Language Sciences 54 (2016) 43–57

Contents lists available at ScienceDirect

Language Sciences

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

Linguistic modelling and the scientific enterprise

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ARTICLE INFO

Article history:
Received 26 September 2014
Received in revised form 5 August 2015
Accepted 22 October 2015
Available online 18 November 2015

Keywords:
Models
Science
Theoretical linguistics
Generative grammar
Linguistic methodology
Tense

ABSTRACT

In this paper, I critique a recent claim made by Stokhof and van Lambalgen (2011) (hereafter S&vL) that linguistics and science are at odds as to the models and constructions they employ. I argue that their distinction between abstractions and idealisations, the former belonging to the methodology of science and the latter to linguistics, is not a real one. I show that the majority of their arguments are flawed and evidence they cite misleading. Contrary to this distinction, I argue that linguistics, like some variants of the scientific enterprise, uses a *minimalist* method of idealisation (Weisberg, 2007b), one which includes abstractions (as defined by S&vL) and other idealisations not uncommon to scientific model-building. Finally, I offer an alternative account of the problems cited by S&vL as a direct result of the modelling choices of linguists as opposed to the methods they use to define such models. I do so through the use of the specific example of the treatment of tense and aspect in the mainstream literature.

1. Introduction

Modern linguistics, with the incorporation of methodology from formal logic and the mathematical sciences, has undergone a revolution in recent times. Multiple formalisations and models have been developed for natural language phenomena as diverse as the semantics of quantifier-phrases and the syntactic resolution of anaphora and ellipsis. Prior to this, natural languages were often assumed to be unsuitable for formal analysis (see Tarski, 1944) or suitable only for a taxonomic cataloguing of its structures (Bloomfield, 1936; Harris, 1951). Chomsky's groundbreaking *Syntactic Structures* (1957) changed that trajectory towards naturalism and arguably created a science of linguistics based around the core ideas of linguistic competence and generative grammar. However, the shift, aimed at isolating underlying biological or neurological structure, resulted in a movement which often disregarded the performance-based and social aspects of natural language use.[1]

In 'Abstractions and Idealisations: The Construction of Modern Linguistics' (2011), Stokhof and van Lambalgen (hereafter S&vL) use the above omission to challenge the notion that linguistic models (mostly of the generative tradition) are built-up in the same manner as those of the more general sciences such as physics and chemistry. They argue that while scientific inquiry uses abstractions as its core modelling method, linguistics incorporates a rather more dubious form of idealisation which fundamentally alters the object of inquiry.

In what follows, I dissect this proposed distinction between abstractions and idealisations and argue that it has no foundation in the philosophy or history of science. In accordance with Weisberg (2007b) on the varieties of idealisation in science, I argue that the linguistic enterprise can be cast as a form of minimalist idealisation which is inkeeping with the

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[1] For an attempted reconciliation of these views, see Clark (1996) in which language is seen as an emergent phenomenon linked to "joint activities".

http://dx.doi.org/10.1016/j.langsci.2015.10.002
0388-0001/

modelling conducted in physics, chemistry and biology. I then claim that although some of the problems listed by S&vL are indeed issues for modern linguistics, these issues do not spring from a flawed scientific methodology or model-building but rather from the specific modelling choices of the linguists responsible. Finally, I offer a sketch of this alternative way of viewing the genesis of certain problems in linguistics.

2. Abstractions versus idealisations

We will start by describing the view espoused by S&vL and what they hold to be its three central claims.

2.1. Abstractions

As theorists interested in an I-language (internal) as opposed to an E-language (external), we are ultimately aiming at discovering the biological reality of natural language. This agenda supposedly places our theoretical concerns within the remit of scientific endeavour. The tools of scientific modelling are thus justified as tools which could shed light on linguistic reality.

Abstraction is one means by which we remove (or ignore) factors deemed extraneous or too complex to a certain phenomenon and isolate the structures which we hope to investigate.

> Abstraction is a well-known tool for turning a natural phenomenon into a 'suitable' object of scientific investigation. Standard examples are the frictionless plane in classical mechanics, the perfect vacuum, pure chemical substances, and so on (S&vL, 2011: 5).

Thus, abstraction is a tool for simplifying or isolating the object of inquiry in such a way that it allows for theorising and often prediction. Another aspect highlighted by S&vL is that "the reality of the factors from which one abstracts, is never denied, and in principle the model is capable of incorporating them". This means that the unabstracted and the abstracted versions of the phenomenon are "conceptually as well as practically" linked.

How this connection is achieved in science, claim S&vL, is by the quantitative nature of the abstraction device (and the phenomena themselves). In lieu of neglecting the parameter over which one is abstracting, we neglect only its value (assign it a zero value in the model).[2] The example they cite is the concept of a perfect vacuum in which particle mass is abstracted over, yet mass itself is still an important aspect of the model. Thus, they claim that mass is still present in the model and therefore the ontology of the phenomenon is untouched. In model talk, we might say that the model and the target system have the same ontological commitments (we will come back to this). The notion of "undoing" the abstraction is pivotal here. This purported reversal of the abstraction is key to understanding that the parameter (mass, in this case) is still present in the model. Consider the concept of a perfect vacuum in physics. The values of the speed of light and the magnetic constant are determined in terms of an ideal space devoid of matter. In reality (and lab experiments) this perfect vacuum does not exist, this situation is what is known as a partial vacuum. The idea is that the relationship between a perfect and partial vacuum is one of symmetry and these concepts are thus interderivable.

Lastly, the motivation for this sort of abstraction is always methodological and practical, it is merely a tool for scientific investigation ("a means to an end" in their words). If we start with a perfect vacuum and wish to represent the data in less abstract terms, we merely re-insert the laboratory values.[3] Thus, we are not presented with any additional "epistemology burden" or need to explain the relationship between our models containing abstractions and the real world phenomenon we are describing with it.

2.2. Idealisations

Idealisations, according the S&vL, differ fundamentally from abstractions in nature, result and motivation. It must be mentioned that S&vL use "abstraction" exclusively to refer to scientific modeling procedures and "idealisation" for linguistics exclusively. Whereas abstractions concern the abstracting of quantitative parameters, idealisations involve ignoring qualitative aspects of the phenomena in question. The result of this difference is that after idealisation, the model no longer contains the phenomena which are idealised over. This constitutes an ontological shift between the model and the linguistic reality which it is supposed to model.

The main thrust for this argument seems to be that S&vL hold that by nature the sciences are more quantitative while the humanities (wherein they locate linguistics) are qualitative.

> One of the reasons that idealisation differs from abstraction is that whereas the objects of study in the natural sciences are defined (mainly) quantitatively, those of the humanities are (primarily) characterised in qualitative terms (10).

[2] It seems to me that here they hold a "semantic" notion of modelling in which models are set-theoretic entities representing the target system which include domains and sets of relations (or functions) over that domain. It is unclear how else "values" could be set to zero as they claim. See van Fraasen 1980 and Suppes 2002 for a detailed account of the semantic view.

[3] In fact, the "quality" of a given vacuum is usually determined by how close or far away it is in value from a perfect vacuum.