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On stage setting thought experiments in cognitive linguistics: A case study

Abstract
The paper raises the following problem: What is the structure and the function of stage setting thought experiments in cognitive linguistics? As a possible solution to this problem, the paper hypothesises that a stage setting thought experiment can be reconstructed as a process of plausible argumentation consisting of a series of plausible inferences which leads to the decision between alternative hypotheses. The solution to this problem suggested in the paper is exemplified by a case study which also shows in what respects a stage setting thought experiment in cognitive linguistics may fail.

1. Introduction[1]

I have been an admirer of Professor Wildgen's scientific achievement, his impressive erudition, his thought-provoking ideas and his multifaceted work from the very beginning of my career on up to the present day. Let me mention only two episodes. I received my MA in 1981 and at that time I was mainly interested in semiotics. During the search for a formal model of the linguistic sign, I came across Professor Wildgen's (1982) seminal book on catastrophe theoretic semantics, which inspired one of my first papers. More than two decades have passed and it was not until 2006 that I had the opportunity to invite him to Debrecen. In the course of his visit to my department we conducted stimulating discussions on many interesting topics, among others on foundational problems of cognitive linguistics and on his plan to write an introduction to cognitive linguistics (Wildgen 2008). The present paper is intended to be a modest contribution to the topics touched on in our conversations.

Current methodological discussions in cognitive linguistics focus on specific aspects of the *empiricalness* problem.[2] In the literature the

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demand for the more frequent use of experimental data and experimental methods is becoming ever stronger. Nevertheless, what experiments are and how they should be used in cognitive linguistics is anything but clarified. However, although the use of experiments has been one of the central novel topics in cognitive linguistics, that of thought experiments has not yet been focused on. Therefore, we will raise the issue of thought experiments in cognitive linguistics.

THOMASON (1991) discusses two kinds of thought experiments in linguistics: stage setting thought experiments and introspection.[3] By stage setting thought experiments, she means that the thought experiment *functions* as a first step in the *argumentation* in which it clarifies the theoretical issue:

> "In fact, the result of this sort of linguistic thought experiment is likely to be theory-dependent. The thought experiment will therefore not be a test of a hypothesis, but rather a stage-setting device that suggests tests that the linguist can carry out. In other words, the major role of the thought experiment is *to clarify the theoretical issue*, or to make it vivid, *as a first step in an argument*. Often the thought experiment *serves to get the audience's agreement in advance* about what would count as supporting evidence for the theory, even if that exact kind of evidence is not going to be forthcoming. The second step – and it is a necessary one if the argument is to be successful – is a demonstration that some real-world situation is sufficiently similar to the result of the thought experiment that other linguists will accept that situation as supporting evidence." (THOMASON 1991: 247-248; emphasis added)

Introspective thought experiments, however, have a different function:

> "Let us turn now to the other kind of linguistic thought experiment – *the kind that involves introspection*, by the linguist or by an informant (a native speaker of some language the linguist is investigating), about the appropriateness of a particular linguistic form or construction. Thought experiments of this type are *actual tests of hypotheses* about language structure." (THOMASON 1991: 252-253; emphasis added)

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[2] Although in general it is of vital importance to clarify the meaning of 'empirical', for the purpose of the present paper it will be sufficient to use it pre-explicatively: as intersubjective observability of events occurring in space and time. Relevant notions used pre-explicatively will be put within single quotation marks.

[3] To our knowledge, the first attempt to discuss the nature of thought experiments in linguistics in general is THOMASON (1991), and, independently of the latter, KERTÉSZ (2004b) in cognitive linguistics.

THOMASON discusses numerous examples from different fields of linguistics, but she does not raise the central problems tackled in the philosophical literature on thought experiments.

In the present paper we will narrow down our subject matter in three respects. Since, at first sight, stage setting and introspective thought experiments seem to be very different, both with respect to their structure and their function, and a unified account of them would not be a realistic objective, we have to analyse them separately. Here we will focus on *stage setting thought experiments*. Second, we will confine the discussion of the latter to *cognitive linguistics* only. Thus, we obtain the following problem:

(P) What is
  (a) the structure
  and
  (b) the function
  of stage setting thought experiments in cognitive linguistics?

Third, we will restrict our considerations to a *case study*.

In Section 2, starting from a brief overview of the difficulties which thought experiments pose for the philosophy of science, we sketch our own approach, which we expect to yield a possible solution to (P). So as to illustrate how it works, Section 3 is devoted to a simple case study. Finally, Section 4 will summarise our main findings.

2. On thought experiments

2.1. Overview

RESCHER (1991), SORENSEN (1992: 7ff.), KÜHNE (2005: 9), MOUE, MASAVETAS, & KARAYIANNI (2006), BUZZONI (2008), COHNITZ (2006) etc. are certainly right in emphasising that from the Pre-Socratics on thought experiments have been detected in many seminal contributions to human knowledge – in scientific research as well as in different subfields of philosophy.[4] As is well-known, thought experiments influenced some of the great scientific achievements of the twentieth century. Moreover, they are frequently used in cognitive science and its subfields (Cooper 1999). Also, in the philosophy of language and the philosophy of mind, heated discussions have been conducted on such famous thought experiments as Putnam's Twin Earth, Searle's Chinese Room or Mary the Colour-blind Scientist.

[4] There are a great number of studies analysing GALILEO's, EINSTEIN's, MAXWELL's, SCHRÖDINGER's etc. famous thought experiments. Instead of enumerating these studies here, let us refer to the detailed overviews e.g. in BROWN (1991), BUZZONI (2008), KÜHNE (2005), SORENSEN (1992).

