

The brain is a computer and the mind is its program

Following a metaphor's path from its birth to teaching philosophy decades later

Anke Beger | Europa-Universität Flensburg

 <https://doi.org/10.1075/ftl.6.08beg>

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Pages 263–295 of

How Metaphors Guide, Teach and Popularize Science

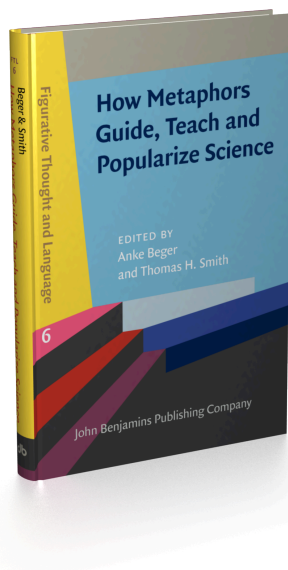
Edited by Anke Beger and Thomas H. Smith

[*Figurative Thought and Language*, 6] 2020. vi, 332 pp.

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CHAPTER 8

THE BRAIN IS A COMPUTER AND THE MIND IS ITS PROGRAM

Following a metaphor's path from its birth to teaching philosophy decades later

Anke Beger

Europa-Universität Flensburg

This chapter analyzes three stops along the life path of the influential metaphor THE BRAIN IS A COMPUTER AND THE MIND IS ITS PROGRAM. At the first two stops, the philosophers Searle, Hofstadter and Dennett argue about the literal truth of this metaphor in two academic papers. They embed the metaphor in complex metaphorical analogies, i.e., *deliberate metaphors*, for primarily persuasive purposes. The last stop analyzed is an academic lecture in philosophy which aims at explaining the metaphorical reasoning of the philosophers. The analysis focuses on the professor's modifications of one of Searle's deliberate metaphors. These modifications result in a misrepresentation of Searle's view on the mind. Linguistic evidence indicates that this misrepresentation influences the students' concept of the mind.

Keywords: recontextualization of metaphors, deliberate metaphors, metaphor across genres, deliberate metaphor use in academic articles, deliberate metaphor use in academic lectures

1. Introduction

Between 1955 and 1956 the scientists Allen Newell, Herbert A. Simon and Cliff Shaw developed a program to mimic human problem-solving skills, which is deemed to be the first Artificial Intelligence program (Crevier, 1993, p. 44) and thus laid the foundation to view computers as being able to think. A few years later, Hilary Putnam (1980, originally published in 1961) proposed the influential “computational theory of mind” (CTM), which he further developed with Jerry Fodor during the following decades. In CTM, thinking is considered to be a

form of computing and the mind/brain is thought of as an information processor (Putnam, 1980; Fodor, 1975). This view on the mind and the brain evolved into a quite contentious position in modern Philosophy of Mind and rendered the theory-constitutive metaphor THE BRAIN IS A COMPUTER AND THE MIND IS ITS PROGRAM.¹ The once theory-constitutive metaphor traveled from the academic arena into everyday life.² This is attested by a multitude of metaphorical expressions realizing this conceptual metaphor in ordinary English.³ To name but a few examples, we talk about *encoding* and *decoding* meaning or about *storing* and *retrieving information*; sometimes, our brain does not *function* properly, which might result in problems of *online processing*. In fact, the metaphor THE BRAIN IS A COMPUTER AND THE MIND IS ITS PROGRAM is still a widely spread (lay) view on how our brains work – so much so that the psychologist Robert Epstein (2016) has recently written an online article titled “The empty brain: Your brain does not process information, retrieve knowledge or store memories. In short: Your brain is not a computer”.

Apart from its career from a novel theory-constitutive metaphor in science to a conventional metaphor in everyday life, THE BRAIN IS A COMPUTER AND THE MIND IS ITS PROGRAM has also caused years of debates among scientists and philosophers about its “truth”. The discussions that this metaphor provoked have often been theoretical (as opposed to empirical) and argumentative, but they have still furthered new scientific insights, particularly in the fields of Artificial Intelligence and Philosophy of Mind.

In the present chapter, I will analyze two argumentative academic papers that are responses to the metaphor THE BRAIN IS A COMPUTER AND THE MIND IS ITS PROGRAM. I will use this analysis to illustrate that the metaphors used in a philosophy lecture from the 21st century are strongly influenced by the metaphors found in the two articles. Thus, in this chapter, I will consider the influence of the metaphor THE BRAIN IS A COMPUTER AND THE MIND IS ITS PROGRAM over the course of 30 years, both on philosophical argument in two academic papers and on knowledge communication in an academic lecture.

The chronologically first point is represented by the academic article “Minds, brains, and programs”, written by the philosopher John R. Searle and originally

1. I am adhering to the usual convention in Cognitive Linguistics, that is, writing what Lakoff and Johnson (1980) call *conceptual metaphors* in small capitals.

2. According to Boyd, theory-constitutive metaphors are “an irreplaceable part of the linguistic machinery of a scientific theory” (Boyd, 1993, p. 486; quoted in Knudsen, 2003, p. 1249).

3. See Lakoff and Johnson (1980) for metaphorical expressions as realizations of underlying conceptual metaphors.

published in 1980.⁴ In Searle's article, the metaphor *THE BRAIN IS A COMPUTER AND THE MIND IS ITS PROGRAM* (henceforth: *computer metaphor*) plays a crucial role, since Searle's goal is to refute the (metaphorical) comparisons established by this metaphor. For his rebuttal of the literal truth of the *computer metaphor*, Searle creates an impressively complex and elaborate metaphorical analogy known as the Chinese Room Thought Experiment. In a nutshell, the Chinese Room Thought Experiment metaphorically compares the claim that computers were capable of cognition, just because they are capable of producing human-like answers to a story, to the invented claim that Searle 'understands' Chinese, just because he produces Chinese symbols – on the basis of a set of rules in English. The reader is invited to conclude that Searle cannot be said to actually understand Chinese and transfer that to the computer program's alleged understanding of stories. Later in his article, Searle extends this initial analogy – or even substitutes it – by another metaphorical analogy which involves replacing the cognitive agent (Searle in the Chinese Room Thought Experiment) with non-cognitive sub-systems (here: a stomach).

The second point of interest in the life of the metaphor *THE BRAIN IS A COMPUTER AND THE MIND IS ITS PROGRAM* is a response to Searle's article. The response is in fact another rebuttal. In their academic essay, which is simply called "Reflections", Douglas R. Hofstadter and Daniel C. Dennett refute Searle's view on the mind and thereby support perspectives of Artificial Intelligence, at least to some extent. Their argument also relates back to the metaphor *THE BRAIN IS A COMPUTER AND THE MIND IS ITS PROGRAM*. This (further) demonstrates the importance of this metaphor in academic reasoning. The *computer metaphor* is at the heart of the scholars' arguments in the dispute between competing theories of Philosophy of Mind and/or Artificial Intelligence. Additionally, Hofstadter and Dennett's language use in their "Reflections" is not only also highly metaphorical, but "reuses" (some of) Searle's metaphors by modifying them for the essay's argumentative purposes. The latter aspect is not astonishing. As Searle's central concepts are communicated by making heavy use of complex metaphors, it is almost impossible not to refer to, or in some way "reuse", his metaphors when arguing against his view on the mind.

Similarly, when trying to explain Searle's concept of the mind in an educational setting, one can hardly succeed without referring to, or "reusing", his metaphors either. This is precisely what happens in the philosophy lecture I filmed at a US-American college about 30 years after the above described philosophical dispute.

4. Note that I will use the second edition of Hofstadter and Dennett's (2000a; 2000b) collection *The Mind's I* as a reference, since Searle's article was reprinted in their book and the philosophy course used this book for class.

In 2010, a professor gave a class in Philosophy of Mind for which the students had to read both Searle's article "Minds, brains, and programs" and Hofstadter and Dennett's reflections on it. In the discussion in class, the professor also refers to, and even quotes, Searle's metaphorical analogies in order to explain to his students what Searle's view on the mind is. Again, the *computer metaphor* underlies the reasoning of the discourse event. However, in this educational type of discourse, the general goal is not (primarily) persuading others of a particular view on the mind, but to communicate different concepts of the mind in the field of philosophy. The third part of my analysis below will show in how far this change in discourse goal is reflected in the "reuse" of metaphors in the philosophy lecture. I focus on the professor's "reuse" of Searle's metaphors and examine whether this reuse in the philosophy lecture enhances understanding.

Before I present my analysis of these three points in the life of the metaphor THE BRAIN IS A COMPUTER AND THE MIND IS ITS PROGRAM, I will delineate and explain some of the linguistic concepts that the present analysis is based on. I will start with the most obvious notion of metaphor. In particular, three different dimensions of metaphor will be outlined: the linguistic, the conceptual, and the communicative dimension (see Steen, 2008, for a three-dimensional model of metaphor). The communicative dimension of metaphor is particularly important for the present study, as all the metaphors presented here are used deliberately. This is rather exceptional, since deliberate metaphors are only rarely found in language use (compared to non-deliberate ones) (cf. Steen, 2008, 2010).

The other concept that needs to be explained concerns the "reuse" of metaphors, especially across discourse events. The metaphors in Hofstadter and Dennett's reflections and in the philosophy lecture are not mere repetitions of Searle's metaphors. Instead, they constitute modified versions of Searle's metaphors. The modifications vary between the academic paper and the academic lecture, since they are adapted to the respective discourse goals and participants. In Linell's (1998a, 1998b) words, we can thus speak of a "recontextualization" of metaphors. I will briefly outline Linell's concept of recontextualization. Once the methodological framework is outlined, the analysis of metaphors centering on the *computer metaphor* will demonstrate the influence of this metaphor on the three different discourse events, particularly on the reasoning of the discourse participants. At the end of this chapter, I will summarize the findings and draw some conclusions about the development of metaphors and their functions at distinct points in time and across different genres. I will particularly highlight the value, but also the challenges of (complex) deliberate metaphors that originate in argumentative scientific settings and are recontextualized in educational settings.

