising thought or for communicating. Rather, it is real-time, interbodily coordination that enables us to achieve results that are unreachable for a single human body or person. As Ross notes, the human species has found a way to "achieve coordination approximating that of eusocial animals despite their standard mammalian population genetics" (Ross, 2007: 729), and the way to do so is "immersion of behavior in language [which] performs the job that haplodiploid [sic] genetics does in bees" (Ross, 2007: 729).<sup>10</sup> Thus, it is a species-specific feature that can extend action and perception by producing and coordinating vocalisations. When for instance our ancestors started hunting in groups, they achieved means for coordinating that allowed them to achieve better results. But from an ecological point of view that is no different from the spider which drastically enlarges its catchment area by producing a web. Both the spider and the human depend on biological bodies – the former externalises silk from spinneret glands and the latter externalises (and modulates) atmospheric air from their lungs. Both depend on their body being adapted to a given ecological environment.

But there are differences as well, of course. While the spider extends its phenotype by producing the web, the human ecology extends by recruiting *sociocultural resources*, i.e. embodied habits of interaction and artefacts handed down from generation to generation. In this sense, the extended human ecology is more like the ecological niche-construction of beavers, because beaver dams are taken over by the next generation of beavers. But whereas the beaver lineage is constituted by shared situatedness in the aquatic ecology, the extended ecology of human lives transgresses situational borders: our forefathers' sociocultural resources impact on and constrain our situated existence just as, in turn, we will be outlived by the sociocultural resources that we shape and enact. Thereby, the situational here-and-now is saturated by a range of trans-situational structures.

The by far most efficacious structure in this respect is our lexicogrammatical patterns that functions as symbolic constraints on the lived dynamics of interaction (Rączaszek-Leonardi, 2009; Pattee and Rączaszek-Leonardi, 2013): while our human anatomy allows us to produce a wide range of sounds, we have developed a fine-tuned control that enables us to exploit a range of vocal gestures (Fowler and Rosenblum, 1991) to coordinate behaviour. Drawing on the work of Bakhtin (1981, 1986, 1993), Per Linell (2009) emphasises that these situation-transcending aspects of interaction imply a *double dialogicality*: when we interact, we do not just engage dialogically with each other, we also engage dialogically with our shared and idiosyncratic pasts.

However, we also have the capacity to construct and recruit non-symbolic structures that include technologies and artefacts. In many ways they resemble a beavers' dam in that they too contribute to a specific ecological niche. Human technologies both extend sensory systems (e.g. glasses, hearing aids, and television), executive systems (e.g. shovels, cars, and printing), and cognitive systems (e.g. calculators, GPS systems, and notebooks). Technologies such as computers integrate all of these aspects. In cognitive science, adherents of distributed cognition understand technologies as systemic entities that distribute cognitive processes, not only *in situ*, but also "through time in such a way that the products of earlier events can transform the nature of later events" (Hollan et al., 2000: 176). One social technology which has had a massively transforming impact on human sociality is writing. Following Kravchenko, the technology of writing functions less as a communicative technology than a cognitive one: "while languaging [i.e. spoken language] functions to extend the human *sensorium*, texts act as scaffolding that enhances human cognitive powers" (Kravchenko, 2009: 541). Writing is primarily a means for stabilising cognitive processes through the recruitment of external resources. The stabilization of cognitive processes allows us to turn written texts into "an ecological medium" (Kravchenko, 2009: 542) that can be scrutinised in situations and accessed across situations. On this view, "The orientational effect written texts can have on an interpreter's behavior, depend, to a large extent, on how the interpreter links this domain to life-time experience" (Kravchenko, 2009: 542), i.e. the real-time cognitive endeavours of the interpreter. In short, there is no 'meaning' in the text – just as there is no 'discourse' behind the text. There are only various (semiotic and non-semiotic) technologies and artefacts whose constraints affect the moment-by-moment trajectory of human existence.