Taking these facts for granted, at first sight it may be surprising that until recently, the structure and function of thought experiments have been a neglected topic in the philosophy of science. Although it is ERNST MACH who is generally considered to have realised their significance from the point of view of the philosophy of science, during the period of logical positivism thought experiments were beyond the interest of philosophers of science. That this was so is quite natural given the background assumptions of logical positivism (cf. MOUE, MASAVETAS, & KARAYIANNI 2006: 64 ff, KÜHNE 2005: 19 f., BUZZONI 2008: 12 ff). In particular, the latter presupposed REICHENBACH's distinction between the context of justification and the context of discovery. It focused on the context of justification in that it applied the method of rational reconstruction, whose objective was to justify established theories in the natural sciences (predominantly physical theories) primarily by revealing their logical structure. The context of discovery – and accordingly, the process of problem solving and the way individual scientists developed their ideas – was assumed to be obscure and was excluded from the domain of the philosophy of science.

However, from the 1960s on, with the fall of logical positivism, new tendencies in the philosophy of science emerged. First, among others, due to KUHN's (1970) work, the focus of interest was shifted from the abstract logical structure of theories to historical cases and, accordingly, the philosophy of science became more and more interested in the practice of scientific inquiry. Second, the context of discovery became integrated into the domain of the philosophy of science and its metascientific investigation ceased to be an illegitimate enterprise (NICKLES 1980). Therefore, third, the process of scientific problem solving became a serious research area for the philosophy of science as well.

These shifts of interest were accompanied by further new methodological developments in the philosophy of science. Certain new trends abandoned the method of rational reconstruction and applied methods rooted, for example, in artificial intelligence research, sociology, psychology and rhetoric – all examining aspects of scientific theory formation which had formerly not been allowed. Within these developments, thought experiments have been detected as an interesting and relevant topic.[5] What is it that makes them so interesting now?

The point is that thought experiments raise a puzzle closely related to their alleged evidential significance. The puzzle is variously labelled as "the paradox of thought experiments" (KÜHNE 2005: 25), or "KUHN's paradox" (HOROVITZ & MASSEY 1991: 1), or "the epistemological

[5] As MOUE, MASAVETAS & KARAYIANNI (2006: 62) concisely put it, one may "trace the 'career' of thought experiments from almost total disregard to the point where thought experiments have been seen as a prominent methodological tool for 'actual thinking'."

problem of thought experiments" (NORTON 2004: 44) etc. In HOROVITZ and MASSEY's words, "[…] thought experiments often have *novel empirical import* even though they are conducted entirely inside one's *head* […]" (HOROVITZ & MASSEY 1991: 1; emphasis added).[6] Accordingly, the puzzle – which we will call 'the basic problem of thought experiments' – can be formulated as follows: [7]

(1) *The basic problem of thought experiments:* How is it possible that thought experiments yield new 'empirical' information about the world, while they do not make use of 'empirical' information?

The problem in (1) challenges the very foundations of 'empirical' inquiry. On the one hand, it seems to be the case that thought experiments provide new information about the world. On the other hand, they achieve this by pure thought, without relying on experiences immediately, and without using 'empirical' data. If it is possible to prove new laws of nature by pure thought, for example in a way Galileo proved the law of gravitation and disproved the Aristotelian hypothesis of falling bodies, then real experiments based on 'empirical' data are superfluous. Thus, according to KÜHNE's (2005: 25) witty remark, the relevance of this problem is the provocation that the workability of thought experiments may lead to the substitution of the laboratory by the department of philosophy.

Therefore, now we are in a position to supplement (P) by (P')

(P') How does the structure of stage setting thought experiments make it possible that they yield new 'empirical' information about the object of cognitive linguistic research, while they do not make use of 'empirical' data?

Let us, as a first approximation, proceed by acknowledging the diversity of thought experiments. One way of capturing this diversity is to put forward the extreme position according to which it may be pointless to strive to define the notion of thought experiment at the outset. PEIJNENBURG & ATKINSON (2003: 306) hold the view according to which it is not necessary at all to state exactly what thought experiments are, because one can distinguish good and bad thought experiments even if they cannot be defined. BROWN (1991: 1) maintains that the only thing

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[6] The paradox was revealed by KUHN in this way: "How, […] relying upon familiar data, can thought experiment lead us to new knowledge or to new understanding of nature?" (KUHN 1977: 241).

[7] There is a rich variety of attempts to develop approaches to thought experiments which give different answers to this question. The relevant literature includes BROWN (1991), NORTON (2004), RESCHER (1991), GENDLER (1998), SORENSEN (1992), GOODING (1992), NERSESSIAN (1992), (1993), COOPER (1999) and (2005), KUHN (1964) etc. For overviews and discussion see MOUE, MASAVETAS & KARAYIANNI (2006), COHNITZ 2006 and BUZZONI (2008).

we may claim about thought experiments is that they are performed as a mental activity, but beyond this it is not possible to say more precisely what they are. KÜHNE (2005: 23-24) highlights their undefinability as well and mentions two features which all approaches attribute to thought experiments: there is a small number of examples from the history of physics and these examples demonstrate the workability, effectiveness and usefulness of the thought experiment as a scientific method.

Thus, we will not strive to define the notion of thought experiment in general, either. However, even without a precise definition we may summarise the points of departure which we expect to pave the way for handling stage setting thought experiments in cognitive linguistics with respect to the problems (P) and (P').

2.2. Points of departure for a possible approach to thought experiments in cognitive linguistics

In a series of papers we developed a particular approach to plausible argumentation named the 'p-model'.[8] We assume that this approach can be extended to stage setting thought experiments as well. Accordingly, here we *reinterpret* insights to be adapted from the literature on thought experiments in the light of the p-model. As a first approximation, which will be further elaborated on in the next subsection, we would like to highlight three points:

(i) Most authors agree that thought experiments are basically *conditional*. We accept the claim according to which in a thought experiment one makes a judgment about what would be the case *if* the particular state of affairs described in some imaginary scenario were actual (see e.g. COOPER 2005 and the literature discussed there).