2. Methodological and theoretical aspects

2.1 Steps of the analysis

The study presented here is based on a corpus composed of three discourse events. Two of those are written academic texts aimed at a readership of fellow academics (mainly philosophers). These academic papers do not present findings of research studies, but constitute strongly argumentative opinion pieces. The fact that the argumentation in these two papers is mainly based on metaphorical analogies attests the necessity of a metaphor analysis for determining the philosophers' line of reasoning. The third discourse event is also in the domain of philosophy, but very different from the first two texts. It is an academic lecture and thus represents spoken discourse. Furthermore, unlike the academic papers, the lecture is not a discourse event among equals, but is characterized by a knowledge differential. For this reason, the main aim of the academic lecture is to communicate knowledge rather than to persuade the participants of an opinion.

Since the present study is part of my PhD project that investigates the role of metaphor in knowledge communication in academic lectures, the starting point is the chronologically last discourse event, the philosophy lecture. The lecture was first completely transcribed and then all metaphors in the lecture were identified, using MIPVU (Steen, Dorst, Herrmann, Krennmayr, & Pasma, 2010). For the present purposes, the entirety of linguistic metaphors was searched for those that are repetitions or modifications of Searle's or Hofstadter and Dennett's original metaphors. These were further analyzed.

In a next step, the original computer-related metaphors by Searle, and by Hofstadter and Dennett, were examined in terms of features of what Steen (2008, 2010) labels *deliberate metaphors*. It was determined that all computer-related metaphors are in fact deliberate metaphors, whereupon I analyzed their specific functions in the argumentative texts. In a last step, the recontextualizations of metaphors were investigated. That is, metaphor "reuses" by Hofstadter and Dennett, and especially by the professor, were examined by looking at the way in which they are "reused" on a linguistic level. For instance, I determined whether or not the linguistic metaphors are mere repetitions of Searle's verbal *computer metaphor* or if the linguistic metaphors were modified: Are parts of the metaphors left out, substituted or elaborated? Each recontextualization of metaphors was then considered in its particular discourse context to establish the communicative purpose of the modification (or the lack thereof).

As this brief overview of my corpus and method has shown, *deliberate metaphor* and *recontextualization* are two key concepts for my analysis of the influence of THE BRAIN IS A COMPUTER AND THE MIND IS ITS PROGRAM on the three

discourse events in my corpus. Thus, the following sub-sections briefly outline these two theoretical aspects. In order to explain what deliberate metaphor is, I will introduce Steen's (2008, 2010) three-dimensional model of metaphor in language, thought, and communication. This is followed by a description of Linell's (1998a, 1998b) concept of recontextualization.

2.2 Metaphor in language, thought, and communication

In a recent attempt to extend the hitherto prevalent two-dimensional model of metaphor as a phenomenon of both language and thought (cf. Lakoff and Johnson, 1980), Steen (2008, 2010) proposes a model of metaphor that explicitly includes the dimension of communication. In each of the three dimensions, Steen differentiates between two oppositional characteristics of a metaphor. In the linguistic dimension, a metaphor can either be expressed indirectly, which is the default form of metaphor in Conceptual Metaphor Theory (Lakoff & Johnson, 1980), or directly (e.g., in the form of a simile or a longer comparison). In the dimension of thought, a metaphor is considered to be either a conventional or a novel connection between two conceptual domains. The new part of Steen's model of metaphor is the dimension of communication, in which he differentiates between non-deliberate metaphor and deliberate metaphor. Non-deliberate metaphors are essentially those metaphors that scholars of Conceptual Metaphor Theory have mainly been interested in over the past 40 years. Non-deliberate metaphors are not recognized as metaphors by discourse participants. Steen hypothesizes that this probably also means that non-deliberate metaphors are not processed as metaphors by cross-domain mappings, since they do not require the addressee's attention to turn to the metaphor's source domain (cf. Steen, 2008, 2010). In contrast, *deliberate metaphor* is defined precisely by their characteristic of shifting the addressee's attention to its source domain so that the addressee considers the current topic from this alien perspective (cf. Steen, 2008, p. 222). Due to a deliberate metaphor's pragmatic effect of changing (at least momentarily – and not necessarily consciously) an addressee's perspective on a given topic, deliberate metaphors can be considered as particularly effective tools in both knowledge communication discourses (such as the philosophy lecture) and argumentative discourses (such as the academic articles/essays by Searle and by Hofstadter and Dennett).

The theoretical delineation of deliberate metaphor is still in its infancy, which makes it hard to identify it, that is, to clearly distinguish deliberate from non-deliberate metaphor with a purely linguistic analysis. Even though Krennmayr (2011, pp. 154–155) proposes a list of features to look for when trying to identify possible instances of deliberate metaphor, and Reijnierse (2017) even suggests a 'Deliberate Metaphor Identification Procedure', there seem to be a number of

cases in which the status of deliberateness still remains unclear (see Beger, 2019). Among other things, the lack of a clear identification procedure for deliberate metaphor renders this type of metaphor subject of lively scholarly debate (see, e.g., Gibbs, 2015a, 2015b; Gibbs & Chen, 2017, and Steen, 2015, 2017 for the most recent discussion). However, since the metaphors in the three discourse events of the following analysis are all clear cases of deliberate metaphor, adopting this concept for the present purposes allows us to consider potential effects on the addressees that this mandatory attention to the metaphors' source domains has.⁵

2.3 Recontextualization of metaphors

The metaphors that I will analyze below are not conventional metaphorical expressions that we can find in any discourse event in ordinary English. Instead, many of these metaphors are novel creations for the particular purpose of the respective discourse event. Moreover, though, the metaphors used by Hofstadter and Dennett as well as those by the philosophy professor in the lecture are also closely connected to Searle's original metaphorical analogies in that they pick up Searle's original metaphors and modify them in some way. Since these "reuses" and modifications of Searle's metaphors happen in different discourse contexts with distinct discourse goals, the metaphors in Hofstadter and Dennett's reflections as well as those in the philosophy lecture constitute what Linell (1998a, 1998b) calls "recontextualizations". Linell defines recontextualization

as the dynamic transfer-and-transformation of something from one discourse/text-in-context (the context being in reality a matrix or field of contexts) to another. Recontextualization involves the extrication of some part or aspect from a text or discourse, or from a genre of texts or discourses, and the *fitting of this part or aspect into another context*, i.e., another text or discourse (or discourse genre) and its use and environment. (Linell, 1998b, p. 145, emphasis mine)

5. The metaphors analyzed in this chapter are clear cases of deliberate metaphors because they are either novel metaphors or direct metaphor – often even both. Direct metaphors have to be deliberate, because they refer to the literal sense of the respective word (they are technically not linguistic metaphors, because they are used in their literal sense. However, in the wider frame of discourse, they are supposed to be metaphorically compared to some other discourse constituent) (cf. Steen, 2010, pp. 52–54). Novel metaphors are also by definition used deliberately, since they do not have any lexicalized metaphorical meaning and thus require attention to the source domain. While almost all novel metaphors are also deliberate metaphors, cases of non-deliberate metaphor use can, for instance, be caused by children or mental patients (cf. Steen, 2016, p. 122). Due to the nature of my data, there are no such instances of novel but non-deliberate metaphor in my corpus.

According to Linell (ibid.), there are various discourse aspects that can be recontextualized, but these aspects include linguistic expressions. Thus, linguistic metaphors are certainly one aspect that can be recontextualized. As the quote from Linell above shows, recontextualization, of metaphorical expressions, for instance, is more than just referring to, or reusing, these expressions. Recontextualization is more dynamic and, crucially, since it involves the travelling of discourse aspects across different discourse events, includes the adaption of the recontextualized aspect to the particularities of the new discourse event. Thus, the term *recontextualization* is more apt for the present study than the term *reuse*.

Semino and her colleagues have already used Linell's concept of recontextualization in metaphor analysis (cf. Deignan, Littlemore, & Semino, 2013; Semino, Deignan, & Littlemore, 2013). They show how metaphors are first used in their original context and then analyze the nature of the adaptations that discourse participants make when they take these metaphors from their original contexts and adapt them to fit to the needs of different discourse contexts (ibid.). In the present chapter, I will provide a similar analysis. However, I will also demonstrate the challenges which elaborate metaphorical analogies pose for a professor in a lecture when he is forced to recontextualize such complex metaphors relatively spontaneously. I will start my analysis with examples of Searle's striking metaphor use in his paper "Minds, brains, and programs" (Searle, 2000), as Hofstadter and Dennett's opinion piece and the academic lecture are based on this paper.

3. Analysis: How THE BRAIN IS A COMPUTER AND THE MIND IS ITS PROGRAM is embedded and recontextualized in deliberate metaphors to argue about, and explain, views on the mind in two different academic genres

I will start by analyzing the two main metaphorical analogies in Searle's line of reasoning in "Minds, brains, and programs". I will continue my analysis of the influence of THE BRAIN IS A COMPUTER AND THE MIND IS ITS PROGRAM by examining selected recontextualizations of Searle's major deliberate metaphors in Hofstadter and Dennett's reflections on Searle's article. The last part of the analysis section also considers recontextualizations of Searle's deliberate metaphors involving the *computer metaphor*, but in a different discourse type with a different discourse goal: an academic lecture aiming at explaining Searle's concept of the mind.

