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Rethinking ecolinguistics from a distributed language perspective

Abstract: In this article, we discuss the current status of ecolinguistics and key issues in the field regarding the positioning of ecolinguistics, and the research objects, aims and methodologies in studies conducted under the label of “ecolinguistics” or “language ecology” (Section 2). Having discussed the inconsistencies and problems in these studies, we present a naturalized view of language from a distributed language perspective (DLP) which has the potential to contribute to a new understanding of the research object in ecolinguistics (Section 3). Under this new understanding of the nature of language and ecology, we propose possible research topics to be explored and potential methodologies to be adopted in ecolinguistics (Section 4). From a distributed understanding of language, ecology, and the research domain and methodologies proposed for future ecolinguistic studies, we argue that ecolinguistics is both an alternative to linguistics and a branch of ecology (Section 5). Future work is needed to explore the research domain proposed for ecolinguistics here, and multidisciplinary cooperation is necessary for the future development of the field.

Keywords: Ecolinguistics; Distributed language perspective; Naturalized view of language; Extended ecology hypothesis; Bio-ecology; Organism-environment system

1. Introduction

In this article, we discuss the current status of ecolinguistics, which may be tentatively defined as “an interdisciplinary and interactive field of study in which the natural sciences (most specifically biological ecology) and the humanities (philology and philosophy) interrelate” (Fill, 1998: 3). The history of ecolinguistics can be traced to 1970 when Haugen proposed the term “the ecology of language”(Haugen, 1972). In the 1990s ecolinguistics “developed into an institutionalized field in its own right primarily within the framework of applied linguistics” (Steffensen, 2007: 6). Since then various approaches have emerged in the field. Steffensen and Fill (2014) group current approaches in ecolinguistics into four strands based on their interpretation of the ecology of language as either a symbolic ecology, a natural ecology, a sociocultural ecology, or a cognitive ecology. These strands all have different definitions of ecology, with different research aims and methods, thus defining a broad research domain under the shared label of ecolinguistics. In response to this trend in the development of ecolinguistics, some scholars have even proposed to regard ecolinguistics as an independent field, rather than as a branch of linguistics (e.g. Steffensen, 2007; Fill and Steffensen, 2014).

However, as Huang and Chen (2017: 38; our translation) recently observed, “there is still no consensus regarding the aim, nature, mission and positioning” of ecolinguistics. Diverse research methods have contributed to the development of the field, but the different understandings of the research objects and aims of ecolinguistics in those approaches may take the future development of ecolinguistics in different and even conflicting directions. Thus, a clear understanding of the nature of ecolinguistics is needed for its future development. To solve this problem, two issues concerning the nature of ecolinguistics need to be tackled, namely, the relationship between language and ecology, and the research aim

and mission of ecolinguistics. These two issues are at the core of the definition of ecolinguistics, and tackling these issues we hope will lead us to an answer as to the positioning of ecolinguistics.

Although all ecolinguists agree that the research object of ecolinguistics is, loosely speaking, the relationship between language and ecology, they have different understandings of this relationship. That is hardly surprising. First, linguists have always differed in their understanding of what language is (just like cognitive scientists quarrel about what cognition is). Second, ecolinguistics has inherited a terminological opacity that stems from Haugen's transfer of the concept of "ecology" from the life sciences to the study of language. The very concept of "ecology" was first coined by the German Darwinist Ernst Haeckel, who defined it as "the total science of the organism's relations to the surrounding environment to which we can count in a wider sense all 'conditions of existence'" (Haeckel 1866: 286; English translation quoted from Steffensen 2007: 5). Clearly, Haeckel focused on how the existence of an organism was conditioned by its material surroundings, including other organisms. However, when Haugen defined "language ecology" as "the study of interactions between any given language and its environment" (Haugen 1972: 325), there is no obvious way to conceptualise such "interactions", unless one reifies language as a (mental or social) structure *sui generis*. When Haeckel studied the *Radiolaria*, both the organisms and their environment were tangible entities, but no such tangibility can be taken for granted when it comes to language. Accordingly, depending on their specific take on the multifarious phenomenon we call language, linguists have interpreted and defined the concept of "ecology" in differing ways, which means that they have emphasised different aspects of the natural and sociocultural *Umwelt* that human beings live in. As will be elaborated in Section 2.2, these differences have led to different research aims for ecolinguistics, and hence to discrepancies among current ecolinguistic approaches, when it comes to the nature and positioning of ecolinguistics.

Recent studies carried out in a distributed language perspective (DLP) have explored the relationship between language and ecologically embedded behaviour from a distributed and naturalized perspective (see Section 3 below), which has the potential to contribute to a new understanding of the nature of language. A naturalized view of language within a DLP framework could shed new light on the research object of ecolinguistics and contribute to new aims and methodologies in ecolinguistics, leading to a redefinition of ecolinguistics and new research domains in ecolinguistics, which is indeed the goal of this article. The following section will explore the nature of ecolinguistics as currently understood. Since the domain of ecolinguistics has not yet been clearly defined, we will summarize and discuss the interpretation of the research object of the intersection of language and ecology, as well as the aims and research methods of current mainstream approaches going under the labels of "ecolinguistics" and "language ecology". The contribution of these approaches to ecolinguistics will be discussed in order to judge whether they qualify to make ecolinguistics a new research field, leading to an answer to the question of the research aim of ecolinguistics as reflected in these approaches.

Section 3 will put forward a naturalized view of language from a DLP to illustrate this new understanding of the research object of language and ecology in ecolinguistics. Section 4 will then re-examine the research domain of ecolinguistics by discussing two basic research

approaches that can be carried out based on this new understanding of language and ecology. Finally Section 5 will propose a distributed definition of ecolinguistics in relation to its nature, positioning, and research domain.

