

UC Merced

Proceedings of the Annual Meeting of the Cognitive Science Society

Title

Grounding Symbols in Understanding versus in Information

Permalink

<https://escholarship.org/uc/item/0js454ng>

Journal

Proceedings of the Annual Meeting of the Cognitive Science Society, 27(27)

ISSN

1069-7977

Authors

Geyer, James D.
Iran-Nejad, Asghar
Venuglopalan, Gopakumar
et al.

Publication Date

2005

Peer reviewed

Grounding Symbols in Understanding versus in Information

Asghar Iran-Nejad (airannej@bamaed.ua.edu)

Program in Educational Psychology, University of Alabama, Tuscaloosa, AL 35487 USA

James D. Geyer (Geyermd@bellsouth.net)

Neurology and Sleep Medicine, Department of Internal Medicine, University of Alabama, CCHS, 701 University Boulevard East, Tuscaloosa, AL 35401

Gopakumar Venugopalan (venug001@bama.ua.edu)

Program in Educational Psychology, University of Alabama, Tuscaloosa, AL 35487 USA

Yuejin Xu (XU009@bama.ua.edu)

Program in Educational Psychology, University of Alabama, Tuscaloosa, AL 35487 USA

The Symbol-Grounding Problem

In this age of information superhighway, claiming that we are drowned in the world of symbols is an understatement. Whereas the topic of the relationship between symbols and the actual world is neither simple nor new, the problem has gained significant momentum in both life sciences and everyday life. What role can cognitive science play in changing the world of overwhelming information into a world of intrinsic understanding? For more than a decade, this topic has been debated in the context of what is now known in cognitive science circles as the symbol-grounding problem. Several solutions have been offered, many of which continue to ground symbols in more information. This paper argues that (a) symbols must be grounded in understanding which must, in turn, (b) be grounded directly in biology and (b) a promising way to think about the nature of understanding is to address this problem as well as the problem of symbol grounding together at the biological level where the physical nervous and bodily systems meet the phenomenal mind in biofunctional intellectual activity.

Grounding Symbols in Information

Symbols may be grounded in information, which can take the form of more symbols. Symbolic logicians, for instance, have assumed that solving the problem of symbol grounding is equal to finding the right set of computational rules for the dictionary-go-round of symbols chasing symbols. A contemporary computational approach with notable symbol grounding relevance is connectionism (Rumelhart, 1984). Parallel distributed processing is an “early rival,” as Harnad (1990) put it, to symbolic models. Harnad’s own hybrid solution builds on the strengths of both the existing connectionist and symbol systems, rather than treating them as rivals.

Grounding Symbols in Understanding and Biology

It is possible to distinguish between information and understanding. One approach capitalizing on this distinction is biofunctional science (see Iran-Nejad, 1989), which maintains that understanding symbols can be grounded, not in more information, but in biology directly. When the nervous system engages in vigorous intellectual activity—when it sounds the click of understanding or insight loudly enough—we hear it through the phenomenal experience of intuitive self-awareness, just as one hears the beat of one’s heart pounding in the chest after a vigorous exercise.

Experimental Implications

The hypothesized causal connection between the biofunctional beat of intellectual activity in the nervous system and the phenomenal glow of intuitive self-awareness—as illustrated in clicks of understanding—implies that the pulse of comprehension ought to be measurable not only phenomenally, but also physiologically; just as heart and pulse rates are measurable (Iran-Nejad, 2000). Explorations of exactly how clicks of comprehension, audible or otherwise, relate to real-time intellectual or physiological activity in the nervous and bodily systems can open new doors for understanding the nature of (a) understanding and (b) the classic mind-body problem. Given the availability of noninvasive brain mapping and other promising technology, the click of comprehension hypothesis promises a significant step toward understanding human understanding.

References

- Iran-Nejad, A. (1989). A nonconnectionist schema theory of understanding surprise-ending stories. *Discourse Processes, 12*, 127-148.
- Iran-Nejad, A., Hidi, S., & Wittrock, M. C. (1992). Reconceptualizing relevance in education from a biological perspective. *Educational Psychologist, 27*, 407-414.