3.1 Searle's metaphorical refutation of the "strong AI claim"

As I have mentioned above, the metaphor THE BRAIN IS A COMPUTER AND THE MIND IS ITS PROGRAM had been the basis for scholars to reason about the nature of the mind for a few decades before Searle published his paper "Minds, brains, and programs". However, the reason why this metaphor plays a central role in Searle's paper is that for a group of researchers in Artificial Intelligence, it had apparently lost its metaphoricity. According to Searle (2000, p. 353), the strong view of Artificial Intelligence (AI) does not consider this metaphor to be merely a metaphor generating theories of the mind anymore. Instead, THE BRAIN IS A COMPUTER AND THE MIND IS ITS PROGRAM is regarded as a literal and true statement. As Searle points out at the beginning of his paper, the strong AI view claims that "the appropriately programmed computer really *is* a mind, in the sense that computers given the right programs can be literally said to *understand* and have other cognitive states" (Searle, 2000, p. 353). Thus THE BRAIN IS A COMPUTER AND THE MIND IS ITS PROGRAM, which was originally considered to be a metaphor whose mappings can help explain what the mind is, is taken as a literal comparison by proponents of the strong AI view. Also, the comparison operates in both directions so that we cannot only think of a mind as a computer program, but that we can also consider a computer program to be capable of cognition.

In his paper, Searle argues that this comparison is not appropriate. According to Searle, computer programs are not capable of cognition, primarily because they are lacking the physical and chemical requirements of our brain (Searle, 2000, p. 367). A considerable part of Searle's argument is based on elaborate metaphorical analogies. In the following, I will analyze the two major metaphorical analogies in Searle's (2000) argumentation. These two central metaphorical analogies both involve the metaphor THE BRAIN IS A COMPUTER AND THE MIND IS ITS PROGRAM or its short form A BRAIN'S MIND IS A COMPUTER PROGRAM. The first metaphorical analogy I will analyze centers on the well-known Chinese Room Thought Experiment. Afterwards, I will analyze the second key analogy, which I labeled the Stomach Example.

3.1.1 Searle's first major metaphorical analogy: *The Chinese Room Thought Experiment*

At the beginning of his paper, Searle (2000, p. 354) describes work by Schank and Abelson (1977), as proponents of the strong AI view allegedly use this work as support for the claim that computers (or their programs) are capable of human understanding. In particular, a computer program developed by Schank and Abelson (1977) which aims at simulating human story understanding is taken as evidence for the strong AI claim (cf. Searle, 2000, p. 354). Searle, however, does not agree

with this reasoning and devotes the first part of his refutation of the strong AI claim to showing why Schank and Abelson's computer program cannot be considered as evidence for computer (programs) possessing actual cognition. According to Searle (*ibid.*), proponents of the strong AI claim equate Schank and Abelson's (1977) computer simulation of human story understanding with human cognition in general, because of the following sub-comparisons. In Schank and Abelson's simulation, the computer receives input, that is, a story, just like the brain of a human being would do. The input is then processed by a special program, which is compared to what the mind would do. Afterwards, the computer is asked questions about the story that go beyond what was explicitly stated in the story. Thus, in order to give human-like answers to these questions, the computer (program) has to engage in inferencing, which is usually a feature reserved for human cognition. And indeed, Schank and Abelson's computer program produces output that is indistinguishable from human-generated answers. Proponents of the strong AI claim take this to mean that understanding takes place. They then generalize that cognition can essentially be defined as 'receiving input – having the appropriate program process it – producing (human-like) output.' Note that all of these comparisons are based on the metaphor *A BRAIN'S MIND IS A COMPUTER PROGRAM*.

In order to prove the proponents of the strong AI view wrong in regard to their claim that Schank and Abelson's computer program is capable of human cognition, Searle creates a complex and elaborate source domain scenario which is supposed to be mapped onto the entire reasoning described above. This means that the target domain of Searle's newly invented metaphor is in fact the original metaphor *A BRAIN'S MIND IS A COMPUTER PROGRAM*. As the target domain of Searle's metaphorical analogy is in fact a metaphor itself, it consists of two parts: the operation of computer programs such as Schank and Abelson's (1977) and the operation of minds. Thus, this bipartite target domain comprises a source domain, *OPERATION OF COMPUTER (PROGRAMS)*, and a target domain, *OPERATION OF A BRAIN'S MIND*. These two parts of the general target domain are supposed to be compared to one another. However, unlike the proponents of the strong AI claim, Searle's goal of this (metaphorical) comparison is to demonstrate that this comparison is unacceptable. These complexities of the target domain of Searle's first metaphorical refutation of the strong AI claim are illustrated in Figure 1.

The bipartite target domain with the embedded metaphor *A BRAIN'S MIND IS A COMPUTER PROGRAM* suggests that Searle has to provide an equally complex source domain from which to consider the various aspects of the target domain as well as the comparison within the target domain. Indeed, Searle provides a quite detailed description of a newly created source domain, which consists of two parts (Searle,

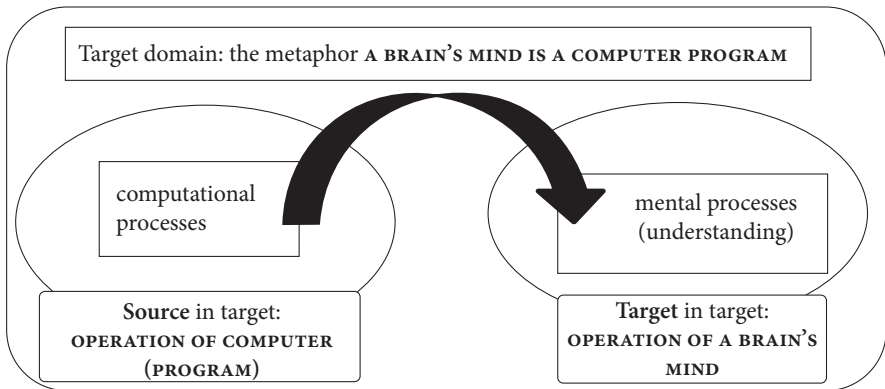


Figure 1. Complex bipartite target domain of Searle's first metaphorical refutation of the strong AI view

2000, p. 355).⁶ Both parts are relatively rich scenarios in which Searle, similar to the computer in Schank and Abelson's simulation of story understanding, receives written stories to which he responds in the form of answers to questions about these stories. Due to the Chinese symbols involved in the first scenario, this source domain is known as the Chinese Room Thought Experiment.

Searle starts his Chinese Room Thought Experiment with what I call the *Chinese Scenario*. This is also the most elaborate of the two source domain scenarios. Example (1) below is an excerpt of Searle's article which illustrates the most important aspects of the *Chinese Scenario* of the source domain CHINESE ROOM THOUGHT EXPERIMENT.

- (1) *Suppose that I'm locked in a room and given a large batch of Chinese writing. Suppose furthermore (as is indeed the case) that I know no Chinese, either written or spoken [...]. To me, Chinese writing is just so many meaningless squiggles. Now suppose further that after this first batch of Chinese writing I am given a second batch of Chinese script together with a set of rules for correlating the second batch with the first batch. The rules are in English and I understand these rules [...]. Now suppose also that I am given a third batch of Chinese symbols together with some instructions, again in English, [...] and these rules instruct me how to give back certain Chinese symbols*

6. Searle's newly constructed source domain also consists of scenarios that are invented, that is, that do not naturally exist in our environment. Wee (2005) calls such invented source domains 'constructed sources'. In his paper (ibid.), Wee shows that such constructed sources function as discourse strategies. The presently discussed source domain invented by Searle is one of the striking examples provided and analyzed in Wee's (2005) paper.

with certain sorts of shapes in response to certain sorts of shapes given to me in the third batch . (Searle, 2000, p. 355; emphasis mine)⁷

As we can see in Example (1), Searle constructs a scenario that is in some ways similar to Schank and Abelson's (1977) computer program which aims at simulating human story understanding. Searle receives a large batch of Chinese writing, which is similar to feeding a computer with scripts. In both cases, the recipients are supplied with information about stereotypical structures of everyday situations, and this information is necessary to answer questions, for instance, questions about stories involving such prototypical situations. The second batch of Chinese symbols in Searle's source domain is supposed to be mapped onto the story that the computer was given in Schank and Abelson's simulations. Similarly, the third batch of the Chinese symbols Searle receives in Example (1) is to be mapped onto the questions Schank and Abelson's computer was provided with. Lastly, in order to be able to create answers in Chinese despite being unable to understand either the Chinese questions or the Chinese answers he produces, Searle receives English rules that allow him to correlate the different symbols he does not comprehend – in a way that native speakers of Chinese are tricked into thinking that the answers he produces are generated by an actual Chinese speaker. This last aspect of the source domain supposedly corresponds to the program that the computer in Schank and Abelson's simulations of story understanding uses. Interestingly, Searle (2000, p. 355) explicitly spells out these intended mappings from source (*Chinese Scenario*) to target domain (OPERATION OF COMPUTER (PROGRAM)) after he describes the *Chinese Scenario* illustrated in Example (1). Thus, the readers know exactly which aspects of the partial target domain OPERATION OF COMPUTER (PROGRAM) (see Figure 1) to understand in terms of what particular aspects of the source domain's *Chinese Scenario*.