2. Ecolinguistics as an interdisciplinary subject: status and issues

2.1. The positioning of ecolinguistics

Ecolinguistics is a new research field and there is no one unanimous claim as to its current position in academic studies. It is widely agreed that ecolinguistics developed primarily as a branch of linguistics in the 1990s (cf. Steffensen, 2007; Fill and Steffensen, 2014) and that it is “frequently associated with applied linguistics” (Couto, 2014: 127). Huang and Chen (2017) also propose to take ecolinguistics as a branch of applied linguistics that studies language from the perspective of ecology and deals with ecological issues from the perspective of language. Other scholars position ecolinguistics as a wider field than merely a branch of linguistics. Fill (2002) mentions ecolinguistics as a new “paradigm” of linguistics, and Trampe (2002) also proclaims the necessity for an ecolinguistic paradigm. Bang and Trampe (2014) further apply Kuhn’s (1962) concept of “paradigm” to identify the basic elements of an integrative ecological approach to language. While Finke (2014) is against the use of this term “paradigm”, as inherited from Kuhn’s theory of scientific revolutions, he regards ecolinguistics as an alternative to linguistics. Couto (2014) regards the term “paradigm” as polemical and suggests instead viewing ecolinguistics as a “platform” for the study of language phenomena.

Although these scholars hold different opinions on how to position ecolinguistics, they all acknowledge the necessity for establishing a shared understanding of ecolinguistics. We notice that except for Huang and Chen’s (2017) and Huang and Zhao’s (2019) positioning of ecolinguistics as a branch of applied linguistics, most ecolinguists now aim for a more ambitious positioning for ecolinguistics. In view of the recent development of ecolinguistic studies, some scholars even propose to reposition ecolinguistics “as a study (or science) in its own right” (Fill and Steffensen, 2014: 1), rather than as a sub-branch of a discipline. For Finke (2014: 81), part of the reason for positioning ecolinguistics as an alternative to linguistics is that an ambitious aim for creating a field with innovative methods and concepts is necessary for ecolinguistics to be taken seriously by the mainstream linguistic community.

These diverse proposals to position ecolinguistics as a “branch of applied linguistics”, a “paradigm”, a “platform”, an “alternative to linguistics”, or even an independent “study (or science)”, differ from each other in their denotations and connotations. However, they are all based on a domain of research observed to have been carried out under the label of “ecolinguistics”, “ecology of language” or “language ecology”. For example, both Couto (2014) and Finke (2014) strive for an ambitious positioning of ecolinguistics based on their observation that ecolinguistic studies have already gone beyond sociolinguistics and ecocritical discourse analysis to contribute new concepts on the grammatical level, such as the “equilibrium concept” (cf. Finke, 2014) of grammar. Similarly, Steffensen and Fill (2014), after identifying the range of current approaches to ecolinguistics, propose to bring these approaches together and to provide a new definition of ecolinguistics within an integrated

framework. Interestingly, even though Couto (2014) has recognized the different interpretations of environment (or ecology) in many ecolinguistic studies, he still defines an ecolinguist as “any investigator who acknowledges that he/she is doing ecolinguistics, or is using ecological concepts in his/her linguistic research and/or is dealing with environmental questions in relation to language, or environment in relation to language” (p.123).

We can see a general trend in previous studies towards defining the nature and the positioning of ecolinguistics according to existing studies on language and ecology, although those studies may vary widely from each other in their interpretation of “language” and “ecology”. We agree with Finke (2014: 81) that “the emergence of manifoldness is normal and rewarding at the beginning of a new movement”. But defining the nature of a discipline by simply summarizing the manifold forms of research conducted under that disciplinary label is putting the cart before the horse. The nature and position of a discipline should be based on its research object, its research aim, and its methods; if we take the opposite route, we will be confronted by an unsolvable puzzle. Firstly, without a unified definition of the discipline, it is impossible to identify exactly which lines of research belong to the discipline and which do not – hence current disputes in the field as to what counts as ecolinguistics. Secondly, it is irrational to acknowledge all studies conducted under the label of the discipline first and then decide on the nature of the discipline based on the domain of these lines of research. By this reasoning, anything conducted under the label of the discipline becomes part of the discipline, leaving the discipline without focus or coherence. Therefore, we suggest that the nature and position of ecolinguistics can only be decided by clarifying its research object and research aim, which first demands an answer to the crucial question of the relationship between language and ecology.

2.2. *The research object of ecolinguistics*

As noted by Fill (1996: 17; English translations quoted from Couto, 2014: 123), “some ecolinguists start at the ecology end and transfer ecological principles to language, while others start at the language end and bring linguistics to ecology”. No matter from which end ecolinguists start, they take the relationship between language and ecology as the research object of ecolinguistics and presuppose the existence of ecology and language as two interdependent areas. Fill himself also adopts the same manner, regarding language and ecology as two related areas, each being a domain *sui generis*. For Fill (2002: 16), ecolinguistics is a bridge that links language and ecology, “making traffic in both directions possible but at the same time keeping the two areas apart and maintaining the tension between them.”

It appears that most ecolinguistic studies follow the same principle of linking language with ecology while keeping them apart. Steffensen and Fill (2014) provide a comprehensive summary of how current approaches to ecolinguistics relate language to ecology. According to their observation, the differences among these approaches can be ascribed to their interpretations of the environment of language, which can be categorized into four strands: “language exists in a symbolic ecology; language exists in a natural ecology; language exists in a sociocultural ecology; language exists in a cognitive ecology” (Steffensen and Fill, 2014: 7). Despite the different interpretations of ecology, all these approaches regard language and

ecology as two interrelated domains.

At the same time, different interpretations of the research object “ecology” have resulted in the disputes as to the nature of ecolinguistics and its related research aims. Though Fill’s definition of ecolinguistics quoted above mentions the natural science of “biological ecology” as part of the research object, the concept of “ecology” is applied in many current ecolinguistic studies with a variety of different meanings other than in the sense of “biological ecology”. Some scholars, like Stibbe (2017), are critical of ecolinguistic studies that apply the “eco-” prefix “in a completely different way from how it is used in other ecological humanity subjects” (Stibbe, 2017). To Stibbe, the use of “ecology” in those studies “can lead to confusion” and “prevent ecolinguistics from taking off in a way that sociolinguistics did” (Stibbe, 2017). We agree that in terms of research object, there is no essential difference between some approaches to ecolinguistics and various branches of sociolinguistics. For instance, studies within the sociocultural ecology strand (e.g. Haarmann, 1986) explore the interrelationship between language diversity and sociocultural structures, and others (e.g. Leather and van Dam, 2003) examine sociocultural influences on language acquisition. However, as for instance Claire Kramsch’s work (Kramsch and Whiteside, 2008; Steffensen and Kramsch, 2017) demonstrates, it is possible to transcend a narrow social focus by building on an ecological view on language socialization.