(ii) In general we agree with COHNITZ (2006: 93) in that, due to this property of thought experiments, they are to be reconstructed as argumentations.[9] Nevertheless, we will mean by 'argumentation' what we called '*plausible argumentation*' for instance in KERTÉSZ & RÁKOSI (2009).

(iii) According to a series of authors (SORENSEN 1992, HÄGGQUIST 1996, COHNITZ 2006), thought experiments aim to change belief. In particular, they assume a certain hypothesis – called the 'target thesis' – which seems to be inconsistent with statements characterising an imaginary situation. Since it leads to inconsistency, it should be given up

[8] See Subsection 2.3 for the characterisation of the p-model and KERTÉSZ & RÁKOSI (2009). The p-model considers plausible inferences to be components of plausible argumentation. For a first attempt to integrate plausible inferences into an approach to thought experiments as applied in cognitive linguistics see KERTÉSZ (2004b).

[9] Nevertheless, COHNITZ uses the term 'argumentation' pre-explicatively and it is not clear at all what exactly he means by it. See also the next section.

and its alternative should be accepted. As a result of the fact that plausible argumentation centres on the decision between alternative hypotheses, we reinterpret this view in the following way: a stage setting thought experiment can be reconstructed as a process of plausible argumentation consisting of a series of plausible inferences which, through several steps within the process of plausible argumentation, lead to *the decision between alternative hypotheses*.

These tentative points of departure motivate the introduction of the basic notions and theses in the next subsection which may yield the solution to the problems (P) and (P').

2.3. Thought experiments as components of plausible argumentation

Several approaches identify thought experiments with 'inferences' or 'reasoning' or 'arguments' (RESCHER 1991, NORTON 2004, IRVINE 1991, SORENSEN 1992, GENDLER 2000, HÄGGQUIST 1996, COHNITZ 2006 etc.). Although the terminology is diverse and vague, irrespective of whether they call such a structure 'argument' or 'reasoning' or 'inference', these approaches have in common that they decompose thought experiments into premises and a conclusion (KÜHNE 2005: 372). We will use the term 'inference' for such a structure. These approaches offer the following solution to the basic problem of thought experiments we introduced in (1):

(2) (a) Thought experiments are inferences or can be reconstructed as such.
(b) The conclusions of inferences cannot transcend the information contained in the premises.
(c) Therefore, "in so far as a thought experiment provides novel information about the world, that information was introduced as experientially based premises in the arguments" (NORTON 2004: 63).[10]

This solution "provides a natural home for an empiricist account of thought experiments" (NORTON 2004: 64). In this view, thought experiments are 'empirical' in a particular sense: they do indeed make use of 'empirical' information – very often tacitly, in a disguised form – in that the premises include information about the world which may be rooted in 'empirical' experience. Since thought experiments are

[10] KÜHNE (2005: 27) explains this claim as follows:

> "Wenn Gedankenexperimente empirisches Wissen gewinnen lassen, dann hat man dieses Wissen schon als verborgene Prämissen in das Gedankenexperiment hineingesteckt. Im Anschluß an NORTONS Standpunkt stellt sich die Aufgabe, die verborgenen Prämissen in den Argumenten zu suchen und zu erklären, woher wir diese beziehen oder warum wir von ihrer Wahrheit überzeugt sind."

inferences and since the conclusion of inferences cannot transgress the information content of the premises, the result of a thought experiment *cannot go beyond the information in the premises*, either. The outcome of the thought experiment – that is the conclusion of the inference – *can* make the implicitly given, disguised 'empirical' information in the premises explicit, but *cannot* generate more 'empirical' information than included in the premises. Therefore, the alleged mysticism of thought experiments disappears, and they do not undermine empiricist epistemology.

It is also important that the inferences may be enthymematic. Then the following is the case:

> "NORTON gibt bereitwillig zu, daß *die meisten Gedankenexperimente Enthymeme sind*, also wesentliche Prämissen unterschlagen und an wesentlichen Stellen gewagte Induktionen beinhalten. Erst bei geeigneter Vervollständigung würden sich erfolgreiche Gedankenexperimente als gute Argumente rekonstruieren lassen." (KÜHNE 2005: 373; emphasis added).

Now, our hypothesis, which we have already touched on in the previous section, says that a stage setting thought experiment in cognitive linguistics can be reconstructed as plausible argumentation decomposable into a sequence of plausible inferences. If this is acceptable, then a possible solution to the basic problem of thought experiments can be obtained that is partially different from (2).[11]

So as to explain this solution, it is necessary to introduce our approach to plausible argumentation, the outlines of which were put forward e.g. in KERTÉSZ (2004a) and which was further developed in KERTÉSZ & RÁKOSI (2009).[12] This approach – called *'the p-model of plausible argumentation'* – includes, among others, the following notions and tenets:

(i) *Demonstrative inferences* are deductively valid and rest on true premises. Therefore, their conclusions may be regarded as certain. However, both in everyday and scientific reasoning very often the premises merely enhance the *plausibility* of the conclusion. In such cases the premises are not sufficient to secure the truth of the conclusion with certainty. The premises are more or less *plausible* statements which may be accepted *to some extent* on the basis of *sources* that support them. In

[11] The proposal we make here is novel in that, to our knowledge, no approach to thought experiments makes use of plausible argumentation.

[12] The general interest in plausible inferences has grown gradually over the past decades. As early as the middle of the past century, POLYA (1948), (1954) revealed their importance for mathematical problem solving; in the seventies RESCHER (1976) developed a comprehensive approach to plausible inferences, and now they have been widely discussed both in argumentation theory and in artificial intelligence research.

scientific inquiry, such sources may be, for example, direct sensory observations, measurement, real experiments, introspection etc.

