ARTICLE IN PRESS

Language & Communication xxx (2013) xxx–xxx

Contents lists available at ScienceDirect

Language & Communication

journal homepage: www.elsevier.com/locate/langcom

Language as tool: The analogy to primate cognition

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ARTICLE INFO

Article history:
Available online xxxx

Keywords:
Prelinguistic cognition
Natural languages
Patterns of variation
Language typology
Reciprocal constructions
Tool use analogy

ABSTRACT

In this paper, I explore the classic notion of 'language as tool' in connection with cultural tool practices in great apes. By showing that patterns of variation in ape tool use (e.g., nut-cracking) are identical to cross-linguistic patterns of variation in grammatical marking (e.g., the expression of reciprocity), I present new evidence for the cultural hypothesis of language. I argue that if both types of behavior are of cultural origin, the underlying cognitive abilities must likewise be the same. In this way, the linguistic notion of language as tool gains clear indicators of cultural development *independently* of language, and moreover a model of cognition and learning from primate research which so far has been marginalized in the study of language.

1. Introduction

> *Why are there so many similarities between languages if each one is a tool for a specific culture? And what does is mean, finally, to say that language is a tool? Is this just a way of speaking? The last question answers them all.* Everett (2012: 5)

One conceptualization of language which has long been associated with the cultural hypothesis is the notion of language as a complex tool system. The Russian psychologist Lev Vygotsky was perhaps the first to make this notion popular among developmental psychologists and to point out the conspicuous parallels between tools for manipulating the physical environment and linguistic signs used for the purpose of communication (Vygotsky, 1978). Back then, however, modern branches of linguistics, such as field linguistics and language typology, had not yet emerged. The behavioral sciences, too, had not seen the cognitive turn yet, and disciplines such as field primatology and comparative psychology were still in the making. Nevertheless, the notion of language as a cultural tool has been kept alive in works by developmental psychologists as well as linguists (e.g., Miller and Hoogstra, 1992; Ingold, 1999; Duranti, 2011; Everett, 2012).

Although the 'language as tool' notion has been around for some time, it has never been juxtaposed to the notion of tool use from behavioral biology. Most attempts to establish the link between tools and language have been but interested in cultural behaviors performed within human societies (Vygotsky, 1978; Ingold, 1999; Dascal, 2002; Everett, 2012). However, if the interest lies with the cognitive foundations of language and their evolutionary history, we should associate the tool notion with genuinely prelinguistic behavior. Human behavior usually relies on language in one form or another; the consideration of prelinguistic behavior in nonhuman primates, on the other hand, provides us with the genuine opportunity to test the hypothesis that language performance and cultural practices of tool use share a common (phylogenetic) basis.

Based on Kuhle (2013), I present here a method of putting language use into analogy with prelinguistic behavior in great apes, such that we can gain a fairly concise model of general cognition and learning, which by way of analogy should also

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http://dx.doi.org/10.1016/j.langcom.2013.08.001

apply to language. The key for arriving at this *tool use analogy* lies in the cross-linguistic analysis of distinct grammatical features and its comparison with cross-group analyses of tool use behavior in great apes. In particular, what is being compared, is the *patterns of variation* characterizing both linguistic and prelinguistic forms of behavior. In both cases, the same 'patterns' of structural and functional variation are discernible, so that in both cases, too, only cultural development can explain their emergence. It can thereby be demonstrated that what linguists and primatologists discern in their respective objects of study as evidence for the cultural hypothesis are based on precisely the same criteria for cultural development. By being able to construct this analogy on the behavioral level, it is only consistent to conclude that the same analogy should persist on the cognitive level. In this way, the cultural hypothesis *of language* gains a concrete model of cognition and behavior from primate research, whose significance for human cultural behavior has so far been marginalized in the study of language.