This intended mapping from the *Chinese Scenario* to the target domain part OPERATION OF COMPUTER (PROGRAM) is illustrated in Figure 2. As Figure 2 also shows, the other part of the general source domain CHINESE ROOM THOUGHT EXPERIMENT is still missing. In his academic paper, Searle continues by filling this gap. He provides another scenario, which I call the *English Scenario*. This second part of the source domain is described in less detail, as it is something the prototypical reader of Searle's article is quite familiar with, as the excerpt in Example (2) demonstrates:

- (2) Now just to complicate the story a little, imagine that these people [who gave Searle the batches of Chinese symbols, etc. in Example (1)] *also give me stories in English, which I understand, and then they ask me questions in*

7. In the examples throughout this chapter, I highlight metaphorically used words in bold and italics. Underlined constructions signal the use of metaphors.

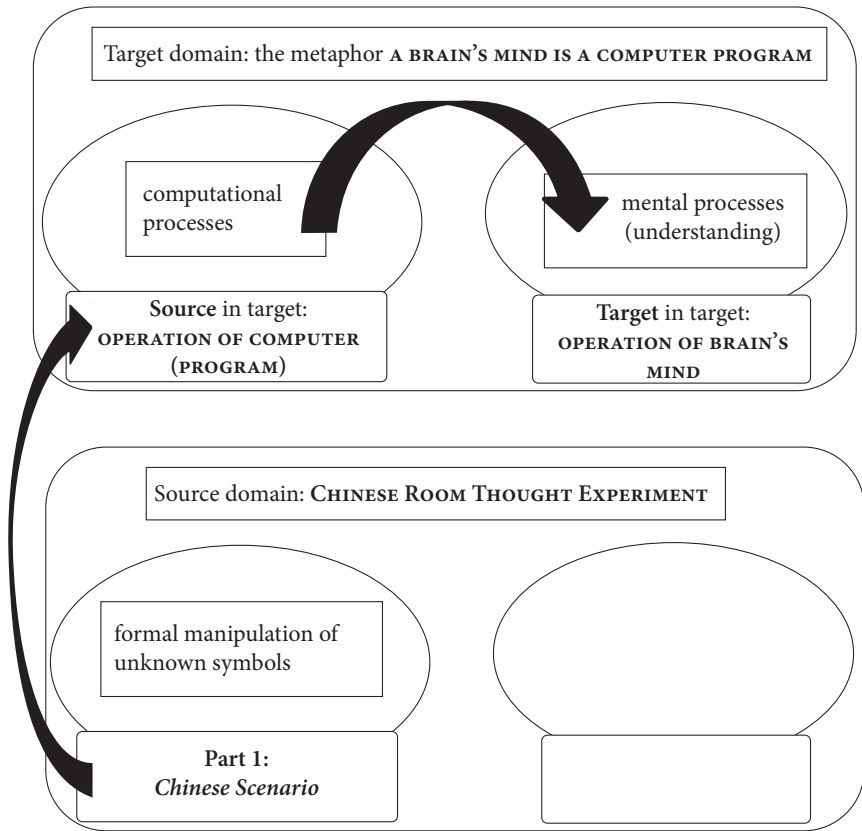


Figure 2. Partial source domain and target domain of Searle's first metaphorical refutation of the strong AI view.

English about these stories, and I give them back answers in English .

(Searle, 2000, p. 355)

Apart from the aspect of being locked in a room (see beginning of the source domain scenario in Example (1) above), the scenario that Searle describes in Example (2) is probably very familiar to most English speakers. Crucially, everyone who has ever heard or read a story in his mother tongue and answered questions about it afterward, will agree that the process that took place between listening to, or reading, the story and answering questions about it is in fact what we call *understanding*. Furthermore, this kind of understanding is usually considered an instance of human cognition in general. Thus, the *English Scenario* that Searle describes in Example (2) can be considered as an example of mental processes and therefore corresponds to the target domain part OPERATION OF BRAIN'S MIND in the general target domain A BRAIN'S MIND IS A COMPUTER PROGRAM (see Figure 2).

The correspondences between the *Chinese Scenario* of the source domain and OPERATION OF A COMPUTER (PROGRAM) of the target domain on the one hand, and the correspondences between the *English Scenario* in the source domain and OPERATION OF A BRAIN'S MIND in the target domain on the other hand, are quite important for Searle's refutation of the strong AI claim. However, the crucial aspect of his metaphorical analogy is that the reader comes to the conclusion that the *Chinese Scenario* and the *English Scenario* involve two quite distinct processes. Even though both scenarios look alike from outside the Chinese Room, the processes taking place *in* the room are vastly different. The *English Scenario* involves mental processes in form of story understanding whereas the *Chinese Scenario* is merely mechanical symbol manipulation according to a set of rules.

Since each of these two scenarios of the source domain CHINESE ROOM THOUGHT EXPERIMENT corresponds to one of the two parts of the target domain A BRAIN'S MIND IS A COMPUTER PROGRAM, the conclusion to be drawn from this complex metaphorical analogy is that just like the two scenarios in the source domain, the two elements of the target domain are quite distinct: Computational processes are as dissimilar to mental processes as the processes in the *Chinese Scenario* are dissimilar to those in the *English Scenario*. Therefore, a brain's mind is not at all a computer program and Schank and Abelson's computer simulation of human understanding cannot be seen as evidence for cognition in computers. The conclusion that the metaphor A BRAIN'S MIND IS A COMPUTER PROGRAM cannot be taken as literal truth is the intended outcome of Searle's invitation to follow his complex metaphorical reasoning of the Chinese Room Thought Experiment. I summarize the different metaphorical comparisons of Searle's Chinese Room Thought Experiment as the first metaphorical refutation of the strong AI claim in Figure 3.

After this first metaphorical refutation of the strong AI claim, Searle continues his article by providing people's reactions to the Chinese Room Thought Experiment. Interestingly, these people are researchers or workers within the field of Artificial Intelligence, most of whom disagree with Searle and reject his metaphorical analogy of the Chinese Room Thought Experiment. In his paper, Searle categorizes the AI researchers' responses and replies to each category, rebutting their arguments. One of these rebuttals is closely connected to the metaphor THE BRAIN IS A COMPUTER AND THE MIND IS ITS PROGRAM. I will continue my analysis with this second metaphorical analogy, which is the foundation of this particular rebuttal.

3.1.2 Searle's second major metaphorical analogy: The stomach example

Searle's rebuttal of what he calls the "systems reply" is based on another metaphorical analogy, which is very similar to the one I have analyzed in the previous

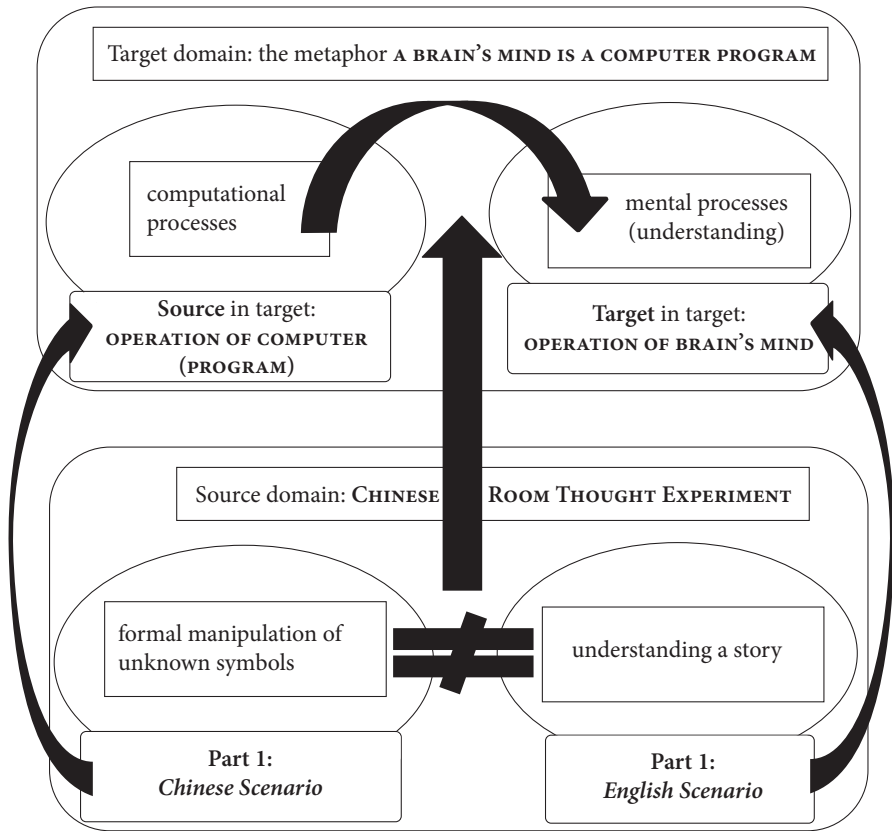


Figure 3. Complete source and target domain of Searle's first metaphorical refutation of the strong AI view.

sub-section. Due to space limitations, I will not recount the “systems reply”, since it is very similar to the general strong AI view, so that Searle's metaphorical argument refuting the “systems reply” can even be understood without a summary of the reply. In Searle's metaphorical rebuttal of the “systems reply”, the reader is once more faced with a bipartite source and target domain. Again the target domain constitutes the original metaphor A BRAIN'S MIND IS A COMPUTER PROGRAM. Thus, the changes in this second metaphorical analogy concern its source domain.