(ii) Basically, an inference can be plausible in three ways: (a) if at least one of the premises is only plausible to a certain extent but not certainly true; or (b) if the inference is *enthymematic* which means that, besides the premises explicitly given, the conclusion also rests on latent background assumptions; or (c) both (a) and (b) hold, i.e. the inference is enthymematic and at least one of the premises is plausible instead of being certainly true.

(iii) Due to their *dynamism*, plausible inferences are closely connected to demonstrative inferences. Plausible inferences can dynamically move towards demonstrativity by three mechanisms. In the first case the plausibility of the conclusion changes monotonically whenever the plausibility of one of its premises changes monotonically; in addition, such a change is also continuous (POLYA 1954: 26, 41). In the second case *an enthymematic inference can be made deductively valid by the explicit addition of the missing premise(s)* (RESCHER 1976: 61 ff.). In the third case both mechanisms are present simultaneously.[13]

(iv) Plausible inferences are *fallible* at the outset, because their conclusion is only plausible to a certain extent instead of being true with certainty. Moreover, if one of the latent background assumptions in enthymematic plausible inferences turns out to be false or implausible, then the plausibility of the conclusion will be undermined irrespective of the plausibility or the truth of the premises.

(v) The basic function of plausible inferences is their *heuristic* function. Plausible inferences can be applied in situations in which the rigour of demonstrative inferences – for whatever reason – cannot be achieved. Moreover, in the enthymematic case, the latent background assumptions make it possible to draw conclusions which *go beyond the information content of the premises explicitly given* (see RESCHER 1976: 60 ff., 97 ff, POLYA 1948: 221). Accordingly, plausible inferences are, on the one hand, fallible in that, due to the uncertainty of the premises and the 'invisible' background assumptions, their conclusion may turn out to be false. On the other hand, they are heuristic tools of problem solving

[13] Plausible inferences do not constitute a "logic" in the classical sense:

> "[…] the only real or genuine *logic* is deductive. […] Deductive *logic* is seen as the only genuine logic, and any other 'logic' – such as inductive logic – is a matter of supplementing its (purely formal) apparatus with some suitable body of special material assumptions and presuppositions. […] these supplemental and allowedly *substantive* mechanisms are provided by the introduction of plausibilistic machinery. The machinery of plausibility reflects the essentially substantive (i.e., "material") devices needed to underwrite the process of reasoning in a domain […] where the resources of pure (that is, *deductive*) logic do not suffice." (RESCHER 1976: 101-102)

In contrast to logic, plausible inferences consider the *content* of the statement as well.

and provide *new information.* Plausible inferences serve the solution of problems – however, due to their fallibility, they only do this in a provisional way that appears to be, in a given situation, more promising than the alternatives.

(vi) It was one of the most important insights provided by early approaches to plausible inferences (such as POLYA's works) that the relation between the premises and the conclusion is not restricted to *formal* aspects, but involves all information needed for the evaluation of the plausibility value of the premises as well as the *semantic relation* between the premises and the conclusion. To capture this fact, KERTÉSZ & RÁKOSI (2009) introduced the notion of the *context*. By context we mean, first, those sources in which the plausibility value of statements is rooted. Second, it includes a set of statements associated with plausibility values and semantic structure. Finally, the context also involves methodological norms such as the permissible type(s) of inferences etc.

(vii) A context may be *problematic* in three ways. First, it may be informationally overdetermined. Informational overdetermination means that a certain statement is made plausible by a given source or an inference while its negation is also made plausible by some other source or inference; accordingly, inconsistency emerges. Second, the context may be informationally underdetermined if there are statements which are neither plausible nor implausible. Third, a context may be both over- and underdetermined with respect to different statements.

(viii) The heuristic device whose application is aimed at the re-evaluation of the context so that it becomes less problematic with the elimination of the under- and/or overdetermination is called *plausible argumentation*. During the process of plausible argumentation a problematic context is continuously re-evaluated by the elaboration of possible solutions to its problems, the evaluation of the alternative solutions and the comparison of the latter. Since heuristics do not necessarily lead to the solution of a problem and may fail, plausible argumentation, too, is fallible. Plausible inferences are components of plausible argumentation in this sense.

(ix) Since the re-evaluation of a problematic context usually does not lead immediately to an unproblematic context but may raise new problems, the plausible argumentation process is basically *not linear*. The consideration of new problems and new pieces of information may require the re-consideration of the decisions that have been made in previous stages of the argumentation as well as the evaluation of further alternatives to the assumptions provisionally accepted. Accordingly, one *retrospectively re-evaluates* the information at hand (cf. RESCHER 1976, 1987). This process of retrospective re-evaluation is *cyclic* in nature. Since during the cycles one continuously changes the *perspective* from which the pieces of information constituting the context are evaluated, the

plausible argumentation process is, in RESCHER's (1987) terminology, *prismatic* as well.

(x) Contradictions play a crucial role in plausible argumentation.[14] As regards their emergence, those premises which a plausible inference is built on, are, by definition, not certainly true, but only plausible in the given context; at best, they are more plausible than their alternatives. Therefore, it may be the case that there are two hypotheses in the context at issue which mutually exclude each other, but are both plausible in certain respects (RESCHER & BRANDOM 1979, 160). So as to resolve such inconsistency, one has to decide which of the alternatives to abandon. One may use plausible inferences once again to resolve the (possible) contradictions by examining which of the alternatives is more acceptable in a given context. Thus, plausible inferences are one of the possible *sources* of the *emergence* of contradictions on the one hand, and one of the possible *means* to *resolve* contradictions on the other.

(xi) While plausible inferences are effective in that they further the solution of a given problem in the course of plausible argumentation, *fallacies* – such as for example circularity – are ineffective in that they prevent the argumentation process from fulfilling its heuristic function.

