Writing Assignment #1: Robots and Symbol Grounding

IDST-010-06
Optional Draft Due: Wednesday, 2 November 2015, 11:59 P.M.
Final Version Due: Sunday, 6 November 2015, 11:59 P.M.

Symbol grounding is the process by which representations in our brains develop and have associations with and meanings for things in the external world. If I make reference to one of the books we are using for the class, it evokes an electrochemical pattern in your brain that is associated with the book, a physical object in the external world, assuming there is an external world, and assuming you bought the book.

Books are a relatively modern invention. We certainly did not evolve with them. And you never saw the book before buying it for the class, and yet you are able to distinguish it from all of the other books you have seen and will see. We are just starting to learn about the neural mechanisms of the brain, but how does a collection of simple neurons that individually do little come to represent that book?

The problem of explaining this process has bedeviled philosophers and neuroscientists, but AI researchers have really taken it on the proverbial chin, probably because we all know that humans have solved the symbol-grounding problem, even though we do not really know how we do it, just that we do, and AI researchers must explain how computers can ground symbols (or that they are already doing so). And since computers are not yet intelligent, no one accepts that computers are grounding their symbols.

Indeed, Harnad (1990) is quite critical, whereas Steels (2008) claims we have solved it. Furthermore, Stanley and Junior provide further evidence (Thrun, 2010), for if they were not able to develop and have associations with and meanings for things in the external world, then they would not have been able to identify obstacles and then avoid them.

What do you think?

For this assignment, read Harnad (1990), Steels (2008), and Thrun (2010) as best you can, take a position on whether computers have solved, or can ever solve the symbol-grounding problem, and argue your position. You should be able to complete the assignment using only these articles, and you must use them, but you are free to consult additional sources provided you cite them.

To structure your writing, use the following template from Graff and Birkenstein (2014, p. 9):

> In recent discussions of _____, a controversial issue has been whether _____. On the one hand, some argue that _____. From this perspective, _____. On the other hand, however, others argue that _____. In the words of _____, one of this view's main proponents, "_____." According to this view, _____. In sum, then, the issue is whether _____ or _____.
>
> My own view is that _____. Though I concede that _____, I still maintain that _____. For example, _____. Although some might object that _____, I would reply that _____. The issue is important because _____.

You can not change the structure or the words of the template, but you can use more than one sentence in an underlined area provided that the additional sentences fit with the existing structure. Finally, make sure you read and follow the instructions in "Guidelines for Short Papers," which you can find in the Materials section of the class Web page. In your draft and final versions, set the words of the template in boldface type, and write the word count between the body and bibliography.

The papers I have selected for this assignment may prove challenging to read because they were written for an audience with much more developed backgrounds in philosophy and in artificial intelligence than we have. Nonetheless, I know that you will be able to understand the articles well enough to complete the writing assignment. Furthermore, when you come across something that you do not understand, then you are free to do your own research, and I encourage you to bring questions and insights into the class or onto the discussion board for discussion.

Submission of your final version for grading will consist of four events: submission of a draft, my review, class discussion, and submission of the final version. Before 11:59 P.M. on Wednesday, November 2, you can a draft of your paper as a PDF document to Blackboard.

During this period, I will provide feedback on everyone's draft. Never write a single-sentence paragraph.

During class, we will hold a class discussion. I will expect everyone to present the crux of their argument and respond to questions or concerns.

With the benefit of my feedback and the class discussion, you will have a few days to edit and refine your paper. Before 11:59 P.M. on Sunday, November 6, you must upload the final version of your paper as a PDF document to Blackboard.

References

Graff, G., & Birkenstein, C. (2014). *"They say/I say": The moves that matter in academic writing* (3rd ed.). New York, NY: W. W. Norton & Company.

Harnad, S. (1990). The symbol grounding problem. *Physica D: Nonlinear Phenomena*, *42*(1), 335–346. Retrieved from https://campus.georgetown.edu/bbcswebdav/pid-3269176-dt-content-rid-4091767_1/xid-4091767_1?target=

Steels, L. (2008). The symbol grounding problem has been solved. So what's next? In M. de Vega, A. Glenberg, & A. Graesser (Eds.), *Symbols and embodiment: Debates on meaning and cognition.* Oxford: Oxford University Press. Retrieved from http://www.csl.sony.fr/downloads/papers/2008/steels-08d.pdf

Thrun, S. (2010). Toward robotic cars. *Communications of the ACM*, *53*(4), 99–106. Retrieved from http://cacm.acm.org/magazines/2010/4/81485-toward-robotic-cars/

Rubric

Content

Rating:	Inadequate				Adequate				Outstanding	
	1	3	5	7	10	12	15	18	19	20
[18, 20]	Clear statement of the thesis. Sound logical argument. Marshals strong evidence from sources in support of thesis. Cites meaningful examples drawn from the works cited. Considers potential objections to or weaknesses of argument.									
[13, 18)	Clear statement of the thesis. Mostly sound logical argument. Marshals strong evidence from sources in support of thesis. Cites meaningful examples drawn from the works cited.									
[7, 12)	Weakly stated thesis. Unsound logical argument. Marshals some evidence from sources in support of thesis. Cites weak examples drawn from the works cited.									
[1, 6)	Poorly stated thesis. Statements of opinion with little or no evidence. Marshals unconvincing or little from sources evidence in support of thesis. Cites poor examples drawn from the works cited.									

Organization

Rating:	Inadequate		Adequate		Outstanding
	1	2	3	4	5
[4, 5)	Strong organization. Strong introduction and conclusion. Clear flow and transitions between elements. Strong cohesion among elements. Appropriate length or word count.				
[3, 4)	Weak organization. Weak introduction or conclusion. Weak flow and transitions between elements. Missing or unnecessary elements. Inappropriate length or word count.				
[1, 2)	Poor organization. Poor introduction or conclusion. Poor flow and transitions between elements. Missing or unnecessary elements. Inappropriate length or word count.				

Style

Rating:	Inadequate		Adequate		Outstanding
	1	2	3	4	5
[4, 5)	Written in clear formal language. Easily understood sentences. Appropriate use of direct quotes to support argument. Paper written in student's own words. Varied sentence structure.				
[3, 4)	Written mostly in clear formal language. Some use of slang, ambiguous words, or phrases. Mostly appropriate use of direct quotes to support argument. Paper mostly written in student's own words.				
[1, 2)	Written in informal language. Overuse of direct quotes. Overuse of slang, ambiguous words, or phrases.				

Sources

Rating:	Inadequate		Adequate		Outstanding
	1	2	3	4	5
[4, 5)	Authoritative sources. Sources appropriate for the thesis. Appropriate number of sources for assignment. Proper use of citation in text. Proper format for bibliography.				
[3, 4)	Mostly authoritative sources. Sources mostly appropriate for the thesis. Inappropriate number of sources for assignment. Problems citations in text. Problems with bibliography format.				
[1, 2)	Reliance on unauthoritative sources. Inappropriate sources for thesis. Too few sources for assignment. Inappropriate use of citation. Inappropriate bibliography format.				