For a field of study to be regarded as “new” it must either examine a new dimension of the object of study, a new methodology, a change of the research object, or even an entirely new aim of research. If ecolinguistics is to be taken seriously as a new research field, of the four ecolinguistic approaches summarized by Steffensen and Fill (2014), only the “natural ecology” strand – and to some degree, depending on definitions, also the “cognitive ecology” strand – actually explore a new domain in language studies and thus differentiate ecolinguistics from other branches of linguistics. If the research object of ecolinguistics is to study the interaction between language and the natural ecology, while at the same time keeping these two domains apart, then ecolinguistics is in essence relating language to another discipline, in parallel with the way in which sociolinguistics is related to sociology or psycholinguistics to psychology, each contributing a new dimension to the research object of language. In view of this interpretation of the relationship between language and ecology, ecolinguistics would then appear to be a new branch of linguistics, investigating the relationship between language within the humanities and the discipline of ecology within the natural sciences. We will argue that, while such an approach may be regarded as representing a step forward, the full potential of ecolinguistics is actually broader than that.

2.3. Research aims and methods in ecolinguistic approaches

The overall aim of a discipline defines its research value and future development, and plays a significant role in positioning that discipline in contrast to related fields of study. Since the research aim is closely related to the research object, different interpretations of the research object in current ecolinguistic studies also lead to different research aims and objectives for ecolinguistics.

For most studies which interpret ecology as symbolic ecology (e.g. Crystal, 2000; Cun and Zhang, 2016; Wang and Liu, 2017), the research aim is to maintain a healthy symbolic

ecology, i.e., to protect and promote language diversity through the methods of descriptive linguistics for investigating the lexis and grammars of endangered languages. By contrast, for most studies that examine the sociocultural ecology of language, the aim is to clarify the sociocultural impacts on language acquisition by applying various theories from other disciplines, such as Bakhtinian dialogism (e.g. Fettes, 2003), or through the integration of a range of theories (e.g. van Lier, 2002). Other studies in this area pursue the practical aim of developing language policy for the benefit of multilingual communities by exploring sociocultural influences on such multilingual communities (e.g. Feng, 2013). As important as such endeavours are, they do not in themselves equip ecolinguistics with a distinct research object of its own. Further, merely applying concepts from the discipline of ecology to reinterpret the interaction between languages, the relationship between language and sociocultural structures, or the relationship between language and cognition, without redefining the research object, research aim, or research methods does not suffice to make a new field of study. As Finke (2014: 81) points out: “if ecolinguistics does not intend to innovate methods and concepts, [...] the linguistic mainstream will take it as mere expression of a popular spirit.”

In contrast, the strand of ecolinguistics that takes language and natural ecology as its research object *does* contribute to a new research area, with different aims and research methods across the range of its approaches. Such approaches aim to expose ecologically damaging language and promote ecologically beneficial language by analysing language patterns in discourse through the method of Ecological Discourse Analysis (EDA, cf. Stibbe, 2015; Huang and Zhao, 2019), by analysing expressions in text types such as media discourse (e.g. Penz, 2018), or by critically analysing experience as construed by grammatical structures in language systems (e.g. Halliday, 2001; Goatly, 1996). Some studies aim at exploring how the natural ecology is represented in language through the traditional methods of descriptive linguistics, such as analysing “diachronic and synchronic data respectively from written and personal sources” (Nash and Mühlhäusler, 2014: 33). Other studies take sociocultural contexts into account and aim at promoting language patterns beneficial for both natural ecology and social ecology by analysing discourse through methods such as deixis analysis (Bang and Døør, 2007) and Harmonious Discourse Analysis (HDA, cf. Huang, 2016, 2017; Huang and Zhao, 2019).

In these pursuits, we find the main force contributing to a new discipline of ecolinguistics. The interpretation of language-ecology relationship, and the concomitant research aims and research methods in this strand are the key factors that determine the development and positioning of this new field of study. Accordingly, examining the research aims in these studies provides a better understanding of the potential for ecolinguistics as a genuinely new field of study.

In light of the research aims, the methods used in these approaches are applied to investigating language patterns in discourse (such as in deixis analysis, EDA and HDA), identifying the grammatical features of certain text types and grammatical structures of a language (in analysis of how language construes our experience of the natural ecology) or describing the structural and lexical aspects of the language system (in investigating how the natural ecology is represented in language). In all of these methods, language is studied by approaching different levels of the language system as conceptualised in current linguistic

theorizing.

In comparing all these ecolinguistic approaches from the viewpoint of their research aims and methods, only those approaches that relate language to the natural ecology have the potential to contribute to a new research area in linguistics. However, even within these approaches one rarely finds significant innovations in research methods that would lead us to a new definition of the language-ecology relation as research objects.

In contrast, recent studies in the framework of DLP have in fact investigated the relationship between language and the ecology in ways that significantly change our understanding of language. As most of these studies have not been carried out under the label of ecolinguistics (for exceptions, see Cowley, 2014; Kravchenko 2016; Steffensen and Fill, 2014), they are rarely included in overviews of the field of ecolinguistics, but they seem to have the potential of catalysing a “radical” turn in ecolinguistics (Cowley, 2017; Steffensen and Cowley, in press), which may lead to new topics and methodologies in ecolinguistics. A naturalized view of language from DLP will be presented in the next section.

