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Research article

Soft and Hard Hermeneutics of Science and Technologies

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Abstract

The Saqqara Bird, a small wooden figure dated to approximately 200 BCE, has sparked significant debate regarding its purpose and meaning. Initially interpreted by Khalil Messiha as evidence of ancient Egyptian knowledge of aerodynamics, this hypothesis was later refuted, with the figure now widely regarded as a weather vane. Messiha's background as an aeromodeller influenced his interpretation, highlighting the role of personal experience and wishful thinking in shaping historical and scientific narratives. This case serves as a starting point for exploring the relationship between hermeneutics – the interpretation of meanings – and wishful thinking, particularly in the context of science and technology. The distinction between "soft" and "hard" hermeneutics is introduced. Soft hermeneutic practices are aimed to understand different meanings and connections between agents and the world, looking from the side. This distinguishes them from hard hermeneutic efforts which involve self-reflective processes that challenge our personal biases and commitments. Examples from scientific and philosophical contexts, such as Ian Mitroff's study of moon scientists and Nancy Cartwright's concept of "physics as theatre," illustrate how hard hermeneutics can reveal the interplay between personal beliefs and preferences, on the one hand, and scientific practice and the construction of knowledge, on the other hand. Ultimately, hermeneutic efforts, especially in their hard form, encourage deeper self-understanding and critical reflection on the role of knowledge in shaping individual identities.

Keywords: Hermeneutics; Philosophy of Science; Wishful Thinking; Critical Reflection; Rationality; Motivation

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Научная статья

Слабая и сильная герменевтика науки и технологий

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Аннотация
Птица из Саккары – это археологический артефакт, представляющий собой небольшую деревянную фигурку, датируемую примерно 200 г. до н. э. Этот артефакт вызвал серьезные споры среди исследователей относительно его назначения. Первоначально эта фигурка в силу её особой формы была интерпретирована Халилом Мессихой как доказательство наличия у древних египтян знаний в области аэродинамики. Позже эта гипотеза была опровергнута на основании проведенных экспериментов и моделирований. Примечательно при этом, что опыт Мессихи как авиамоделиста, очевидно, повлиял на его интерпретацию данного артефакта, что наглядно иллюстрирует роль личного опыта и склонности агентов порой выдавать желаемое за действительное при формировании своих познавательных установок. Этот случай может служить отправной точкой для изучения взаимосвязи между герменевтикой – интерпретацией значений – и критической рефлексией над склонностью выдавать желаемое за действительное, особенно в контексте науки и технологий. В статье вводится различие между “слабой” и “сильной” герменевтикой. Слабые герменевтические практики направлены на понимание различных значений и связей между агентами и миром при их рассмотрении со стороны. Это отличает их от сильных герменевтических усилий, которые включают в себя процессы саморефлексии, направленные на наши личные предубеждения и обязательства. Примеры из научного и философского контекста, такие как исследование Яна Митроффа об ученых, изучающих Луну, и концепция Нэнси Картрайт “физика как театр”, иллюстрируют, каким образом сильная герменевтика способна раскрыть взаимосвязи между личными убеждениями и предпочтениями с одной стороны и научной практикой и конструированием знаний с другой. В конечном счете, герменевтические усилия, особенно в их жесткой форме, способствуют более глубокому самопониманию и критическому осмыслению роли знаний в формировании индивидуальных идентичностей.

Ключевые слова: Герменевтика; Философия науки; Критическое мышление; Рациональность; Мотивация

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INTRODUCTION

In room 22 of the Egyptian Museum in Cairo there is a small wooden figure called The Saqqara Bird and dated to approximately 200 BCE (Desmond, 2018, p. 5). However, although it is a figure of a bird – it has a head, eyes, nose, body, wings and tail – it definitely is not just a figure. It is something more. Its wings are smooth and flat, its tail is vertical and it has no legs and no feathers. So, it looks like a wooden glider.

Figure 1. The Saqqara Bird

Based on the fact of unusual form of this bird Khalil Messina suggested in 1972 that ancient Egyptians had some knowledge of aerodynamics (Messiha, 1972). Twenty years later he wrote a paper on this topic and called it: "African Experimental Aeronautics: A 2,000-Year-Old Model Glider" (Messiha, 1991). Later, the hypothesis that this figure could be a model of a real glider has been refuted by numerous experiments (Hallion, 2003, p. 11) and simulations (Zierow & Lesemann, 2023, p. 409). Nowadays the most probable explanation is that this figure was used as weather vane.

However, one remarkable fact in this story is that Khalil Messina was a member of the Egyptian Royal Aeromodellers Club, and the Egyptian Aeronautical Club (Abdel-Hamid, 2017). This indicates that his vision and perception of this figure was different from the vision and perception of many people before him. He saw it differently and his experience of aeromodelling influenced him and led to his hypothesis. This hypothesis changed his own view on the history of his land. And at the same time, it was a clear example of wishful thinking which is both quite natural and a flawed type of human reasoning.

In the following sections my aim is to explore in more details the relationship between the notion of hermeneutics of science and technologies on the one hand and the phenomenon of wishful thinking on the other hand. My hypothesis is that analysis of the latter phenomenon plays a crucial role for the former one. I also introduce the distinction between soft and hard hermeneutic efforts.