2.4. A possible solution to (P) and (P')

What has been said in the previous sections suggests the following hypothesis as a possible answer to the question asked in (P):

(H) (a) As for its structure, a stage setting thought experiment in cognitive linguistics can be reconstructed as a process of plausible argumentation consisting of a series of plausible inferences.

(b) With respect to its function, in cognitive linguistics a stage setting thought experiment is a heuristic device which

— works as the initial step of a plausible argumentation process,

— serves to trigger the decision between rival hypotheses, and

[14] Cf.:

> "The major applications of plausibility theory have a common structure – they all envisage the use of plausibility considerations as an instrument of conflict resolution in the cognitive domain. Setting out from […] qualitatively plausible but mutually inconsistent theses, more finely detailed […] evaluations are deployed to determine which of the various *possible* ways of restoring consistency are to count as *optimal*. Plausibility considerations thus serve in their characteristic role of providing the requisite guidance for retention and rejection in such situations of informational overdetermination […]." (RESCHER 1976: 71; emphasis as in the original).

— is subject to the cyclical, prismatic, retrospective re-evaluation of information.

In addition, we obtain a possible solution to (P1') which states the following:

(H') (a) Since we have characterised stage setting thought experiments as components of plausible argumentation consisting of a series of plausible inferences, in accordance with (2), the premises of these inferences may in principle include experiential information which will be transferred to the conclusion.

(b) In the special case of enthymematic plausible inferences – due to the latent background assumptions – the information content of the conclusion may go beyond that of the premises. Therefore, if we reconstruct a stage setting thought experiment as a plausible argumentation process decomposable into a series of plausible inferences including at least one enthymematic inference, then the result it leads to may contain information not inherent in the premises.

(c) Whether the information thus obtained is 'empirical' or not, depends on the specific content of the latent background assumptions, the content of the premises and the way 'empirical' is defined.

(d) The information thus provided by thought experiments is provisional, fallible and can be overruled by more plausible alternatives during the argumentation cycles.

In the following section we will illustrate the workability of these hypotheses by a case study.

3. A case study

3.1. The structure and the function of a stage setting thought experiment in cognitive linguistics

In LAKOFF & JOHNSON (1980) the alternative hypotheses are put forward right in the very first paragraph of the book: [15]

[15] In this paper the numbered quotations, which are subject to our analyses, are divided into smaller units marked by letters. The division makes it easier to refer to parts of the quotation to be analysed. The units do not necessarily correspond to paragraphs of the original text.

(3) (a) "Metaphor is for most people a device of the poetic imagination and the rhetorical flourish – a matter of extraordinary rather than ordinary language. Moreover, metaphor is typically viewed as characteristic of language alone, a matter of words rather than thought or action. For this reason, most people think they can get along perfectly well without metaphor.

(b) We have found, on the contrary, that metaphor is pervasive in everyday life, not just in language but in thought and action. Our ordinary conceptual system, in terms of which we both think and act, is fundamentally metaphorical in nature." (LAKOFF & JOHNSON 1980: 3).

So as to argue against (3)(a) and for (3)(b), the authors make use of the following stage setting thought experiment:

(4) (a) "Try to imagine a culture where arguments are not viewed in terms of war, where no one wins or loses, where there is no sense of attacking or defending, gaining or losing ground. Imagine a culture where an argument is viewed as a dance, the participants are seen as performers, and the goal is to perform in a balanced and aesthetically pleasing way.

(b) In such a culture, people would view arguments differently, experience them differently, carry them out differently, and talk about them differently.

(c) But *we* would probably not view them as arguing at all: they would simply be doing something different. It would seem strange even to call what they were doing 'arguing'.

(d) Perhaps the most neutral way of describing this difference between their culture and ours would be to say that we have a discourse form structured in terms of battle and they have one structured in terms of dance.

(e) This is an example of what it means for a metaphorical concept, namely, ARGUMENT IS WAR, to structure (at least in part) what we do and how we understand what we are doing when we argue.

(f) *The essence of metaphor is understanding and experiencing one kind of thing in terms of another*." (LAKOFF & JOHNSON 1980: 4-5; emphasis as in the original.)

At first sight, (4) seems to be a perfect example of what THOMASON calls a stage setting thought experiment in linguistics:

(i) It is placed at the very beginning of LAKOFF and JOHNSON's argumentation.

(ii) It clarifies the theoretical issue in that it explains what the authors mean by conceptual metaphor.

(iii) It serves to convince the reader of the book's central hypotheses before the detailed analyses of metaphorical expressions and metaphorical concepts have been carried out.

(iv) It is expected to be followed later on by real-world examples which are sufficiently similar to the imaginary situation thus described.

We assume that (4) can be analysed according to the principles of the p-model of plausible argumentation summarised in the previous section. The inferences will be reconstructed in a simplified form in that the indicators of plausibility (i.e. "it is plausible that", "it is true with certainty that") are omitted. Latent background assumptions will be set within '<' and '>'.

As KERTÉSZ & RÁKOSI (2009) have shown, the crucial point in (4)(a) and (b) is that the following latent background assumption is presupposed without which the conclusion of the plausible inference cannot be drawn:

(5) There are systematic connections among thinking, experience, action and language.

This assumption is not formulated explicitly in the thought experiment itself, but is touched on later in the text, that is it is part of the context of (4) (see LAKOFF & JOHNSON 1980: 5). Thus, the inference in (4)(a) and (b) can be reconstructed like this:

(6) Premises:
- (a) We imagine a culture in which argument is not viewed in terms of war, but in terms of dance.
- (b) <There are systematic connections among thinking, experience, action and language.>
- (c) <If we imagine a culture in which argument is not viewed in terms of war, but in terms of dance and there are systematic connections among thinking, experience, action and language, then in this culture people would view arguments differently, experience them differently, carry them out differently, and talk about them differently.>

Conclusion:
- (d) In this culture people would view arguments differently, experience them differently, carry them out differently, and talk about them differently.