3. The naturalized view of language in the distributed language perspective

According to Steffensen (2015), the DLP framework originated with Love’s (2004) observation on the parallels between distributed cognition (Hutchins, 1995, 2014) and integrational linguistics (Harris, 1981, 1997). Although there are still disputes among scholars as to the connotations of some of the concepts in this newly emerging perspective, from current research on DLP we can see a general trend in DLP research towards adopting the principle of “non-locality” (Steffensen and Cowley, 2010; Steffensen, 2015). DLP brings distributed cognition together with integrational linguistics by regarding language as multi-scalar and multi-logical, and hence irreducible to the view that language is a code-system for exchanging messages through communication. Taking languaging as human activity that is influenced by multiple causal frameworks on multiple timescales, DLP scholars argue that human organism-environment systems (Järvillehto, 1998, 2009) are “extended” by language, that is, our situated here-and-now activities are transformed and empowered by our access to sociocultural resources, which has had drastic consequences for all ecological systems on Earth. In the following three subsections, we will display how DLP leads to a naturalized view of language by summarizing three viewpoints on language as shown in DLP. Then, in Section 4 we will outline the implications of a distributed perspective for ecolinguistics.

3.1 Language as full-bodied activity

Saussure’s separation of *langue* from *parole* and synchronic perspectives from diachronic perspectives has had a profound influence on linguistics. Under this influence, many schools of linguistics approach languages as synchronic codes. In contrast to this code view of language in linguistics (cf. Kravchenko, 2016), DLP adopts Love’s (1990, 2004, 2017) distinction between first-order language activity (or languaging) and second-order constructs in order to avoid the conflation of dynamic languaging with the description of it. In this way, DLP refutes the code view of reducing language to a set of symbols and treats language as

both dynamic and symbolic, or “symbiotic” (Cowley, 2011b; Cowley and Steffensen, 2015).

In DLP the dynamic aspect of language is demonstrated through both empirical work and theoretical reasoning showing how symbols emerge from dynamic human interactions. Empirically, Cowley (2003, 2005, 2006) examines how language develops in human infants and early childhood in the process of coordinating with caretakers. It shows that people notice recurrent patterns perceived in utterances and that by doing so, they are able to “hear words”, make “repetitions” of utterances and collaborate with each other, which is a process of “taking a language stance” (Cowley, 2011c). The perceived sameness in utterance carries over into written patterns as representing spoken language. Through theoretical deduction, Rączaszek-Leonardi (2011) also demonstrates the inextricability of symbols and dynamics in language. Based on Pattee’s framework (1972, 1982, 1997), Rączaszek-Leonardi argues that symbols arise as constraints on dynamic processes and that symbols cannot be abstracted from the meshwork in which they have evolved. Steffensen and Harvey (2018) further argue that Rączaszek-Leonardi’s (2011) “symbols-as-constraints” view is “best approached as part of an interactivity-based model of organism-environment system” (p.2), which further illustrates the ecological basis of linguistic meaning.

The theoretical inextricability of symbols and dynamics in language sheds new light on the nature of language and stimulates a rethinking of the code view of language. DLP scholars have exposed several problems associated with the code view. One of these problems is that the code view impedes our understanding of the biological and dynamic nature of language (cf. Cowley, 2011b), as it reduces language to sets of fixed symbols and neglects the aspect of whole-bodied interaction. Thibault (2017: 76) argues that “linguaging is not reducible to acoustic, auditory, and articulatory dynamics”. The concept of wordings (or verbal patterns) is regarded in DLP as a type of virtual “second order constraints” (cf. Cowley, 2011a). Heusden (2011) further shows that the code view fails to explain “the two related peculiarities of human culture: interpretation and creativity” (p.120). Heusden illustrates that it is the double processing of the stable patterns and the changing dynamics in real-time occurrences that build “the grounding of the *condition humaine*” (ibid.). Thus the mechanical code view of mapping meanings to forms can neither explain the nature of language nor the nature of human culture.

Refuting the code view of language, many DLP scholars have striven to show the dynamic nature of language. Through a series of empirical studies, Cowley (1994, 1998), Johnstone (1996), Goodwin (2002), Steffensen et al. (2010), and Steffensen (2013) have shown that gestures, vocalisations, posture and other subtle behaviours function in coordination with verbal patterns. As they have been found to play a significant part in sense-making, DLP demonstrates that the whole human body participates in languaging, treating language as “full-bodied human coordination” (Cowley, 2011b: 186). Thus, DLP shows that it is not the “mind” that stores “stable” grammar for the so-called language system and releases it in use. By taking language as fully embodied coordination, DLP calls attention to the behavioural dynamics neglected in linguistic studies that regard language as symbols or systems. By emphasising how languaging (to differing degrees) is a constituent of behaviour in a given environment, DLP sheds new light on the ecological nature of language.

3.2 Language as multi-scalar

Based on empirical studies of how infants behave while their caregivers are “linguaging” with them, Cowley (2006: 112) finds that “culture-specific dynamics are already of indexical value *for the baby*” before the baby can produce an utterance. Cowley thus argues that infants learn about appropriate behaviour by becoming sensitized to the sociocultural norms that are formed on slow timescales in the history of their community. By tracing the origin of language ontogenetically, Cowley argues that for human infants linguaging happens in a multi-scalar way (cf. Steffensen and Harvey 2018). Thibault (2011) further illustrates how first-order language activities gradually lead to the emergence of second-order language patterns, which appear in the form of lexicogrammatical patterns and serve to guide and constrain first-order linguaging.¹

By taking language as first-order linguaging constrained by second-order language, DLP regards language as linking multiple timescales in the here-and-now: language happens across different groups of people and artefacts on multiple timescales, using modes of communication formed and evolved on relatively slow timescales as the community as a whole exploits the dynamics of linguaging to organize various kinds of social activities, solve problems, and realize values (cf. Cowley, 2011a). By viewing language as taking place on multiple timescales, the DLP avoids the “blind alley” (cf. Love 2017) problem in integrational linguistics that regards the analysis of language activity as solely approachable by the agents themselves in the immediate context of the language activity. Rather, in DLP language is regarded as both collective and individual.