Searle (2000, p. 360) points out that the “systems reply” equates cognition with having input, output and a program in between – which is essentially what the strong AI view believes, on the grounds of Schank and Abelson's (1977) simulations discussed above. In order to point out another (in his words “absurd”) aspect of such an equation, Searle provides the reader with another source domain from which to consider the strong AI claim/the “systems reply”. The difference to the CHINESE ROOM THOUGHT EXPERIMENT source domain is, essentially, that there is

no human agency involved anymore. Searle's metaphorical argument is illustrated in Example (3):

- (3) If we are to conclude that there must be cognition in me on the grounds that I have a certain sort of input and output and a program in between, then it looks like all sorts of noncognitive subsystems are going to turn out to be cognitive. For example, *there is a level of description at which my stomach does information processing, and it instantiates any number of computer programs, but I take it we do not want to say that it has any understanding.*
(Searle, 2000, p. 360)

In the excerpt in Example (3), Searle first reminds the reader of the topic of his argumentation, that is, that the metaphor A BRAIN'S MIND IS A COMPUTER PROGRAM (target domain) is not literally true. Both parts of the target domain are indicated in the first half of the first sentence in Example (3). The word *cognition* points at the target domain part OPERATION OF BRAIN'S MIND. Searle then designates the other target domain part OPERATION OF COMPUTER (PROGRAM) by mentioning the main constituents *input*, *output* and *a program*. The truth of the metaphorical comparison within the target domain is rejected in the second half of the sentence. Searle argues that taking the metaphor A BRAIN'S MIND IS A COMPUTER PROGRAM literally would mean that all kinds of non-cognitive subsystems featuring input, output and a program were able to engage in cognitive processes.

While this argumentation might still be somewhat abstract, Searle skillfully continues by providing an example of another possible non-cognitive subsystem, his stomach. *Stomach* functions as part of the source domain that Searle creates for the reader to think about the target domain A BRAIN'S MIND IS A COMPUTER PROGRAM. Using the stomach as part of the source domain is effective, since all readers are quite familiar with a stomach and they will in all probability agree with Searle's next point, which is that whatever a stomach does is far removed from understanding and cognition. This comparison between processes of a stomach and processes of a brain constitutes the source domain of Searle's second major metaphorical analogy for the refutation of the strong AI claim. Just as in Searle's first main metaphorical analogy analyzed above, the conclusion that the two processes (stomach processes versus brain processes) of the source domain have nothing in common is supposed to be mapped onto the comparison established in the target domain A BRAIN'S MIND IS A COMPUTER PROGRAM. Thus, Searle's second metaphorical attempt at refuting the strong AI claim has a structure very similar to the first one. Furthermore, three of the four components of the metaphorical analogy are almost identical. This second major metaphorical analogy is illustrated in Figure 4.

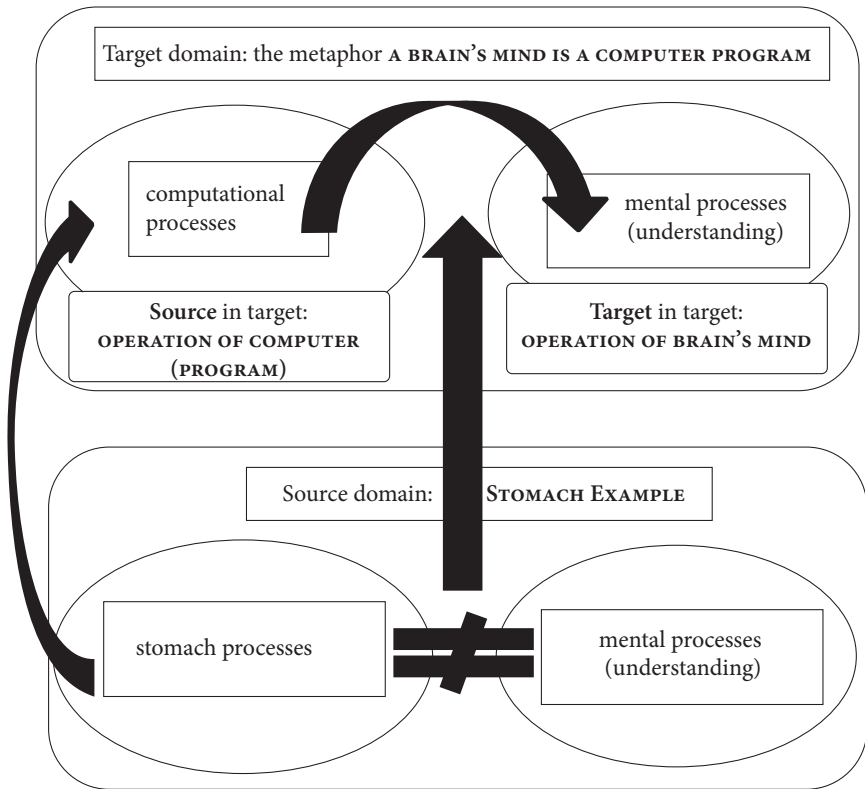


Figure 4. Searle's second metaphorical refutation of the strong AI view: The Stomach Example.

As we can see in Figure 4, the target domain in Searle's second metaphorical analogy refuting the strong AI claim is identical to his first metaphorical analogy (see Figure 3). The source domain in Figure 4 features mental processes, which is a more general version of the story understanding in the *English Scenario* of the CHINESE ROOM THOUGHT EXPERIMENT. At the same time, it is identical to part of the target domain, so that there is no mapping necessary between these source and target domain parts. The left-hand side of Figure 4 shows that the reader is to understand computational processes in term of stomach processes. Their shared aspects are, according to Searle in Example (3) above, the very features that the AI researchers with the "systems reply" apparently identified as necessary and sufficient to describe mental processes: receiving input, instantiating a program, and producing output (accordingly). As the straight arrow in Figure 4 indicates, the crucial aspect of Searle's analogy is that the discrepancy between the processes of the source domain is mapped onto the relation between the processes of the

target domain. Thereby, Searle once more refutes the literal truth of the metaphor A BRAIN'S MIND IS A COMPUTER PROGRAM.

As I have demonstrated throughout this section, the two main metaphorical analogies that Searle (2000) uses in his paper "Minds, brains, and programs" to refute the strong AI claim are both inseparable from the original *computer metaphor*, as they both use its shortened version as their target domains. A year after Searle's initial publication of "Minds, brains, and programs", Hofstadter and Dennett (2000a) reject Searle's two metaphorical analogies by pointing out flaws in the alleged correspondences. They do so by employing even more metaphors in their argumentation, as the following section will point out. These metaphors are consequently also connected to the original metaphor A BRAIN'S MIND IS A COMPUTER PROGRAM.

3.2 Hofstadter and Dennett's rebuttal of Searle's metaphorical rejection of the strong AI claim

Unlike Searle, Hofstadter and Dennett have more faith in the possible truth of the metaphor A BRAIN'S MIND IS A COMPUTER PROGRAM. The conclusion of their reflections is that

[m]inds exist in brains and may come to exist in programmed machines. If and when such machines come about, their causal powers will derive not from the substances they are made of, but from their design and the programs that run in them. (Hofstadter & Dennett, 2000a, p. 382)

As Hofstadter and Dennett seem to approve of the strong AI claim, the aim of their reflections is to point out flaws in Searle's (metaphorical) argument so that his refutation of the strong AI claim is nullified. Since much of Searle's reasoning is communicated via metaphor, Hofstadter and Dennett recontextualize Searle's main metaphors in their reflections.

At the outset of their reflections, Hofstadter and Dennett (2000a, p. 373) acknowledge that Searle's entire argumentation throughout his article hinges on the Chinese Room Thought Experiment. Accordingly, they spend the majority of their reflections on Searle's paper tearing apart the metaphorical analogy involving the Chinese Room Thought Experiment. In their recontextualizations of Searle's complex analogy, they take different aspects and elaborate them in order to show that the analogy is inadequate and can therefore not disprove the strong AI claim. It would go beyond the scope of this contribution to present all recontextualizations of Searle's Chinese Room Thought Experiment metaphor. I will therefore demonstrate the general principle of Hofstadter and Dennett's recontextualizations by providing one example. The excerpt in Example (4) below shows how

Hofstadter and Dennett reject the correspondence between the *Chinese Scenario* of the source domain and OPERATION OF A COMPUTER (PROGRAM) in the target domain of Searle's analogy.

- (4) *We find it hard enough to memorize a written paragraph; but Searle envisions the demon* [i.e., Searle as the human agent in the *Chinese scenario*]⁸ *as having absorbed what in all likelihood would amount to millions, if not billions, of pages densely covered with abstract symbols – and moreover having all of this information available, whenever needed, with no retrieval problems.* (Hofstadter & Dennett, 2000a, p. 375)

As Example (4) demonstrates, Hofstadter and Dennett do not simply reject Searle's *Chinese Scenario*, but they change it. Instead of simply rejecting the entire metaphorical analogy, they reject a correspondence and provide a more detailed version of the actions in the *Chinese Scenario* to support their argument. Remember that in Searle's metaphor version, Searle merely stated that he (called *demon* in Example (4)) received batches of Chinese symbols along with English rules that allow him to correlate these symbols and produce more Chinese symbols without understanding any Chinese. The reader was supposed to map this process onto the partial target domain, that is, OPERATION OF A COMPUTER (PROGRAM). As we can see in Example (4), though, Hofstadter and Dennett modify the *Chinese Scenario* by providing a much more detailed version of the actions of the human being (or demon) in this scenario. This recontextualization is supposed to give the reader a more realistic description of the actions of the human being in the *Chinese Scenario* that would correspond to what a computer (program) does when simulating story understanding.