According to the EEH it is characteristic of human technologies that they enlarge our sensory and action domain far beyond our ecological situatedness. Just as our own here-and-now life trajectory is transformed as we integrate the outcomes of earlier events into our situated cognitive systems, our current technological means allow human agents to affect

<sup>10</sup> The correct form is "haplodiploid genetics."

environmental structures on the other side of the globe (and into space). Technologies have taken us beyond adaptation to the environment into a large-scale adaptation of the environment to human needs and desires. We change local and global structures, as we, to a growing degree, employ technology-driven means to satisfy our basic demands, e.g. when we transform geological sedimentations (so-called “fossil fuels”) into locomotion and heating. Cognitive technologies are of crucial importance in that they allow us to plan, perform and control interventions in our environment on a magnitude that goes far beyond the capabilities of individual phenotypes. Weapons of mass destruction, vehicles of mass transportation, and channels of mass information are today’s order, and they are all dependent on the socioeconomic exploitation of small-scale technological innovations.

Only in the last five or six decades has it been recognised that there are likely to be limits to this development. Only now does the insight dawn at us that matter, energy and information that are channelled into our local ecological niches will evaporate into the larger ecosystem of which our local domains are part. Only now do we realize that when we heat our houses, we are also heating our common planetary household.

## 8. Redefining ecolinguistics

A naturalised language view demands a response to the question, what does the extended ecology model offer ecolinguistics? What is the rationale for adopting, adapting and elaborating the hypothesis? In this section we offer three arguments for naturalising our view of language and, thus, three arguments for developing ecolinguistics as a naturalised language science.

First of all, for metatheoretical reasons, a naturalised model is more satisfactory. Our argument builds on Peter Finke’s (2013) observation: “searching for truth and a critical consciousness, is a value of scientific behaviour. [...] Searching for truth is the only morally acceptable behaviour for a scientist.” As Finke points out (Finke, 2013), this does not entail that there be only one possible truth: “Alternative truths may be just like equations with several solutions. This is not relativism but manifoldness.” However, it is important to add that such truths are all truths about one and the same universe. From an ecological point of view, this universe is considered to be a unified whole, i.e. there are no self-sufficient realms that are separable from other domains of reality. Therefore, a truth about one part of reality *must* be compatible with truths about other parts of reality. An ecological philosophy of science will thus exclude local truths, i.e. models of a single realm (e.g. ‘language’) that contradict our best models of other realms (e.g. ‘nature’).<sup>11</sup> A theoretical model of language must fit what is known about the universe. For, in spite of gaps and misconceptions, we do possess a large, well-established body of knowledge about human ecology and biology. Language, socioculture and behaviour are deeply and irreversibly intertwined with nature, or rather: linguistic and sociocultural resources and behaviours express species-specific ways of being nature. If ecolinguistics adopts a naturalised model, compatible with knowledge about human ecology and biology, it leaves behind formal and functional models of language that depend on the ontological reification of language (cf. Section 6).

Second, a naturalised model of language can integrate the four ecological approaches presented in Sections 2–5. The rationale for this claim is that generalizing the four parallel domains of ecological linguistics – the *symbolic*, the *natural*, the *sociocultural*, and the *cognitive* – leads towards understanding language in its full ecological complexity. We thus argue that a naturalised model construes these four realms as *descriptive* dimensions of a single *explanatory* framework. To unfold this argument, we begin with the cognitive ecology of human interactivity. As argued in Section 5, how human beings coordinate to establish functional wholes is ecologically embedded, i.e. dependent on complex ecosystemic structures. Thus, on the one hand cognition is dependent on how we interpret and exploit ecological resources and, on the other, cognition equips us with the flexible, adaptive behaviour that distinguishes us from automata under the control of external factors. The cognitive dynamics of human interactivity is thus the key to understand human sociality, culture and language. Its importance is enhanced by the fact that situated human behaviour is at the same time the locus of both *symbolic* processes in a sociocultural ecology and *metabolic* processes in a natural ecology. Coordinative human behaviour thus establishes functional wholes that engage in intentional activity in a larger ecology. This may occur, for example, when a group of hunters coordinate to bring down prey, or when the cockpit crew coordinates to land a plane. What human beings do in a small-scale cognitive ecology thus impacts on larger-scale ecologies, i.e. those ecologies that were described as natural and sociocultural in Sections 3 and 4. Pursuing the extended ecology hypothesis, we can thus link the sociocultural and the natural ecologies to our small-scale cognitive ecology: while the latter flows as situated, human interactivity within a narrow temporal range (in the words of Uryu et al., 2013), the former recruits environmental structures into the cognitive ecology. When we integrate physical artefacts or socially validated procedures into here-and-now interactivity, we link the cognitive ecology to a large-scale ecology; and when we achieve results – some intended, others not – the outcomes of our coordinative behaviour manifest themselves as *post festum* structures that change the natural and sociocultural ecologies. What human beings do together arises in a specific ecological niche (cognitive–natural–sociocultural) and feeds back into that very niche: structures and resources arise in ecologically embedded interactivity, just as they integrate into human interactivity, across time and space. A naturalised model of language demands that both natural and symbolic structures be traced to the real-life flow of human interactivity.