The structure of (6) corresponds to that of plausible modus ponens.[16] The imaginary situation as reconstructed above is further analysed in (4)(c) where it is compared to our culture:

(7) Premises:
- (a) If people in this culture viewed arguments differently, experienced them differently, carried them out differently, and talked about them differently, then we probably would not view them as arguing at all, they would simply be doing something different which we would not call 'arguing'.
- (b) People in this culture view arguments differently, experience them differently, carry them out differently, and talk about them differently.

Conclusion:
- (c) We probably would not view them as arguing at all; they would simply be doing something different which we would not call 'arguing'.

As regards (4)(d), in the structure of the inference there are latent background assumptions related to the notion of 'discourse form', a concept which has not been introduced explicitly:

(8) Premises:
- (a) <If one views argument in terms of dance, then one has a discourse form structured in terms of dance.>
- (b) They view argument in terms of dance.

Conclusion:
- (c) They have a discourse form structured in terms of dance.

(9) Premises:
- (a) <If one views argument in terms of battle, then one has a discourse form structured in terms of battle.>
- (b) We view argument in terms of battle.

Conclusion:
- (c) We have a discourse form structured in terms of battle.

For lack of space, we will not go into the precise reconstruction of (4)(e) and (4)(f). Just for the sake of illustration we tentatively sketch the final step. (4)(f) involves an inductive generalisation including latent premises. Here the point is that the premises (10)(b), (c) etc. are latent background assumptions, that is it is presupposed at this point of the argumentation that further examples will be found. Indeed, the examples presupposed here will be provided in the book in later analyses. Accordingly, they are part of the context in the sense in which we have introduced this notion.

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[16] *Plausible modus ponens*: {it is plausible that if *A* then *B*; *A* is plausible} $\Rightarrow$ *B* is plausible.

(10) Premises:

(c) The essence of the metaphorical concept ARGUMENT IS WAR is understanding and experiencing one kind of thing in terms of another.

(b) <The essence of the metaphorical concept X is understanding and experiencing one kind of thing in terms of another.>

(c) <The essence of the metaphorical concept Y is understanding and experiencing one kind of thing in terms of another.>

etc.

Conclusion:

(d) The essence of metaphor is understanding and experiencing one kind of thing in terms of another.

(10)(d) is one of LAKOFF and JOHNSON's main theses. The aim of their book is to illustrate the plausibility of this thesis by the analysis of further examples. We can reconstruct the way the authors do this as a process of plausible argumentation. Thereby, the context in which the above inferences appear is problematic in both of the ways mentioned in Subsection 2.3. First, it is informationally underdetermined because, at the outset, there are many statements about which it is not known whether they are plausible or not. The authors' discussion of numerous further examples reduces the number of these statements. Second, in the course of this argumentation process, various contradictions and fallacies, such as circularity may arise (see also Subsections 3.2.2. and 3.2.3.)

There is a continuous retrospective re-evaluation of previous findings by feeding back to them cyclically and prismatically in the light of further information. It is in this way that the latent background assumptions inherent in the context – for example, (5) and (10)(b), (c) etc. – may contribute to the conclusions of the inferences we reconstructed. The argumentation process does not, however, resolve the problematic nature of the context, because a series of contradictions and the risk of circularity remain, and many cases have not been discussed (see Subsection 3.3.).

The analysis has also illustrated that (4) as a stage setting thought experiment indeed functions as an initial step in argumentation. Thereby it has a heuristic function. We must not forget that one of the central aims of plausible argumentation is to trigger – at least in a provisional, uncertain, fallible manner – the decision between alternative hypotheses in the light of the information at one's disposal. This means that the sequence of plausible inferences that initiate a plausible argumentation process in (4) aim at the rejection of the thesis (3)(a) and the acceptance of the rival hypothesis (3)(b). The inferences themselves do not provide direct evidence against the thesis (3)(a) and for its rival (3)(b), but merely

pave the way for later argumentation cycles which – following the mechanisms the p-model assumes – might lead to a decision between them.

It is natural that we must also ask to what extent thought experiments with the structure and function thus revealed are successful devices of cognitive linguistic inquiry. This is what the next subsection will be devoted to.

3.2. The ways in which a stage setting thought experiment in cognitive linguistics may fail

3.2.1. The non-'empirical' nature of the premises and the latent background assumptions

We reconstructed the thought experiment at issue as a series of plausible inferences, some of which were enthymematic. We assumed in our hypothesis (H') that *in principle* it is these background assumptions and/or the premises that might be responsible for the fact that thought experiments yield new 'empirical' information about the world.[17] However, although the background assumptions made it possible that the conclusion went beyond the information content of the premises explicitly given, they are hardly 'empirical', in the pre-explicative sense mentioned in Section 1. Likewise, the premises are not 'experientially based', either. Therefore, (4) as a thought experiment seems to fail in this respect.

3.2.2. Circularity

That stage setting thought experiments in cognitive linguistics run the risk of circularity seems to be well-motivated from several points of view. First, the literature on scientific thought experiments in general emphasises that one way in which thought experiments can fail is that they become circular (PEIJNENBURG & ATKINSON 2003, COHNITZ 2006). Second, as discussed in KERTÉSZ (2004b) and KERTÉSZ & RÁKOSI (2009), current debates on cognitive theories of metaphor centre on charges of circularity as well. The question, then, is how the p-model handles the potential circularity of stage setting thought experiments in cognitive linguistics. With respect to (4), HASER (2005) puts forward the charge of circularity as follows:

[17] NORTON (2004) analyses numerous examples from the natural sciences which illustrate the way in which experientially based information may be included in the premises and/or the latent background assumptions.