The elaboration is more detailed in two aspects: (1) the necessary amount of pages of what Searle just called "a batch" of Chinese symbols and (2) the fact that correlating and producing symbols would in fact mean memorizing and retrieving an incredible amount of symbols. The point of this recontextualization by elaboration is to convince the reader that it is impossible for a human being to perform such tasks.⁹ Additionally, in the very first sentence of Example (4), Hofstadter

8. Calling the human agent in Searle's Chinese scenario "Searle's demon" or "demon" is indicative for Hofstadter and Dennett's general tone in their reflections on Searle's paper. Their reflections are characterized by evaluative comparisons and labels, sarcasm, and the like.

9. Also note that while Searle's metaphorical *Chinese Scenario* conveyed the message that a computer simulating story understanding engages in something 'less intelligent' than actual human understanding of stories (mechanical matching of symbols), Hofstadter and Dennett's recontextualization of this partial source domain can be said to send the opposite message. Their more detailed account of the actions in the *Chinese Scenario* suggests that the computer is capable of carrying out tasks whose complexity is beyond a human being's ability to perform.

and Dennett skillfully set up the opposition between what normal human beings already find difficult to do (memorizing a written paragraph) and what Searle suggests a human is capable of. The reminder of the difficulties some people have memorizing a single paragraph adds to the persuasive power of the recontextualization of the *Chinese Scenario* metaphors. It probably makes the reader even more likely to draw the intended conclusion that the centerpiece of Searle's entire analogy of the Chinese Room Thought Experiment is flawed and can therefore not be considered as an argument against the strong AI claim. Thus, Hofstadter and Dennett's recontextualizations of Searle's metaphors, just as Searle's original metaphor use, also have a persuasive function in an argumentative text type.¹⁰

Apart from frequent recontextualizations of Searle's central metaphorical analogy involving the Chinese Room Thought Experiment, Hofstadter and Dennett (2000a) also recontextualize the second key analogy in Searle's (2000) article "Minds, brains, and programs", that is, the Stomach Example. As the excerpt in Example (5) below demonstrates, Hofstadter and Dennett recontextualize the Stomach Example not by elaborating on particular aspects, but by over-simplifying the metaphorical analogy and using part of it as a target domain which they embed in their own novel metaphorical analogy:

- (5) If you can see all the complexity of thought processes in a churning stomach, then *what's to prevent you from reading the pattern of bubbles in a carbonated beverage as coding for the Chopin piano concerto in E minor? And don't the holes in pieces of Swiss cheese code for the entire history of the United States? Sure they do – in Chinese as well as in English. After all, all things are written everywhere! Bach's Brandenburg concerto no. 2 is coded for the structure of Hamlet – and Hamlet was of course readable (if you'd only known the code) from the structure of the last piece of birthday cake you gobbled down.* (Hofstadter & Dennett, 2000a, p. 381–382)

The first sentence in Example (5) is a rhetorical question in which Hofstadter and Dennett establish a metaphorical analogy. The analogy indicates that Searle's metaphorical comparison of thought processes and a churning stomach is comparable to reading the pattern of bubbles in a carbonated beverage as coding for a certain musical composition. The structure of Hofstadter and Dennett's analogy in Example (5) thus follows the pattern we saw in Searle's analogies of the Chinese Room Thought Experiment and Stomach Example. That is, Hofstadter and

10. For different functions of metaphors in scientific texts, including a persuasive function, see Semino (2008, p. 134), who incidentally also analyzes a text by Daniel Dennett (Semino, 2008, pp. 125–134). Also see Semino, Deignan and Littlemore (2013, pp. 45–46) for the interplay of an explanatory function and a persuasive function in a single metaphor.

Dennett compare two entities that have nothing in common (bubbles in a carbonated beverage and the Chopin piano concerto in E minor) and subsequently map the resulting incongruity onto a comparison in the target domain of the analogy (see Figure 5). Hofstadter and Dennett's analogy in Example (5) recontextualizes Searle's Stomach Example metaphors by turning the source domain comparison of Searle's analogy (see Figure 4) into the target domain of their own analogy. The function of their resulting analogy is also a persuasive one: Hofstadter and Dennett try to convince the reader that the two elements in the target domain do not share anything (important).

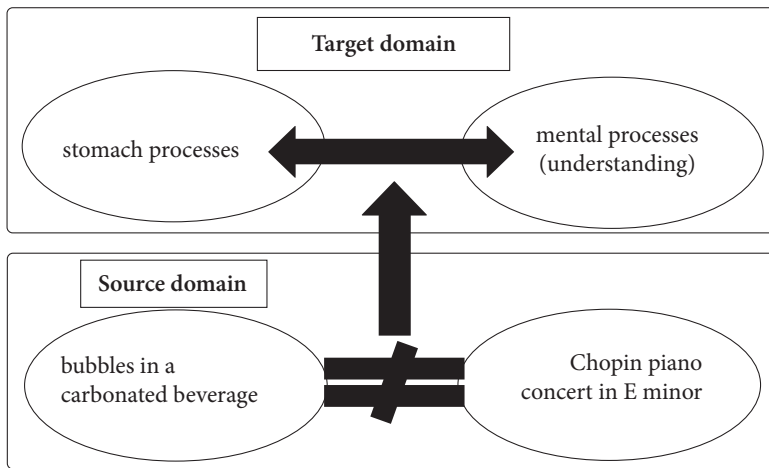


Figure 5. Hofstadter and Dennett's metaphorical rebuttal of Searle's stomach example.

As we saw earlier, Searle's argument involving the Stomach Example hinges on urging the reader to consider the strong AI claim from the perspective of the source domain comparison. By using Searle's source domain comparison as their own target domain, Hofstadter and Dennett's can point out flaws in the foundation of Searle's reasoning in the Stomach Example. Since Hofstadter and Dennett substantially weaken Searle's refutation of the strong AI claim with their analogy in Example (5), they indirectly support the strong AI claim and thus the possible truth of the metaphor *A BRAIN'S MIND IS A COMPUTER PROGRAM*. This is the exact opposite of what Searle tried to accomplish with deliberate metaphors of the Stomach Example.

The analysis of the first sentence of Example (5) and Figure 5 seem to reveal the structure and the function of Hofstadter and Dennett's partial rebuttal of Searle's Stomach Example. Yet, the logic of their argumentation in the analogy (or analogies) in Example (5) may not be entirely clear. Their analogy aims at ridiculing Searle's comparison between stomach processes and mental processes.

However, this is also precisely the point in Searle's Stomach Example. Otherwise, Searle could not have mapped the impossibility of comparing stomach processes and brain processes onto the metaphor A BRAIN'S MIND IS A COMPUTER PROGRAM in the target domain of the Stomach Example. Thus, even though Hofstadter and Dennett's recontextualization of Searle's Stomach Example analogy attempts to refute Searle's rebuttal of the strong AI claim, it remains unclear which step in Searle's metaphorical reasoning Hofstadter and Dennett criticize with their analogies in Example (5).

Also note that Hofstadter and Dennett's analogy in Example (5) can be considered a simplification of Searle's Stomach Example, as it only takes into account the analogy's source domain. They do not reuse Searle's entire analogy, but only embed part of it for their local rhetorical purposes. However, despite their own simplification, Hofstadter and Dennett are able to insinuate that it is Searle who oversimplifies matters. This is indicated by the use of hyperbole in Example (5). Hofstadter and Dennett use increasingly absurd comparisons, such as comparing holes in Swiss cheese to the history of the United States, for their analogy's source domain. This form of humor mixed with the deliberate metaphors results in ridiculing Searle's metaphorical argumentation. By providing progressively grotesque comparisons, culminating in the structure of Hamlet being readable from the structure of a piece of already eaten (!) birthday cake, Hofstadter and Dennett may even portray Searle as slightly insane.

In summary, the analysis of Hofstadter and Dennett's recontextualizations of Searle's most important deliberate metaphors demonstrated how metaphors can be taken out of their original context and, by carrying out some well-thought-out modifications, can be used for other purposes in a different discourse event. In this case, Hofstadter and Dennett's recontextualizations of Searle's metaphors have the desired effect of dismantling Searle's argumentation in his refutation of the strong AI claim, and perhaps of discrediting Searle in general.

All of the deliberate metaphors analyzed this far center on the metaphor that constitutes our starting point, THE BRAIN IS A COMPUTER AND THE MIND IS ITS PROGRAM, as all of them are used to argue for or against the literal truth of this metaphor. Furthermore, we saw that the deliberate metaphors in both academic papers are of paramount importance in the philosophers' argumentation. The reader is also forced to consider the topics of the argumentation from the view of the metaphors' source domains, since these are newly constructed, quite elaborate, and in some instances even sprinkled with other rhetorical devices such as hyperbole. Thus, the deliberate metaphors presented so far are in all probability used by the readers in order to make sense of the arguments presented. The highly persuasive function of all deliberate metaphors analyzed here may therefore have quite some effect on readers' views on the mind.

Another feature that all deliberate metaphors in the academic articles by the three philosophers share is that they are carefully planned. The next point in the life of the metaphor THE BRAIN IS A COMPUTER AND THE MIND IS ITS PROGRAM that I want to consider here will take us to a more spontaneous discourse event. It takes place approximately 30 years after the publication of the philosophical argument between Searle and Hofstadter and Dennett. In 2010, a lecture in Philosophy of Mind at a US-American college centers on 'the same old question', that is, whether or not computer programs are capable of human understanding. Thus, the literal truth of the metaphor THE BRAIN IS A COMPUTER AND THE MIND IS ITS PROGRAM is once more contemplated.