Apart from the rapid timescales of real-time biological agency, and the slow timescales of sociocultural norms, patterns and values, other timescales involved in language are explored and examined in recent theoretical and empirical research on DLP (e.g., Pedersen and Steffensen, 2014; Steffensen and Pedersen, 2014; Uryu, Steffensen and Kramsch, 2014; Cowley and Steffensen, 2015; Loaiza, Trasmundi and Steffensen, submitted). To address the temporal dynamics of language, Steffensen and Pedersen (2014) propose an ecological model of temporal ranges and timescales (see Figure 1). This model presents a heuristic for exploring how “participants in dialogical systems recruit sociocultural resources in non-linear and unpredictable ways” (Steffensen and Pedersen, 2014: 95).

¹ As pointed out by one of the reviewers, the term ‘first-order linguaging’ seems to imply that there is ‘second-order linguaging’. The distinction originally comes from Nigel Love’s (1990, 2017) work who distinguished between the activity of engaging in vocalising, scripting, or trace-making behaviour (“first-order”) and the descriptions of such activities in terms of “a language” or “a grammar” (“second-order”). In DLP, a similar distinction is made between ‘linguaging’ (i.e., the activity) and ‘language’ (the slow lexicogrammatical patterns that are widely considered as the grammatical core that enables us to engage in linguaging). The reviewer is right in pointing out that it is a pleonasm, then, to distinguish between ‘first-order linguaging’ and ‘second-order linguaging’. However, as it has become a norm in the literature (see in particular, Thibault, 2011), we have decided to stick to this terminological distinction.

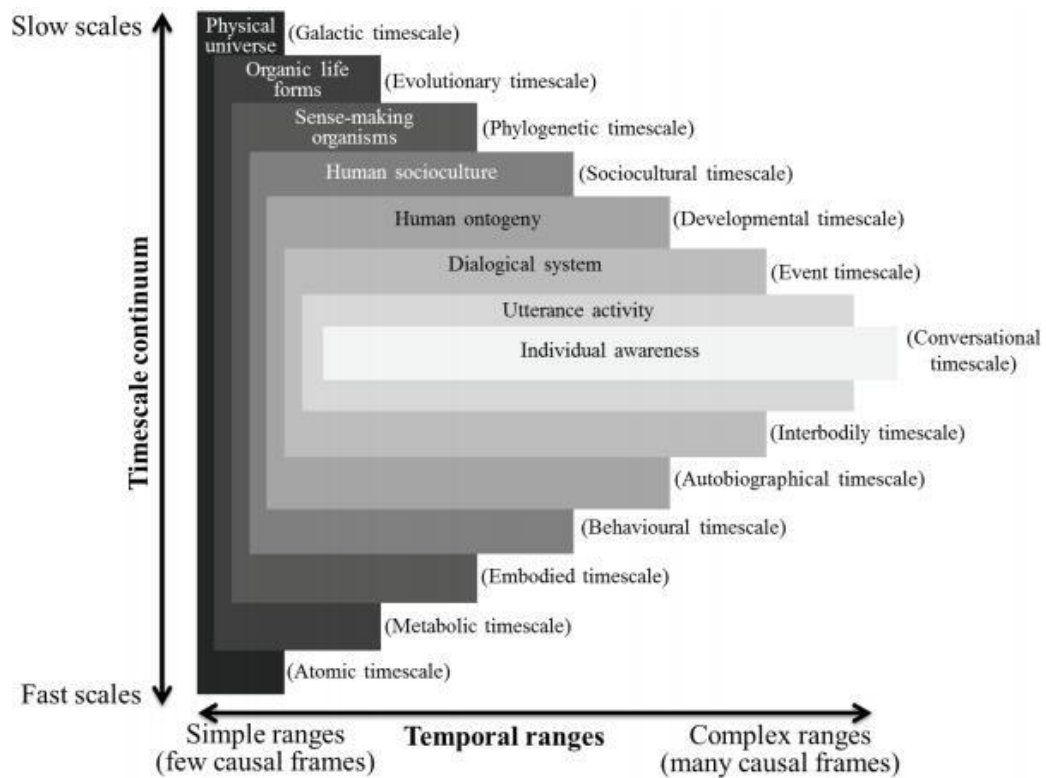


Figure 1. The temporality model proposed in Steffensen and Pedersen (2014)

By adopting this model, multiple causal frames in languaging can be examined within an integrative framework of temporal ranges and timescales. In this way, DLP avoids the problem found in various linguistic approaches of ascribing language to one single causal frame, or of applying various methods without integrating them into a consistent and resilient framework. At the same time, such a model has also proved to be empirically revealing in the practice of cognitive event analysis (e.g., Pedersen and Steffensen, 2014; Trasmundi and Steffensen, 2016).

In addition, Steffensen and Pedersen (2014: 95) draw attention to one significant aspect of DLP in pointing out that “the ecological model of time emphasizes an ecosystemic view on how organisms relate to their environment”. DLP takes an ecosystemic view (Järvilehto, 1998, 2009) to account for how languaging (constrained by second-order language) reconfigures the organism-environment system. This organism-environment system view claims that organism and environment should be treated as inseparable, as only representing different poles within the organism-environment system. By placing language in an organism-environment system, DLP is able to break with the dualistic tendency of contrasting subject with object, observer with observed, and mind with world. Therefore, from the DLP perspective, language cannot be objectively described as something *sui generis* but is rather regarded as a “meshwork” (Steffensen, Thibault and Cowley, 2010; Cowley, 2011; Thibault, 2011; Steffensen, 2015) unfolding on multiple timescales in the organism-environment system, that is, as a result of multiple causal frames operating in the whole organism-environment system.

3.3 Language in an extended ecology

Approaching language as multi-scalar and multi-logical, DLP further explores the role language plays in human cognition, which relates to how human beings exhibit intelligent behaviour as they make their way in the world. In approaching the relationship between language and cognition, DLP adopts the tenets of the “4E cognition” framework (e.g. Clark, 2008; Chemero, 2011) developed in recent cognitive science. On so-called 4E views, cognition is Embedded, Enacted, Extended and Embodied. Using this framework, DLP is able to discard earlier “3I” models of language and cognition, which regard language and cognition as Individual, Internal and Instrumental (cf. Steffensen 2015). Applying the 4E model to linguistic cognition, Steffensen (2011) develops a radical ecological view of language in proposing the Extended Ecology Hypothesis (EEH).