<sup>11</sup> A number of ecological models explain seemingly contradictory truths as basically unified, either as parts of larger patterns of dynamical temporal patterns (cf. Hodges, 2007b, 2013), or as attractors in a larger epistemological enterprise (cf. the discussion of Raphael’s *Schools of Athens* in Hodges et al., 2012). Niels Bohr had a similar insight when he famously claimed that “the opposite of a correct statement is a false statement. But the opposite of a profound truth may well be another profound truth” (quoted after Delbrück, 1986: 167).

As a consequence an ecolinguistic approach to the analysis of symbolic structures such as ‘discourses’, ‘lexicogrammatical patterns’, ‘sense-making resources’, etc. is necessarily bound to reject the hermeneutically inclined schools of (Critical) Discourse Analysis. An Ecological Discourse Analysis (cf. Alexander and Stibbe, 2013) aims at, not analyses of abstractions called ‘discourses’ but rather ethnographically informed explanations of how human beings integrate symbolic structures in their lives. This approach is exemplified by Nash and Mühlhäusler’s (2013) empirical work on topological terms on Norfolk Island. So-called environmental discourses do not impact on our natural ecology but, rather, affect human behaviour in specific ecological niches. This arises because for natural beings behaviour is, for good or ill, intertwined with the ecosystems in which we live. Thus, in order to understand the relation between ‘discourse’ and nature, we need to follow the winding road laid down by the trajectories of human interactivity.

A similar argument goes for the sociocultural ecology of human interactivity even if, initially, it addresses the dynamics of human groups and communities rather than how human agency affects the non-human environment. What investigations of the sociocultural ecology of language clarify is, above all, that sociocultural resources are affordances that we may or may not pick up. *How* we pick them up, and *who* is able to or allowed to pick *what* up, is determined by interpersonal dynamics within a social setting that can be described as a sociocultural ecology. In other words, on a naturalised view of language, while the cognitive ecology describes a *short-loop* feedback system of situated behaviour, the natural and the sociocultural ecologies describe a *long-loop* feedback system of situated behaviour.

Finally, the *symbolic* ecology of language can be understood as a short-loop feedback system that emerges as dialogical and social systems recruit a heterogeneous multitude of symbolic resources. Borrowing a term from Morin (1987), the relations between such structures are *dia-logical*, i.e. “at the same time complementary and antagonistic.” From a naturalised point of view, what matters in our understanding of the symbolic ecology of language, is how the diversity of symbolic resources leads to surprising insights as we coordinate behaviour, goals and dreams across gaps that tempt us to position ourselves in relation to cultures, classes, ethnicities, sexes, etc. However, at the same time as doors open, other doors close, not because of symbolic differences, but because differences integrate in human interactivity in ways that impede our coordinative efforts. We might think of the other as insensitive to our encultured self (cf. Uryu et al., 2013), or we might not even glimpse the other due to the yoke of pre-formed prejudices that are activated by such symbolic resources as a veil, a uniform, a diphthong, a terminological choice, etc.