Additionally, the students of this course have read the two texts analyzed hitherto (Hofstadter & Dennett, 2000a; Searle, 2000) and the professor as well as the students directly address the texts over the lecture, sometimes even by reading out passages. Since the argumentation in both academic texts is highly metaphorical, the main metaphors analyzed above are recontextualized in the philosophy lecture. In the following sub-section, my analysis focusses on three recontextualizations of Searle's Stomach Example, two of them by the professor of the lecture and the third by a student. The analysis examines if the forms and the functions of the recontextualized metaphors are different from those in Hofstadter and Dennett's text, as a lecture is usually considered to be explanatory rather than argumentative.¹¹ Furthermore, I will investigate if the professor's recontextualizations of Searle's deliberate metaphors further the students' understanding of Searle's concept of the mind.

3.3 A professor's recontextualizations of Searle's stomach example analogy in a philosophy lecture

The philosophy lecture starts with a student being allowed to initiate a discussion about a topic of his choice (from the homework readings by Searle, Hofstadter and Dennett). Incidentally, the student picks the Stomach Example by Searle and reads out part of the excerpt in Example (3) above. To ease reading, I provide this part again as Example (6).

11. What I call explanatory is also called informational, for instance by Biber (2006). Biber's analysis of university lectures shows that they have "a primary informational focus" (Biber, 2006, p. 136). Even though a persuasive function of academic lectures is thus de-emphasized, this does not mean that they are completely objective. Biber (2006, pp. 116–117) also finds that lecturers, to varying degrees, convey their own stance on the content of a course.

- (6) For example, *there is a level of description at which my stomach does information processing, and it instantiates any number of computer programs, but I take it we do not want to say that it has any understanding*.
(Searle, 2000, p. 360)

The professor, being faced with this quote and being forced to react to it on the spot, makes several attempts to explain the context as well as the meaning of this short Searle quote. In each of these attempts, he recontextualizes Searle's metaphors. All of those recontextualizations are interesting, and most of them are also problematic in regard to how adequately they express or explain Searle's view on the mind. Due to space limitations, I will concentrate on the most intriguing recontextualizations of the Stomach Example in the philosophy lecture. The first instance is presented in Example (7) below.

- (7) (...) we can define the stomach in the exact same way that the computationalists define the brain. Right? *We don't wanna say that what the stomach is doing is thought or understanding or awareness*. Likewise, you know, since the brain is doing exactly the same thing, it's just, you know, slightly – or quite a bit – more complex, uh, it's just doing the exact same sorts of things and so, you know, if *we don't call the stomach a mind*, therefore we shouldn't call the brain a mind.

There are several problems with the professor's explanation and metaphor recontextualization in Example (7). In fact, the first (partial) sentence is already problematic. The professor establishes a comparison between the stomach and the computationalists' definition of the brain (i.e., the strong AI claim). While this is not exactly wrong, the comparison either blends together the target domain elements in Searle's Stomach analogy or it ignores an important step. If we look back at Example (3) and Figure 4, we can see that Searle uses the stomach to compare it to a computer, not the brain. While it is true that the brain in strong AI is considered to be identical to a computer, leaving the computer out of the explanation of the analogy ignores the metaphor *A BRAIN'S MIND IS A COMPUTER PROGRAM* as a target domain in Searle's analogy. However, spelling out this comparison is vital, since Searle's metaphorical argument intends to show that this comparison in the target is improper. The professor's simplification of Searle's Stomach Metaphor results in the failure to spell out the entire analogy. Therefore, the relationship between the target domain elements is not properly established, which probably leads to the troublesome last sentence in Example (7), where we find a severe misrepresentation of Searle's argumentation and also of his general view on the mind in relation to the brain.

Before the professor's misrepresentation of Searle's view on the mind, he accurately establishes the source domain of Searle's Stomach Example (first part marked

in bold and italics in Example (7)). The professor then returns to the target domain of Searle's analogy (signaled by the word *likewise*) and incorrectly represents it. In the professor's faulty version of Searle's Stomach Example, the brain is doing the same as the stomach, just in more detail. This is the exact opposite of what Searle's analogy establishes (see Figure 4). Searle's comparison between stomach processes and brain processes does not take place in his analogy's target domain, but in its source domain. The point of this comparison in the source domain is, as we have seen, that the two processes have nothing in common, as one involves understanding and the other one does not.

While the first part of the sentence introduced by *likewise* is quite a problematic recontextualization of Searle's Stomach Example, the professor's conclusion in Example (7) takes the misrepresentation of Searle's view on the mind even further. Whereas the professor suddenly correctly repeats Searle's source domain implication that a stomach should not be considered a mind (last clause in bold and italics), he concludes that this means we should not consider brains as minds.

The professor's recontextualization of Searle's deliberate metaphors establishes a target domain with a comparison between brains and minds (the last clause in Example (7)). Such a comparison is not part of Searle's analogy of the Stomach Example, or any of his other analogies. As I established earlier, the target domain in both of Searle's key analogies is the metaphor A BRAIN'S MIND IS A COMPUTER PROGRAM and not a comparison between brain and mind. What makes this incorrect representation of the target domain worse is that throughout his paper "Minds, brains, and programs", Searle argues for a quite embodied notion of the mind. In Searle's opinion, the biochemistry of the brain is the only thing that is capable of giving rise to a mind. However, the professor's conclusion in Example (7) that "we shouldn't call the brain a mind" is quite misleading in regard to Searle's overall view on the mind.

While the misrepresentation of Searle's view on the mind (Example (7)) is rather problematic, it could be argued that this is just a brief slip-up by the professor. He may merely have mixed up elements of the analogy in this one instance. Furthermore, we do not even know if these analogies have any influence on the students' reasoning. However, the immediate progression of the philosophy lecture attests that these objections are not correct. Immediately after the professor's turn, whose end is represented in Example (7), a student challenges Searle's metaphorical analogy in the Stomach Example. The brief dialog between the student and the professor is expressed in Example (8) below.

- (8) a. Student: I don't really see how food is the same as data –
- b. Prof: Uhu.

- c. Student: – like, uh, isn't food – wouldn't that be more comparable for the machine being charged or something? Like its (?zest?)¹²
- d. Prof: Yeah, ummm, Ken?

Example (8) shows that the student questions the accuracy of part of the mapping in Searle's Stomach Example (8a), since she cannot see how food (part of the source domain) would correspond to data (part of the target domain). The student continues by providing an alternative partial mapping (8c) when she says that the source domain constituent *food* would better correspond to the target domain element *charging of computer*, probably because both food and recharging are necessary for the organism (source domain) and machine (target domain) to function. It is interesting that the student in Example (8) reestablishes Searle's original mapping (stomach to computer) immediately after the professor represented this mapping inaccurately (stomach to brain).

At the same time, though, she also uses an aspect in her comparison that Searle does not mention explicitly, which is *data*. *Data* as one of the aspects of the partial target domain COMPUTER PROCESSES is part of the professor's earlier metaphor recontextualization. Before the partial turn in Example (7) above, the professor elaborated on the exact processes involved in Searle's Stomach Example, mentioning *data* as one of the metaphor constituents. Hence, the student's utterances in Example (8) demonstrate that both Searle's original metaphorical analogy and the professor's metaphor recontextualizations have an impact on her reasoning about the perspectives on the mind presented in the homework readings (and in the lecture).

I will address possible implications of the student's partial ignorance of the professor's metaphor misrepresentation for metaphor in education in general later on in my conclusion. For now, I want to focus on the ensuing development of the lecture. As we can see in the last turn of the example above (8d), the professor's reaction to the student's recontextualization of Searle's metaphors in the Stomach Example is to ignore the student's suggestion of an alternative mapping. The professor does not immediately acknowledge the student's objections, but instead proceeds by giving the turn to another student, perhaps assuming that the other student wants to respond to the female student's criticism. In his turn, the next student calls attention to the fact that brain and stomach differ vastly in complexity. The professor responds to that by connecting this comment to Hofstadter and Dennett's (2000b) response to Searle's (2000) article, since what the second student pointed out is precisely the difference in complexity that Hofstadter and

12. Words surrounded by question marks in brackets indicate educated guesses by the author, as the respective part of the lecture was more or less inaudible.

Dennett criticize Searle for. Rather than pursuing Hofstadter and Dennett's criticism of Searle's paper any further, though, the professor takes a step back and once again explains Searle's Stomach Example. This is illustrated in Example (9) below.

- (9) But, you know, it's [stomach processes] basically, uh, you know, input, some sort of formally defined procedure, output. Right? And you know, that's the picture that computationalism gives us and that's all there is to thought, right? Some sort of input is perceived, some formally defined process is, uh, implemented and then there's some sort of output. Right? So, you know, the *stomach takes in food from the esophagus, which then, you know, churn, churn, churn, churn, bio, bio, bio, acid, acid, acid, whatever, then output into the intestines*. Um, and, you know, basically, if you take the computationalist model of thought at face value – that's what the brain is doing, right, it's receiving data, some formal process is implemented and then it outputs and that's all neurons are, right? It's just – they get input, do something, generate output. Um, and they're all, you know, formally defined, so, you know, *if we don't wanna think of a stomach, which is just a collection of cells, as thought*, then likewise we shouldn't think about the brain, which is just a collection of cells, as thought. Um, Jim, did you put your hand up?

Perhaps the professor's repetition of the explanation of Searle's Stomach Example, including much more elaborate metaphor recontextualizations (Example (9)), are a delayed reaction to the female student's challenges of the Stomach Example metaphors earlier in the lecture (Example (8)). Rather than moving on to Hofstadter and Dennett's criticism, he professor might provide this second explanation because the comment by the female student in Example (8) made him doubt that Searle's stomach analogy is completely understood yet. Another indicator that the female student in Example (8) might have triggered the professor's second problematic recontextualization of Searle's Stomach Example is that he quite explicitly presents how food relates to "what the stomach is doing". Probably in order to show that in Searle's analogy, food is not about keeping the organism functioning, the professor exemplifies different processes that food runs through when it is in the stomach (see first part in Example (9) in italics and bold). Thereby the professor reinforces the aptness of the *food-data* comparison that the female student challenged.