In the sections below, I proceed as follows. In Section 2, I focus on past and contemporary research concerned with tool use behavior in great apes (chimpanzees). In Section 2.1, I summarize the seminal work by W. Köhler, which laid the foundation for the model of learning still associated with tool use today. In Section 2.2, the critical debate about social learning in nonhuman primates is taken into consideration. In Section 2.3, the previously discussed research on tool use acquisition is complemented by field research on wild-living apes, which has uncovered a considerable amount of cross-group variation in tool use behavior. By focusing on a single domain of tool use, so-called nut-cracking behavior, we will be able to illustrate what primatologists identify as indicators of cultural development. In Section 3, I turn to patterns of variation in language use. In order to illustrate my point, I focus on a concrete grammatical phenomenon, the reciprocal construction, which has been studied intensively in both language-specific and cross-linguistic perspective. In Section 3.1, I briefly introduce the reciprocal construction as an object of study. Subsequently, in Section 3.2, I outline the dimensions of structural and functional variation characterizing reciprocals in cross-linguistic perspective. In order to facilitate the transition from language to prelinguistic behavior, I will identify and label the *tool characteristics* of this type of construction. Section 4 summarizes and concludes the major insights to be gained from this transdisciplinary analysis for the study of language. Section 5 briefly concludes the intended contribution of the tool use analogy.

2. Tool use in great apes

Before turning to research on wild-living apes (*Pan troglodytes*) in Section 2.3, we consider the study of tool use acquisition in captive chimpanzees (Sections 2.1 and 2.2). Not only did such research predate research in the field, it also first clarified the specific type of learning involved in the acquisition of simple and more complex forms of tool use – thereby making such behavior of special interest for speculations about the phylogenetic origins of human rational thought and behavior. Before, however, let me briefly clarify two points: the definition of tool use and the specific aim of this investigation regarding language. Tool use is broadly defined here as behavior consisting of arbitrary, context-dependent combinations of elements of behavior, each of which may be voluntarily controlled by the acting individual, and which serve as instrumental (manipulative) means to overcome nontrivial environmental problems in pursuit of individual, subjective goals. Such behavior may or may not involve material objects as functional extensions of the body (Köhler, 1925; Byrne and Russon, 1998; Whiten et al., 2004), providing the individual with more as well as new possibilities to interact with its environment. Crucially, such behavior is based on intentional goal orientations in the acting individual. The significance of the learning process involved in this type of behavior in regard to the subsequent discussion of language relates to the *specific form of acquisition* which may be clearly distinguished from other forms of learning. By showing, based on the relevant research, that the acquisition of prelinguistic tool use involves associations gained beyond trial and error, not to mention instinct, it is possible to identify *characteristic patterns of transfer* across the situations which then result in *patterns of distribution of behavior* specific only of functional tool use that has been acquired on this basis. It is such patterns of distribution which can then serve as behavioral indicators for a type of cognition which may also be involved in the acquisition and practice of natural languages. As I will concede in Section 2.2, the current debate around social learning in nonhuman primates and in particular the question of animal culture is complex and unresolved. Nevertheless, to make my point, I will bypass many finer details of this ongoing debate and focus only on those aspects of it which seem relevant to the consequences of the claimed analogy between patterns of variation in prelinguistic tool use and grammatical encoding across languages (Section 3).

2.1. Individual and context-dependent learning

Field primatology is still a relatively young discipline. Until the second half of the twentieth century, scientists knew more about the behavior of great apes held in captivity than they did under natural conditions. Some of the earliest and most comprehensive studies on *the mentality of great apes* were conducted by the German psychologist Wolfgang Köhler, who worked with a small group of captive chimpanzees on Tenerife between 1917 and 1920. He tested his apes in simple problem settings (food items out of reach), which often required complex manual skills or the employment of objects as material tools for solving them. Naïve individuals, who had no prior experience with such tools, could acquire such knowledge if exposed to simple enough problem settings, in which potential tool objects would be close at hand and physical obstacles not too difficult to be overcome. In this way, the chimpanzees could acquire simple forms of stick use, or learn how to use wooden boxes in order to gain access to things otherwise out of reach. Moreover, they were able to gradually extend and improve

Please cite this article in press as: Kuhle, A. Language as tool: The analogy to primate cognition. Lang. Commun. (2013), http://dx.doi.org/10.1016/j.langcom.2013.08.001