As is discussed in the previous section, DLP regards language as a complex process unfolding on multiple timescales. Thus, from a distributed perspective, human beings are able to exploit the sociocultural resources of second-order language formed on the slow timescales. In this way, language stabilizes social coordination and enables human cognition to function more efficiently, as observed by Steffensen (2011, p. 201):

We can take advantage of our ancestors’ experientially developed ways of coping with their everyday existence. We normally rely on their experiences as these are compressed in verbal patterns: we trustfully rely on the “wet paint” sign, allowing our behaviour to be shaped by the arduous lessons of our forefathers.

Therefore, through languaging, human agents are able to coordinate with each other by integrating sociocultural norms and values in their first-order languaging. In this way, the human agents in languaging align their perspectives in real time, thus creating powerful supra-individual activity systems (Goodwin, 1994). Empirical studies of human interactivity conducted within DLP (e.g., Pedersen, 2010, 2012; Steffensen et al., 2010; Steffensen, 2013; Steffensen and Pedersen, 2014; Jensen, 2018; Trasmundi and Harvey, 2018) also demonstrate that second-order language enables human beings to efficiently extend the ecology by exploiting collective cognitive resources such as categorizations and simulations.

Steffensen’s (2013) study of human problem-solving in the wild, using the method of Cognitive Event Analysis (CEA) further shows that second-order language (deictic markers, in this case) helps the cognitive agents co-orient to an unfamiliar perspective and reframe a workplace problem, leading to a creative solution of the problem. At the same time, this study also found that nonverbal dynamics in first-order languaging (such as shifts in gaze) work together with elements in the environment and second-order language to bring forth insights in problem-solving. Such empirical studies show that it is not language, the agent, or any single part of the system that does the cognition and languaging, but the entire language-extended organism-environment system. By exploring language in cognition, DLP displays how language enables human agents to coordinate observations, feelings, and activities. It is thus a powerful hypothesis as to how language works in the organism-environment system.

3.4 Summary of the naturalized view of language in DLP

By prioritizing first-order, whole-bodied languaging, rather than second-order language, DLP grounds language in the human body and the immediate environment. Through viewing language as multi-scalar and multi-logical, DLP further relates language to physical processes, biological processes and sociocultural processes unfolding on multiple timescales in the organism-environment system, thus adopting a naturalized view of language, where language is regarded as an important part of nature and as governed by multiple causal frames. DLP thus illustrates that the study of language cannot be reduced to just one single causal frame and should be approached from the entire organism-environment system.

By exploring the relationship between language and cognition, DLP further demonstrates that language is part of the *bio-ecology*. The term “bio-ecology” comes from Clements and Shelford (1939), and to Cowley it refers to “the domain of plant-animal-human-culture formations” (Cowley, 2014: 60), shaped by “particular living organisms with temporalities and the contingencies of a place: a bio-ecology is an entangled world of co-existence and events” (Cowley, 2018). The term points to a biocentric one-system view (unlike organism-environment system that centres on an organism), but at the same time the emphasis on contingencies and particularities is at odds with how the traditional 3rd person science of ecology models bio-ecologies as “ecosystems” in a fashion that “remains true to the dualist tradition and thus is primarily preoccupied with the purely physicochemical interplay of animals and plants” (Hoffmeyer, 1997: 143; quoted after Cowley, 2018). Through empirical studies on the human cognitive ecology, DLP illustrates how first-order languaging and second-order language shape human cognition. Thus, DLP establishes a rationale for studying the impacts of language on the bio-ecology, by way of human agents and their cognition. In conclusion, DLP proposes a naturalized view of language that sheds new lights on the relationship between language and ecology, both ontologically and epistemologically, contributing to a new perspective for ecolinguistics.

4. Applying DLP to Ecolinguistics

Some scholars, for instance Cowley (2014), Kravchenko (2016), Steffensen and Fill (2014), Steffensen (2018), and Steffensen and Cowley (submitted) have applied DLP to ecolinguistics, both to discuss theoretical problems in ecolinguistics and to propose solutions to these problems. However, as we noted before, discussing research approaches to ecolinguistics without defining the domain of ecolinguistics is problematic. In Section 2, we warned against defining ecolinguistics as a branch of linguistics simply based on what scholars evoking the label of “ecolinguistics” or “language ecology” have presupposed as their research object, aims and methodology. However, our discussion in Section 3 of a naturalized view of language within the framework of DLP shows that DLP has genuinely been able to foster a new perspective on the research object of ecolinguistics.

The naturalized view of language provides a new perspective for viewing the research object of language and bio-ecology in ecolinguistics. By viewing first-order languaging as whole-bodied activity, and by taking language as unfolding on multiple timescales governed by multiple causal frames in the organism-environment system, the naturalized view of language illustrates that language is ontologically a part of the bio-ecology. Such a naturalized view of language focuses on how language affects the macro-scale bio-ecology through

constraining the speakers' everyday microecological existence (cf. Steffensen, 2018). Therefore, rather than treating language and ecology as two independent domains and then building a relationship between them, as Fill (2001) suggests, DLP *unites* language with ecology and regards them as inseparable from each other, contributing to a new understanding of the nature of language and ecology. This naturalized view of language leads to a new understanding of the nature of language, giving rise to epistemological and pragmatic explorations of language in relation to the bio-ecology, approaches which broaden the domain of ecolinguistics and leads to a necessary change in its definition and positioning.

The following subsections will provide a reassessment of ecolinguistics under this new understanding of ecolinguistics, with the aim of providing a new perspective on the future development of the field.

4.1 How language influences the bio-ecology

DLP's naturalized view of language has demonstrated that language is ontologically a part of the bio-ecology. In this subsection, we will look at how language as part of bio-ecology influences the entire bio-ecology, and in Section 4.2, we will go on to discuss the complementary perspective of how the bio-ecology influences language.