While this elaborate account of food processes might have illuminated the correspondences between stomach and computer processes, including the target domain constituent *data*, the professor fails to actually point this out. Instead, he reinforces the incorrect representation of Searle's stomach analogy. The first underlined part in Example (9) indicates the professor signaling a metaphorical comparison between the detailed recontextualization of the stomach part of Searle's source domain and the brain (rather than a computer). This repeated incorrect

mapping between STOMACH and BRAIN then leads to a reiteration of the wrong analogy in the second highlighted part in Example (9). Again, the professor claims that Searle concluded that we should not consider the brain as thought based on differences between the source domain parts STOMACH and THOUGHT. As we saw above, this is not at all what Searle argues in his metaphorical stomach analogy. Searle's target domain in the Stomach Example does not consist of a comparison between stomach and mind, but of the metaphor A BRAIN'S MIND IS A COMPUTER PROGRAM, whose literal truth is disproved by the overall analogy.

This second misrepresentation of Searle's argumentation in Example (9) is highly problematic in such an educational setting for at least two reasons. First, the professor's repeated metaphor recontextualizations occurs at an important point in the lecture, where it is even more likely that students pay particular attention to it. As we have seen in Example (8), shortly before the professor's recontextualizations in Example (9), a student has challenged the accuracy of one of the mappings in Searle's stomach analogy. The professor's turn in Example (9) constitutes the first response to this objection by the professor himself. Other students may have waited for the professor's view on the issue and would now be more alert than usual, perhaps also paying more attention to the exact words of the professor. Thus, the incorrect metaphor recontextualization might be even more likely to be noticed. Second, unlike the first incorrect metaphor recontextualization (see Example (6) above), this second problematic recontextualization is much more detailed, which adds to its prominence. The almost graphic details of the source domain part STOMACH PROCESSES make it almost impossible for the hearers not to attend to the source domain and consequently consider the target domain (COMPARISON BETWEEN BRAIN AND MIND) from the source domain's perspective. These two problematic aspects might result in students integrating the misrepresentation into their own reasoning about the mind. This reasoning, however, is far removed from the starting point of the philosophical and scientific debate about the mind, that is, the metaphor THE BRAIN IS A COMPUTER AND THE MIND IS ITS PROGRAM.

In the following last section of this chapter, I will summarize the path of this *computer metaphor* across the three stations considered here. I will also draw some tentative conclusions about the use of deliberate metaphors in scientific discourse and recontextualizations of these deliberate metaphors in educational contexts.

4. Summary and conclusion

This chapter examined three stations on the path of the influential metaphor THE BRAIN IS A COMPUTER AND THE MIND IS ITS PROGRAM. The metaphor was established in the 1960s as a theory-constitutive metaphor to theorize about the

nature of the mind. Later on, some researchers in Artificial Intelligence turned the metaphor into a literal truth, claiming that the mind is not just *like* a computer program, but literally *is* one. This is known as the “strong AI claim”. My analysis of three points in the lifetime of the *computer metaphor* started in 1980 when Searle argued against the literal truth of this metaphor in his paper “Minds, brains, and programs”.

Searle's argumentation is mainly based on a newly constructed and quite complex metaphorical analogy, featuring A BRAIN'S MIND IS A COMPUTER PROGRAM as the target domain. This analogy as a rebuttal of the strong AI claim is well-known as the Chinese Room Thought Experiment. The rich source domain scenarios (*Chinese Scenario* and *English Scenario*) of the analogy practically force the reader to consider the target domain comparison between computer programs and minds from the perspective of the analogy's source domain. Searle's other major metaphor in his refutation of the strong AI claim is the Stomach Example. This can be seen as an extension (or modification) of the Chinese Room Thought Experiment analogy. The Stomach Example is described in far less detail, but its structure is quite similar to the analogy of the Chinese Room Thought Experiment and it also features the comparison between computer processes and brain processes as its target domain. Thus, the *computer metaphor* is again at the heart of the metaphorical analogy. Both deliberate metaphors are carefully constructed to best accomplish their goal of persuading the reader of Searle's view on the mind.

The second point in the life of the *computer metaphor* that I examined took place a year after Searle's original publication of “Minds, brains, and programs”. Again, the question about the literal truth of THE BRAIN IS A COMPUTER AND THE MIND IS ITS PROGRAM is the object of an argumentative paper in the discourse of Philosophy of Mind. The philosophers Hofstadter and Dennett also address fellow experts with the purpose to persuade the reader of their view on the mind. However, their view is opposed to Searle's, granting the *computer metaphor* the potential to become literally true. Thus, their essay is a rebuttal of Searle's arguments and systematically disassembles his metaphorical analogies. Intriguingly, they do this by recontextualizing Searle's original metaphors.

The last station of the *computer metaphor* that I considered takes place approximately 30 years later and in a different discourse setting. Both Searle's and Hofstadter and Dennett's metaphorical arguments for or against the literal truth of the metaphor THE BRAIN IS A COMPUTER AND THE MIND IS ITS PROGRAM play an important role in a philosophy lecture, as this lecture is dedicated to these philosophers' views of the mind. In my analysis of metaphor use related to the *computer metaphor*, I focused on the professor's explanations of Searle's view on the mind. Specifically, I focused on explanations of Searle's reasoning in his analogy of the Stomach Example.

Unlike the previous types of discourse with a primarily argumentative function, an academic lecture is primarily explanatory in nature. In order to explain Searle's view on the mind, though, the professor has to recontextualize Searle's original metaphors of the Stomach Example, just like Hofstadter and Dennett had to, but for different purposes. The analysis of two of the professor's recontextualizations of Searle's Stomach Example metaphors has indicated several problematic aspects. Perhaps most troublesome is the fact that the professor changes the target domain of Searle's analogy to a comparison between brain and mind. Thus, the professor loses sight of the central point of Searle's metaphorical analogies, that is, the metaphor *A BRAIN'S MIND IS A COMPUTER PROGRAM* as the target domain. This modification of Searle's analogy necessarily results in a misrepresentation of Searle's view on the mind, as the topic of Searle's reasoning is not expressed correctly. Furthermore, with his flawed metaphor recontextualizations, the professor arrives at the troublesome conclusion that the brain and the mind are utterly disconnected. However, one of Searle's main claims throughout the paper "Minds, brains, and programs" is that brain and mind are deeply connected, as only a brain can give rise to a mind.

The professor's misrepresentations probably influence the students' concept of Searle's view on the mind. I argued that this is due to the heightened prominence of the professor's metaphors. This prominence, especially of the professor's second metaphor recontextualization analyzed here, results from detailed elaborations of a part of Searle's metaphorical analogy (stomach processes) and also from the point of the lecture at which it occurs. Indeed, my analysis of a student objection to a perceived mapping in Searle's Stomach Example showed that this student's reasoning is in fact making use of the metaphorical analogies of the texts and the lecture. Even though the student uses a metaphorical expression from the professor's incorrect representation of Searle's metaphors, which indicates that the professor's metaphor use influences her conceptualization of the topic, her reasoning is mostly based on Searle's original analogy of the Stomach Example, including the correct target domain (*A BRAIN'S MIND IS A COMPUTER PROGRAM*).

In light of the professor's repeated misrepresentation of Searle's Stomach Example, the student's accomplishment in not becoming confused seems extraordinary. It would be conceivable that the student "resists" the professor's incorrect metaphors, because she has a very good understanding of the original texts and a firm grasp on the complex metaphors that the reasoning of the philosophers is based on. Considering the complexity of the metaphorical analogies in the readings, though, I do not expect all of the students to have such a good understanding of the philosophers' figurative reasoning. Particularly weaker students probably have to rely much more on the professor's explanations of the two contradictory views on the mind that are expressed by the different authors. Thus, the detailed

and almost graphic metaphors that the professor uses in his recontextualizations of the Stomach Example are probably quite memorable so that especially weaker students (or students who have not read the papers at all) may construct distorted concepts of Searle's view on the mind.

Of course, any claims about the students' reasoning and the influence of the professor's (or the authors', for that matter) metaphor use on their conceptualizations are speculative and go beyond the scope of this linguistic analysis. Still, the linguistic evidence that we observed also included student utterances challenging a mapping aspect of the Stomach Example. This indicates that psycholinguistic experiments investigating the influence of the metaphorical analogies in the texts (and the lecture) would probably constitute a valuable future research project. If experimental research will show that such deliberate metaphors in educational settings greatly influence the students' conceptualizations of the topic, deliberate metaphors can be a powerful tool for educators. Deliberate metaphors are a tool to make students consider a specific topic from the point of view of the metaphor and reason from this standpoint. They can thus be powerful devices to help transforming lay perspectives of students into (more) expert ones, considering the topic from multiple viewpoints. At the same time, such results of experimental studies would also mean that educators have to be made more aware of the challenges deliberate metaphors also create, since wrong mappings may lead to a distorted concept of the respective topic. Thus educators should be quite careful in their choice of metaphors and they should thoroughly prepare the deliberate metaphors that their students encounter in preparatory readings. To conclude, the present study indicates that awareness of the pitfalls and the potential of deliberate metaphors should be raised among educators, but experimental support for the linguistic evidence analyzed here still needs to be collected.

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