University of Wollongong

Research Online

Faculty of Engineering and Information
Sciences - Papers: Part A

Faculty of Engineering and Information
Sciences

1-1-2013

Instructional information processing: replies considered

Nir Fresco

University of Wollongong, nfresco@uow.edu.au

Follow this and additional works at: <https://ro.uow.edu.au/eispapers>

Part of the [Engineering Commons](#), and the [Science and Technology Studies Commons](#)

Research Online is the open access institutional repository for the University of Wollongong. For further information contact the UOW Library: research-pubs@uow.edu.au

Instructional information processing: replies considered

Abstract

Wolf and White address different aspects of the paper, and in this present reply, space only permits making two brief remarks. Starting with White's intriguing observation, digital computation without erasing information is possible. This clearly has important implications for real-world digital computing systems, since they can be designed and constructed in a more energy-efficient manner, if information erasure operations are kept to a minimum. Yet, avoiding information erasure operations completely in the course of computation is another matter. At least *prima facie*, this introduces difficulties relating to memory storage. Information is conveyed by data and (particularly persistent) data in computing systems occupy space. However, computation that only adds new information without erasing any will inevitably require an infinite memory space. Whilst idealised Turing machines have this capacity by definition, real-world computing systems do not.

Keywords

information, processing, replies, instructional, considered

Disciplines

Engineering | Science and Technology Studies

Publication Details

Fresco, N. (2013). Instructional information processing: Replies considered. *Philosophy & Technology*, 26 (1), 71-72.

Instructional Information Processing: replies considered

Nir Fresco

School of humanities, UNSW, Sydney, Australia

Fresco.Nir@Gmail.com

Wolf and White address different aspects of the paper and in this present reply space only permits making two brief remarks. Starting with White's intriguing observation: digital computation without erasing information is possible. This clearly has important implications for real-world digital computing systems, since they can be designed and constructed in a more energy efficient manner, if information erasure operations are kept to a minimum. Yet, avoiding information erasure operations completely in the course of computation is another matter. At least *prima facie*, this introduces difficulties relating to memory storage. Information is conveyed by data and (particularly persistent) data in computing systems occupy space. However, computation that only adds new information without erasing any one will inevitably require infinite memory space. Whilst idealised Turing machines have this capacity by definition, real-world computing systems do not.

The second remark is about control information in digital computing systems. White omits the fifth requirement from the list of requirements, which an information processing system has to meet to qualify as a computing system. However, it is the capacity of the physical system to actualise control information that shoulders much of the burden in terms of distinguishing nontrivial digital computing systems from trivial ones. This requirement is the main focus of Wolf's commentary. Unlike factual information, instructional information is fully compatible with control information. Questions, requests and commands (the building blocks needed for an adequate explanation of concrete digital computation) are examples of control information, since their information processing function involves making something happen.

Interestingly, whilst discrete connectionist networks lack any controller unit, they still actualise control information. Typically, the pattern of activating of a set of units depends on the previous activation pattern (in some other possibly overlapping set of units), the weighted connections between the two sets and the units' threshold functions for combining these weighted influences. Therefore, discrete connectionist

* This is a preprint of the article appearing in *Philosophy & Technology*. It is reproduced with the kind permission of Springer-Verlag. The final publication is available at <http://link.springer.com/article/10.1007/s13347-012-0072-9>.

networks also actualise (conditional) control information, where conditions are tested in parallel and the actions are determined on the basis of the total accumulated excitation or inhibition of the (other) receiving units.