Many ecolinguistic studies, for instance Goatly (1996), Halliday (2001), Stibbe (2015), and Huang and Chen (2016), have explored linguistic features in discourse and grammar that have had harmful influences on the bio-ecology. However, as pointed out by Steffensen (2018), models accounting for the mechanisms by which language influences the bio-ecology are rare in ecolinguistics. For instance, most studies carried out within the framework of Ecological Discourse Analysis focus on judging whether the language features of the discourse are ecologically beneficial or ecologically destructive in terms of how nature is represented, holding the assumption that such linguistic features affect the bio-ecology simply through their representation of nature. Yet, as Steffensen (2018) points out in relation to Shultz's (2001), Penman's (2001), and Halliday's (2001) models of how language and ecology connect, in most cases the mechanism by which the linguistic representation of nature influences people's behaviour is neglected.

A prominent example is Halliday's (2001) article, "New ways of meaning" (originally given as a keynote talk in 1990), which has been highly influential in ecolinguistics. In this article, Halliday critiques the negative ecological influences of English grammar based on the assumption that grammar is "a theory that is born of action, and therefore serves as a guide to action" (p.195). An illustration of this model can be found in Halliday and Matthiessen (1999), in which, as in many such ecolinguistic accounts, the implicit theoretical premise is to analyse how second-order language influences the ecology. This model sees human experience as construed by the grammar, and regards language as realized by the "neural networks" of the brain, "constantly being modified through ongoing exchanges with its environment" (Halliday and Matthiessen, 1999: 606-607).

Viewed from a DLP, this model reduces our knowledge of environmental reality to the second-order language, either on the semantic level of "environmental matter" in talking, or on the grammatical level. At the same time, Halliday and Matthiessen's (1999) explanation of the mechanism of how grammar affects ecology reduces language to second-order language

realized in the brain, which presumes a problematic mechanical view of language and cognition, preventing this model from recognizing the dynamics of the organism-environment system in languaging. Here we argue that the naturalized view of language taken by DLP provides two new insights into the mechanisms of how language influences the bio-ecology: the first focuses on how language influences the bio-ecology in here-and-now languaging, and the other focuses on how language influences the bio-ecology on slower timescales.

First, taking the bio-ecology as both “the system in action” and as “an object that emerges as the result of this action” (Cowley, 2014: 69), we argue that first-order languaging influences the bio-ecology in two ways. On the one hand, first-order languaging is an inescapable part of human activity in bio-ecologies. Thus, as languaging partakes in human activity, it exerts here-and-now dynamic influences on the plant-animal-human-culture formations. On the other hand, because first-order languaging stabilises human organism-environment relations, it also exerts long-term influences, both on an individual level and on a population level. Basically, today’s first-order languaging shapes tomorrow’s bio-ecologies by shaping human agents, their social relations, and the physical environment. Thus, tomorrow’s plant-animal-human-culture formations emerge under the influence of how first-order languaging shapes various activities today. Thus, as agents are active parts of bio-ecologies, their first-order languaging enables them to coordinate their lives as part of the bio-ecology. Through such processes, “language makes us what we are” (Cowley, 2014: 69). But language does more than influence human beings, it affects the entire bio-ecology. For instance, empirical studies on human interactivity (e.g. Steffensen, 2013) have illustrated how the human agents solve their workplace problem in first-order languaging, showing how entire plant-animal-human-culture formations are shaped by and in languaging.

Second, the Extended Ecology Hypothesis (EEH) proposed in Steffensen (2011) accounts for the causal mechanism between second-order language and the bio-ecology by demonstrating how second-order language is a sociocultural resource for human agents. Thus, second-order language, mediated and aggregated by generations of human agents, will have a lasting impact on the bio-ecology. An understanding of this causal mechanism is urgently needed for many pragmatic ecolinguistic studies on the ecological impacts of discourses and grammars. EEH explains the mechanism of how second-order language impacts cognition firstly by illustrating how the “phenomenologically stabilized patterns of languaging” (Steffensen, 2011: 194), lasting beyond an individual’s lifetime, functions as a perceptual tool that allows for specific behavioural patterns in the bio-ecology (cf. van den Herik, 2018). A recent study by Luardini et al. (2019) shows that the Dayak Ngaju language, with the embedded social-cultural values, helps to “motivate efforts to preserve plants that can continue to play a useful role in the life of the community” (Luardini et al., 2019: 78). In this respect, second-order language is on a par with epistemic artefacts and material structures which guide cognitive agents embedded in dialogical and social systems. EEH further explains this mechanism by relating second-order language to first-order languaging in cognition, claiming that “language provides an extended ecology within which human cognizers engage in languaging” (Steffensen, 2011: 188). According to EEH, language unfolds in organism-environment-systems where human agents become each other’s environment, and in this way language provides an extended ecology for human cognitive agents. Thus, the EEH provides an explanatory model of the relation between language and

the bio-ecology by showing the mechanism of how language shapes human cognition. In this way, it provides a strong rationale for conducting research on exploring how language influences the bio-ecology through human cognition and human behaviour.

Accordingly, the naturalized view of DLP accounts for the mechanisms of how language influences the bio-ecology by seeing language as extending the bio-ecology. From the DLP perspective, research into how language influences the bio-ecology can be conducted into all aspects of the language-bio-ecology relationship. More research is needed to explore the nature of language as part of the bio-ecology and to explore the immediate influences of languaging on the organism-environment system. At the same time, more research is needed to develop the EEH. Among the above claims as to how first-order languaging and second language extends ecology, one is based on experiments, while two others are theoretical hypotheses proposed either in order to improve another theory or by metaphorical comparison. Thus, these claims still need to be tested in empirical work. Some recent studies on problem-solving cases through the method of Cognitive Event Analysis or CEA (e.g., Pedersen and Steffensen, 2014; Steffensen and Pedersen, 2014; Uryu, Steffensen and Kramsch, 2014; Cowley and Steffensen, 2015) support the view that language extends the human ecology by influencing people's perception and behaviour in nature. More empirical work in areas explicitly related to the bio-ecology is needed to further examine these mechanisms.

4.2 How the bio-ecology influences language

While many studies in ecolinguistics are preoccupied with the impact of language on the bio-ecology, studies on how the bio-ecology influences language are rare in contemporary ecolinguistics. Inspired by the naturalized view of language in DLP, we propose that the mechanism of how the bio-ecology influences language should be approached from two dimensions on the language side, i.e., how the bio-ecology influences first-order languaging and how the bio-ecology influences second-order language.