(11) (a) "The conclusion of this argument is launched by an observation which *merely repeats the premise*. LAKOFF/JOHNSON *presuppose what they should be arguing for*.

(b) Their premise ('imagine a culture ...') can be spelt out as follows: Suppose that people in a certain culture view arguments in a different way than we do (i.e., not in terms of war, but in terms of a dance).

(c) Their conclusion says that in such a culture, people would 'view arguments differently' (LAKOFF & JOHNSON 1980: 5)." (HASER 2005: 146; emphasis added)

Although HASER does not use the notion 'circular', (11)(a) and (c) clearly suggest that she considers the inference involved in (4)(a) and (b) to be circular in the sense that the conclusion is the same as some part of the premises.

On the one hand, there is no doubt that LAKOFF and JOHNSON's argumentation runs the risk of circularity because the authors seem to presuppose one of their theses at the outset while they infer it through the series of inferences we reconstructed in subsection 3.1. On the other hand, however, KERTÉSZ & RÁKOSI (2009) showed that the authors' argumentation is cyclic rather than circular for the following reasons.

First, HASER detaches (12) from (13):

(12) "In such a culture, people would view arguments differently […]"

(13) "[…] experience them differently, carry them out differently, and talk about them differently."

However, they constitute the conclusion together.

Second, HASER does not consider the context. This is important because the context shows that (12) is not a simple paraphrase of (11)(b), i.e. (4)(a). Moreover, (13) – because of the latent background assumption (5) – is not a simple repetition of (12). As we have seen in subsection 3.1., without (5) the conclusion (6)(d) could not have been drawn.

In KERTÉSZ & RÁKOSI (2009) we made a distinction between circular and cyclic argumentation. In the case of cyclic argumentation one does not repeat a previous claim, but retrospectively re-evaluates it at "a different cognitive level".[18] This kind of cyclic, prismatic argumentation

[18] Cf.:

"The sort of 'self-criticism' at issue does not reflect any vicious or vitiating circularity, but in effect amounts simply to a feedback process that uses later, more refined stages of the analysis to effect revisionary sophistications in the materials from which earlier stages proceeded. One indeed returns to 'the same point' but does so at a different cognitive level." (RESCHER 1976: 119)

is *heuristically effective* and is one of the central features of plausible argumentation. However, if the argumentation process returns to a former state by failing to re-evaluate the context, then the argumentation is *ineffective*, because it has lost its cyclic and prismatic character. Circularity is an ineffective argumentation process deprived of the cyclic, self-corrective, and prismatic nature of effective plausible argumentation.[19] At the same time, it is important to remark that this distinction does not provide a necessary and sufficient criterion with universal validity. There are no patterns which one can use to decide whether a certain argumentation is circular or not. The decision can be made only from case to case by considering the whole of the context. In principle, there are many ways of avoiding circularity.

In sum, although it is true that the stage setting thought experiment we discussed in subsection 3.1. runs the risk of circularity, the p-model has revealed that its argumentation structure is cyclic rather than circular.[20] In this respect the thought experiment did not fail.

3.2.3. Contradiction

According to PEIJNENBURG & ATKINSON (2003), a thought experiment fails if it yields two conclusions which contradict each other. In LAKOFF & JOHNSON (1980) contradictions in the sense of Peijnenburg and Atkinson emerge, because the thought experiment (4) supported the hypothesis (3)(b) which facilitates the compatibility of certain metaphorical expressions with several different conceptual metaphors incompatible with one another. Examples illustrating this claim are discussed in RITCHIE (2003), VERVAEKE & KENNEDY (1996), GIBBS & PERLMAN (2006), and HASER (2005). In these works it is shown for instance that the metaphorical expression from which one concludes that there is a conceptual metaphor ARGUMENT IS WAR underlying them, may also motivate conclusions with respect to a series of other conceptual metaphors. VERVAEKE and KENNEDY emphasise that

> "[…] expressions that are evidence against one implicit metaphor can be taken simply as evidence for some other implicit metaphor, such as 'ARGUMENT IS A BUILDING' that can be '*buttressed*'

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[19] Cf.:

> "[…] circularity in a cognitive method or procedure would be bad only if this procedure commits the fallacy of question-begging (*petitio principii*) so as to pre-empt the prospect of error-discovery and correction. Circularity is harmless when it is compatible with defeasibility – the potential discovery of mistakes. What is critical is corrigibility – and *self*-corrosiveness will (if genuine) serve perfectly well." (RESCHER 1979: 99)

[20] Nevertheless, KERTÉSZ & RÁKOSI (2009) also pointed out the circular aspects of LAKOFF & JOHNSON's theory.

> (LAKOFF & JOHNSON 1980: 46) or ARGUMENT IS A BODY that can be *'fleshed out'*, and *'has a skeleton'*. Expressions that cannot be grouped under any such metaphor, such as 'arguments have premises', can be taken simply as indications that we do have some non-metaphorical concept of argument. Therefore, no expression about argument could count as evidence against the existence of such implicit metaphors." (VERVAEKE & KENNEDY 1996: 275)

The authors also discuss examples which suggest that it is difficult to find the correct level of generality. For example, since wars take place in space, a more general conceptual metaphor would be ARGUMENTS ARE SPACE. However, from further linguistic expressions one may conclude that the underlying conceptual metaphor may be even more general, for example, ARGUMENT IS BRIDGE. As further options, ARGUMENT IS COMPETITION, or ARGUMENT HAS A GOAL, or ARGUMENT IS BODY etc. present themselves, all on the basis of linguistic expressions including the word *argument*.