In conclusion, the extended ecology hypothesis links realms that have hitherto been separated: the domain of human agents enacting small-scale cognitive events through which our lives, projects and aspirations flow, and that of large-scale societal arenas structuring the sociocultural and technological resources at our disposal. It thus offers an explanatory framework for understanding, not just sociocultural resources (be they lexico-grammatical structures, discourses, communicative technologies, media, etc.) but, just as crucially, how such structures are integrated in what human agents *do* in their lived environments, the extended ecology. Thus, the extended ecology model sets out to overcome the ‘paradox of aboutness’ (i.e. the view that language is *about* nature, but not *of* nature) because it transcends the structuralist and post-structuralist appeal to self-sufficient languages and discourses *sui generis*.

Finally, a naturalised language view may actually be better equipped for an ecological linguistics that contributes to critical studies. This claim runs counter to the received wisdom found in poststructuralist language science, discourse analysis and the like. These traditions are, in varying degrees, immersed in a social constructivist framework whose strategy is to *denaturalize* firmly held views, discourses, etc. which are said to create prejudices, stigmatisation, and social marginalisation. While this strategy has its merits when it comes to sexism, racism, classism, etc., the social constructivist arguments falls short in the critique of capitalism, growthism, and excessive industrialism. A social constructivist critique of racist, sexist, classist, etc., social practices is thus essentially a matter of showing that (1) the dominant practice/discourse/viewpoint/life form is not naturally privileged, (2) that there are social and ethical alternatives to the dominant practice, and (3) that we should strive for a more pluralist, inclusive social practice that promotes ethnic, religious, sexual, ideological, and social tolerance.<sup>12</sup> This poststructuralist argumentation builds on the acceptance of de Saussure’s (1916/1972) semiotic principle of arbitrariness which disconnects social practices (defined through their meaningfulness to human beings) from the non-semiotic world. If a social practice is only defined by its semiotic value, i.e. how it is upheld as a meaningful practice in society, no social practice that is meaningful to a large number of people can be said to be inferior to other practices. For example, the fact that heterosexuals outnumber homosexuals does not make heterosexuality a better or more ethically justified sexual practice than is homosexuality.

However, when it comes to social practices that presuppose ecosystemic metabolism – such as the social practice of material production (industrialism), agricultural systems, or transportation of goods and persons – evaluation of such practices cannot be pursued independently of a criterion of metabolic impact, i.e. they do not reduce to discourse or language. Since *the critical stance of ecolinguistics is concerned with how human practices impact on ecosystems*, a social constructivist framework is potentially perilous to the discipline. While still in a formative stage, the Extended Ecology Hypothesis – or a

<sup>12</sup> This argumentation echoes Ian Hacking’s (1999: 6) rendering of the social constructivist argument:

1. X need not have existed, or need not be at all as it is. X, or X as it is at present, is not determined by the nature of things; it is not inevitable.
2. X is quite bad as it is.
3. We would be much better off if X were done away with, or at least radically transformed.

similar approach – might be useful in coming to terms with how second order phenomena (discourses, grammar, wording) impact on our ecosystemic existence.

To some it will appear odd to claim that a naturalised view offers a foundation for the critical study of language in nature and society. But others in ecological linguistics have made similar claims. For instance, Mark Fettes (2003: 45) argues that “ecological explanations offer a more promising foundation for critical reasoning than any of the alternatives (Marxism, poststructuralism, gender theory and the rest).” Today, those persons seen as the opponents of the ecological enterprise – environmental sceptics, global capitalism, and die-hard anthropocentrists – have begun to adopt poststructuralist argumentation, e.g. by claiming that global warming is just another theory. In this situation, proponents of a scientific enterprise that is morally committed to the well-being of humans, other species, and the ecosystem as a whole must develop other argumentative strategies. In our opinion, pursuing a scientific approach to truth – not the questioning of truth – seems to be the only viable move. And since there are no local truths, as argued above, the truth about what language is and does cannot be separated from the truth about how we are living creatures on a blue planet in a dark and light universe. Again, Fettes (2003) puts this nicely into words:

Language devices work by accomplishing something in the world, but what they accomplish is not knowable *a priori* (Millikan, 1984), and may very well vary for different individuals and different contexts. So the investigation of this situatedness, of the conditions for the interpretation and reproduction of language devices, becomes the ultimate test of ‘truth’: this is a critical and ecological enterprise.