The mechanism of how the bio-ecology influences first-order languaging can be explored by understanding the bio-ecology as “the system in action” (Cowley, 2014: 69). Different processes involved in languaging in “the system in action” can be investigated by approaching different timescales using the temporality model presented in Steffensen and Pedersen (2014). Applying this model to explore the bio-ecological influences on languaging, we can start by examining the bio-ecological processes unfolding on different timescales in languaging. Taking Steffensen's (2013) problem-solving case as an example, we can explore how the bio-ecology influences first-order languaging by approaching the event timescale (Steffensen and Pedersen, 2014). Thus, we can examine observable processes taking place in an organism-environment system where human agents are engaged in solving mundane, everyday problems. By doing so, we can start illuminating how bio-ecological dynamics influence first-order languaging during a single event.

The mechanism of how the bio-ecology influences second-order language can be approached by examining the bio-ecological impacts on the virtual representations contained in second-order language, e.g. in terms of phonetics, lexis, grammar, and semantics, respectively. In contrast to the study of bio-ecological influences on first-order languaging,

bio-ecological influences on second-order language unfold on slow timescales and are not directly observable. However, the causal mechanism between the bio-ecology and first-order languaging may serve as a reference in predicting the causal mechanism between the bio-ecology and second-order language, although not all bio-ecological influences on first-order languaging would persist in second-order language. Thus, the causal mechanism between the bio-ecology and second-order language can only be approached by making and testing hypotheses that would require knowledge of both bio-ecology and language.

There have already been instances of cooperation between biologists and linguists in approaching the topic of bio-ecological influences on second-order language. Certain methods in biological studies have contributed to this field of study: for example, quantitative phylogenetic methods used in biological studies have recently been “applied to linguistic data to elucidate the evolutionary history of language families” (Honkola et al., 2013). In the study of Uralic languages, for instance, Honkola et al. (2013) apply two models for evolution studies in biology, the Red Queen model and the Court Jester model, to examine the divergence within the Uralic language family. These models represent two ways of viewing evolution as applied in evolution studies on different timescales (e.g. Benton, 2009). The Red Queen model (Van Valen, 1973) takes evolution as primarily caused by competition between species; while the Court Jester model (Barnosky, 2001) takes the major changes in organisms and environment as primarily caused by unpredictable changes in the physical environment. By applying the Red Queen model to study biological influences on evolutionary change on “short temporal scales” (Honkola et al., 2013: 1244), and the Court Jester model to study influences of the physical environment “more dominant at larger scales in terms of both space and time” (ibid.), researchers have found that the decline in temperature in the transition period between the Lyalovo culture and the Volosovo culture resulted in lowered carrying capacities for hunter-gatherer populations and led to migration and hence divergence in Proto-Uralic. This research provides an exemplar of cross-disciplinary research on how the bio-ecology influences language evolution. Further research is needed to explore the bio-ecological influences on language evolution in other environments.

In addition to approaching the mechanisms of how bio-ecology influences language evolution, studies can also be conducted to explore the bio-ecological influences on different aspects of second-order language. For example, Everett et al. (2016) demonstrate how the sound systems in human language are adapted to the physical ecology by exploring the relationship between tones of languages in different areas and the air humidity in the environment. In terms of lexis, Nash and Mühlhäusler (2014) demonstrate from their years of empirical work how the social and natural environment influences the lexicon of the languages spoken on Pitcairn and Norfolk Island in how fish, people, and places are named in these languages.

Studies on the mechanisms of how the bio-ecology influences language have just begun emerging and further studies are needed to explore these mechanisms in detail. Detailed observations and analyses of different languaging activities are needed to achieve a comprehensive understanding of the bio-ecological influences on language. Explorations of the bio-ecological influences on different aspects of second-order language in various language communities are needed for understanding the mechanism involved in second-order language. To pursue such a research agenda, cooperation between linguistics and other

disciplines in making and testing hypotheses is needed. For instance, the predicted relationship between language tonality and air humidity made in Everett et al.'s (2016) study is based on findings in laryngology, which has the potential to be tested collaboratively by scientists in the fields of anthropology, linguistic and cultural evolution, human history, language and cognition, and psycholinguistics.

5. Conclusion

Although the field of ecolinguistics has developed rapidly, with various approaches generating a range of different research questions, there is still not a single definition of ecolinguistics shared by all ecolinguists. We have summarized the current approaches to ecolinguistics in terms of their positioning of ecolinguistics, their research object, and their research aims and methods, in order to see to what extent current ecolinguistic studies may be understood as contributing to a new research field. We have found that while some of these studies have applied terminology from the discipline of ecology to language studies, and some have attempted to include the dimension of ecology in characterising lexis, grammar and discourse in language, none have genuinely contributed to a new understanding of the nature of language or ecology.

As Cowley (2017), Steffensen and Cowley (submitted) suggest, DLP can contribute to a kind of radical ecolinguistics. Applying a naturalized view of language to ecolinguistics suggests a new understanding of the research object of ecolinguistics, the multi-scalar bio-ecology, which includes first-order languaging and second-order language. Accordingly, this opens up the possibility of ecolinguistic research on the mechanisms of how language influences the bio-ecology and how the bio-ecology influences language. Research on how language influences the bio-ecology expands the research domain of the discipline of ecology by approaching the bio-ecology through human language. In this respect, ecolinguistics can be positioned as a branch of ecology that explores the bio-ecology from a human interactive-cognitive perspective. At the same time, the redefinition of language in ecolinguistics places language within the broader area of bio-ecology, allowing us to explore the nature of language, language development, and the relationship between language and the environment. In this respect, ecolinguistics can be positioned as an alternative to linguistics, an alternative that puts forward new methodologies in the language sciences.

The development of modern science requires collaborations between different scientific disciplines working across strict boundaries. Ecolinguistics is such a multidisciplinary research field emerging in line with this scientific trend. Multidisciplinary collaborations have the potential to promote the future development of ecolinguistics with new approaches and new methodologies.

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