



On the indispensability of visual information in science

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Introduction

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In 2012 the community of particle physicists was excited about the CERN announcement that most probably the Higgs Boson was detected at the LHC (Large Hadron Collider). The announcement of this event was accompanied by, at least, four recurring image types: There were the diagrams showing the important data peak of the experimental measurement at around 125 GeV, the theoretically predicted value. Computer graphics of the particle collision were distributed and photographs of the collider, likewise a comic strip explaining the Higgs mechanism via an easily understandable analogy. Visualisations such as these are an essential part of our current scientific practices not only in particle physics. Scientists include them in their presentations and publications and in quite a few cases the outputs of measurement processes are computer graphics or diagrams, just as the detection of the Higgs Boson illustrates.

The question that we will consider then is what the *epistemic status* of these visual representations in science may be. Obviously, there are at least three possible approaches: Firstly, we could deny that visualisations play any epistemic role whatsoever. Explaining their integration in scientific communication would then amount to the thesis that they are mere *decorations*, added maybe for psychological purposes only such as attracting attention (see Carney and Levin 2002). Secondly, we could take a more moderate stance and admit that visual representations in science serve important *heuristic means*. Integrating them into communicative acts allows arranging complex data in a comprehensible way, highlighting the essentials and presenting all the relevant details at first glance (see Kulvicki 2010). Thirdly, we could defend the more controversial thesis that (at least some) visual representations are *indispensable* in scientific publications and presentations as they can make

accessible certain information which cannot be transmitted otherwise (see e.g. Elkins 1998).

The first alternative can relatively easily be dismissed by pointing to the growing literature on the epistemic value of scientific images (see e.g. Baigrie (ed.) 1996, Frigg and Hunter (eds.) 2010, Gross and Louson (eds.) 2012, Mosley (ed.) 2007). Thus, next to being eye catchers, they apparently fulfil further more important tasks. The question, however, remains what exactly their status in science might be.

In this context, we will defend the thesis that visual representations can be used both as heuristics and as indispensable sources of information. Obviously, the choice between these alternatives is deeply intertwined with the question about the translatability of information presented in different representational formats (numerical, linguistic, and pictorial). Is it e.g. possible to fully translate verbal information into pictorial and vice versa? What about the Fregean puzzle that images cannot express propositions? We will be especially concerned with the question of an assumed indispensability of visual representations, inquiring about the possibility whether there is any kind of information that can be transmitted in the visual format only. The aim of this symposium is to approach the topic from different angles, thereby also paying respect to the diversity of knowledge seeking and distributing practices in science.

References

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Program

- Prof. em. Dr. Patrick Maynard (University of Western Ontario, London, Ontario, Canada): “**Our graphic minds**”
- Prof. Dr. Laura Perini (Pomona College, Claremont, USA): “**Visual variety: why do scientists use so many different kinds of figures?**”



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