Having thus argued for how ecolinguistics can develop into a unified framework by adopting a naturalised language view, we suggest the following definition of ecolinguistics:

*Ecolinguistics is (1) the study of the processes and activities through which human beings – at individual, group, population and species levels – exploit their environment in order to create an extended, sense-saturated ecology that supports their existential trajectories, as well as (2) the study of the organismic, societal and ecosystemic limits of such processes and activities, i.e. the carrying capacities for upholding a sound and healthy existence for both human and non-human life on all levels.*

This vision for an ecolinguistic discipline is (1) based on a naturalized and realist philosophy of science, and (2) comprises the various ecological dimensions described in this state of the art.

## 9. Conclusion

On the one hand, ecolinguistics is a scientific enterprise that aspires to grasp the complexities of the-thing-we-call-language and, on the other, it attempts to reach beyond the scientific community by raising consciousness about the interdependence between discursive practices and ecological devastation. Faced with this ambition, it is wise to remember Claire Kramsch's (2005: 545) call to the applied linguistic community: “Up to now, the scientific community has responded to problems that practitioners consider to be relevant to their professional practice [...]. [There are] two kinds of ‘response’. The first response addresses the problems as identified and conceptualized by practitioners; the second [...] if necessary, reconceptualizes the nature of the issues before it seeks to propose solutions.” Hitherto, most ecologically minded linguists have conceived the discursive and linguistic dimensions of the ecological crisis in terms of a nature–culture dichotomy. One lesson learnt from this state of the art is that we do in fact need a reconceptualization of environmental issues in general and the nature–culture dichotomy in particular. The proposed model of a naturalised language view represents one such reconceptualization.

Informed by this reconceptualization, we have shown how ecological linguistics can eschew the reification of language in both its formal and functional guises. Such a scholarly enterprise, we argue, can develop into a naturalised language science that both opens in-depth investigation of how we integrate language in our human communities and natural habitats and critical reasoning about the future state of human societies and our shared environment. Ecolinguistics can thus link “hard science” and the investigation of coordinative behaviour in the species we call *Homo sapiens sapiens* to “soft science” analysis of ethical and sociocultural consequences, and the “critical science” debates about anti-environmental, destructive social practices.

In her thoughtful discussion of the ecolinguistic enterprise, Lechevrel (2009: 2) notes that ecolinguistics has brought forth “a vast body of research and propositions,” but also that it has “failed to lead to a unified field of research.” To some, this is a strength because it shows that ecolinguistics has avoided scholarly myopia and uniformity. We disagree. While we celebrate manifoldness and heterogeneity because science, in Finke's (2013) words, functions “like equations with several solutions,” we call for a unified field of ecological linguistics. The critics of such unifying tendencies forget that unity does not necessarily established by imposing legislative dictates on practitioners. In ecological systems larger, unified wholes emerge through self-organization, i.e. the intensified interaction between elements within the system. Living organisms have evolved in this way and so have sound social systems that include the distributed cognitive system we call science.

Hitherto, the main problem in ecolinguistics has not been internal disagreement or struggles for power but, rather, the lack of genuine interaction between its various parts. What is the use of letting the thousand flowers blossom, if we can never appreciate the whole field? What is the worth of exploring our own small island, if we neglect the rest of the archipelago? It is our hope that this state of the art, by outlining our vision for a unified field of ecolinguistics, will pave the way



for further scholarly interaction. In that spirit, this special issue is laid forward as a scholarly traveller's guide to the archipelago of ecolinguistics.

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