RITCHIE (2003: 131 f.) and GIBBS & PERLMAN (2006: 213) mention ARGUMENT IS CHESS and ARGUMENT IS BOXING as alternative conceptual metaphors inferred from the same data. RITCHIE (2003: 140 f) also calls attention to the non-directionality of metaphors. For example, it does make equal sense to treat arguments as if they were wars and wars as if they were arguments (WAR IS ARGUMENT) or boxing as if it were war (BOXING IS WAR) and war as if it were boxing (WAR IS BOXING). Similarly to VERVAEKE & KENNEDY (1996), HASER (2005: 177) also raises the issue of the level of the generality of the source domain. She discusses the possibility that conceptual metaphors like ARGUMENT IS FORCE or ARGUMENT IS FIGHT or ARGUMENT IS GAME-PLAYING may be inferred from the data as more general ones than ARGUMENT IS WAR.

All these observations boil down to the fact that what we have to deal with is exactly that kind of failure which PEIJNENBURG and ATKINSON mention: from the same thought experiment contradictory conclusions can be drawn. Accordingly, in this respect (4) as a stage setting thought experiment seems to fail, because in LAKOFF & JOHNSON (1980) the contradictions cannot be solved by the mechanism sketched in (x) in subsection 2.3.

3.2.4. The lack of real experiments

The lack of real experiments plays a crucial role. In principle, as the philosophical literature on thought experiments in general emphasises, a thought experiment paves the way for the real experiments (for a summary of the literature tackling this stance see BUZZONI 2008). If THOMASON's (1991: 247) claim according to which stage setting thought

experiments "are more or less similar to those in other disciplines" is correct and in other disciplines thought experiments should be followed by real ones, then the latter is to be expected from stage setting thought experiments in cognitive linguistics, too. In this way, at the outset, they may indirectly contribute to the obtaining of 'empirical' information which is provided by the real experiment they trigger. In principle, if we narrow down this claim to (4), then (4) should be followed by real experiments focusing on the question of whether there are really different cultures in which argument is not conceptualised in terms of war, but in terms of something else. Consequently, one of the ways in which a stage-setting thought experiment like (4) may fail is that it is not followed by a corresponding real experiment. In particular, this consequence affects the potential circularity and inconsistency of LAKOFF and JOHNSON's argumentation.

In Subsection 3.2.2 we discussed the risk of circularity and showed that, although (4) may seem circular, it is not, because of the process of retrospective re-evaluation as a result of which contextual information was included in (9) as a latent background assumption. Another means of avoiding circularity and turning the argumentation into cyclicity is the supplementation of the thought experiment by real ones. If a thought experiment that runs the risk of becoming circular is at some stage of inquiry supplemented by a real experiment, then the very process of prismatic, retrospective re-evaluation occurs. For new information is adapted through which the ineffective repetition of the premises can be avoided.

This situation is similar to that of the contradictions which we mentioned in subsection 3.2.3. In general it is – as PEIJNENBURG & ATKINSON (2003) emphasise – real experiments again that may contribute to avoiding the failure of the thought experiment by resolving the contradiction. In our terminology this means that the real experiment serves the retrospective re-evaluation of the result of a thought experiment and can, by this mechanism, resolve the contradiction at issue.

Although (4) clearly failed as a stage setting thought experiment because of the lack of the corresponding real experiments in the early phase of its development, in later works many attempts have been made to support its result by real experiments (see e.g. GIBBS's and GENTNER's attempts and many others).

4. Summary

We have seen that the latest attempts to enrich the inventory of the devices of cognitive linguistics by real experiments are worth reconsidering, among other things, in relation to the structure and role of

thought experiments. The case study we presented has shown that stage setting thought experiments may play a constitutive role in the argumentation which is an inseparable part of cognitive linguistic theories. Thereby we applied the p-model which may shed new light on the basic problem of thought experiments as well.

We may conclude that, on the one hand, LAKOFF and JOHNSON's use of the stage setting thought experiment seems to fulfil its heuristic function in that it makes the first step in a plausible argumentation process and in this way illuminates the hypothesis for which the authors will argue later on. Thereby, at least provisionally, it seems to have avoided circularity. On the other hand, it clearly fails in two other respects. It generated contradictions which, at least in the early version of Conceptual Metaphor Theory, could neither be resolved by the plausible argumentation process represented in the book nor be avoided by conducting real experiments. In addition, the latent background assumptions as well as the premises themselves do not seem to have transferred experientially based empirical information to the conclusions of the inferences which the argumentation process consists of. Therefore, in these two respects, the thought experiment in (4) also failed to meet (H').

We left crucial problems open. For example:

(i) If we accept THOMASON's distinction between stage setting and introspective thought experiment, how does then the p-model of plausible argumentation capture their similarities and differences in cognitive linguistics?

(ii) If we accept THOMASON's claim already quoted in Section 1 according to which a stage setting thought experiment is to be followed by the demonstration of the fact that some real-world situation is sufficiently similar to the result of the thought experiment, the question arises as to what this relation should be like and how the p-model can capture it.

(iii) We have seen that (4) as a stage setting thought experiment failed in several respects. Nevertheless, we have also seen that its inferential structure is an integral part of a cyclic and prismatic argumentation process. Thus, the question arises whether it is really justified to assign it a special status other than a particular sequence of inferences in an argumentation process.[21] In other words: is it justified at all to regard (4) as a kind of thought experiment?

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[21] A negative answer to this question would be in accordance with NORTON's (2004: 45) claim according to which thought experiments

> "[…] perform no epistemic magic. In so far as they tell us about the world, I shall urge that thought experiments draw upon what we already know of it, either explicitly or tacitly; they then transform that knowledge by disguised argumentation. They can do nothing more epistemically than can argumentation. […] the epistemic

The solution of these and related problems should be tackled by later investigations into the nature of cognitive linguistic theorising.

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