SOFT AND HARD TOUCHES OF THOUGHT

As Alfred Nordmann says, "how the present connects to the world of the archaeological artefacts is a question of hermeneutics, of telling a story which does not represent 'the past' but constructs this pathway and connection" (Nordmann, 2023, p. 195). Let's call this type of investigation of meanings of things, ideas and theories 'soft hermeneutics.' I call it soft due to the fact that these kinds of hermeneutic practices do not touch us and do not influence us in any significant way. They are not about us. We just try to understand different meanings and connections, looking from the side.

However, far more interesting questions appear when we place ourselves in Messina's position and try to see it from the first person perspective. In that case we may imagine ourselves having some perceptual experience looking at some technical artefact. And based on our imagined previous experience we could feel some inclination to interpret this technical artefact in this or that way, as evidence in favor of some hypothesis about technological knowledge of previous ages. And the hard questions here go as follows. How can we determine whether we are in a position of wishful thinking? How might we estimate the distorting effect of the influence of our past experience? And how could we tell whether we are fair enough in our judgments, or not?

I think that questions of this type could play an important role both in hermeneutics of modern science and hermeneutics of technologies. We can classify these questions as a part of so called 'hard hermeneutics.' This type of hermeneutic effort touches us and can provoke some crucial changes in us and in our self-perception.

I would like to mention two examples here.

The first one is a well-known case study by Ian Mitroff from1969-1972. In this study each of forty-two leading moon scientists was intensively interviewed four times: between the eleventh and twelfth Apollo missions, between the twelfth and fourteenth, between the fourteenth and fifteenth, and between the fifteenth and sixteenth missions. The main goal of the study was quite clear: to explore "the nature and function of the commitment of scientists to their pet hypotheses in the face of possibly disconfirming evidence" (Mitroff, 1974, p. 581) and to examine "the resistance by scientists to the scientific discoveries of other scientists" (Mitroff, 1974, p. 582). There are 260 hours of such recorded interviews where these scientists discuss theories and hypothesis of each other and admit (or not admit) changes in their positions and evaluations in face of new data collected during the period of the study. I submit that this material is exactly what we need to show what hard hermeneutic of science could be.

The results of the study were quite remarkable. There were three scientists among forty-two who were known as the most attached to their pet hypotheses and most resistant to any change. And it turned out that exactly these three scientists were judged by their peers to be the most creative and the most outstanding scientists in the program. So, there was a kind of ambivalence in assessments here.

On the one hand, these three committed scientists were strongly criticized by their colleagues in words such as: "X is so committed to the idea that the moon is Q that you could literally take the moon apart piece by piece, ship it back to Earth, reassemble it in X's backyard and shove the whole thing and X would still continue to believe that the

moon is Q. X's belief in Q is unshakeable. He refuses to listen to reason or to evidence. I no longer regard him as a scientist. He's so hopped up on the idea of Q that I think he's unbalanced" (Mitroff, 1974, p. 586); "Y is a good salesman: that's why he gets attention"; "Z tried to put words in the astronauts' mouths; he tried to get them to see what he wanted them to find"; "X has a curious if not perverted pattern of reasoning that goes something as follows. Hypothesis: if the moon were P, then Q would be true; premise: I want Q to be true; conclusion: therefore, P is true"; "X and Y don't do science, they build personal monuments to themselves; I no longer regard them as scientists" (Mitroff, 1974, p. 587).

On the other hand, the same interviewed scientists acknowledged that phenomena of this kind are normal practices in science. They say: "Commitment, even extreme commitment such as bias, has a role to play in science and it can serve science well. Part of the business [of science] is to sift the evidence and to come to the right conclusions, and to do this you must have people who argue for both sides of the evidence. This is the only way in which we can straighten the situation out. I wouldn't like scientists to be without bias since a lot of the sides of the argument would never be presented. We must be emotionally committed to the things we do energetically." "You've got to make a clear distinction between not being objective and cheating. You don't consciously falsify evidence in science but you put less priority on a piece of data that goes against you. No reputable scientist does this consciously but you do it subconsciously." "If you make neutral statements, nobody really listens to you. You have to stick your neck out. The statements you make in public are actually stronger than you believe in. You have to get people to remember that you represent a point of view even if for you it's just a possibility." "In order to be heard you have to overcommit yourself. There's so much stuff if you don't speak out you won't get heard but you can't be too outrageous or you'll get labeled as a crackpot; you have to be just outrageous enough. If you have an idea, you have to pursue it as hard as you can." "Science is an intensely personal enterprise. Every scientific idea needs a personal representative who will defend and nourish that idea so that it doesn't suffer a premature death" (Mitroff, 1974, pp. 588-589).

I think that the intellectual efforts of these scientists during the interviews can be characterized as a hermeneutic process, or at least they serve as a good starting point for a hermeneutic process in its hard form. They tell us here what scientific theories and hypotheses really mean for them. These scientists begin their talks by expressing negative assessments of the behavior of their biased colleagues. However later they make some reflections on this subject and as a result they become willing to admit that such involved and committed strategies may be reasonable forms of behavior in science. And the next step for them could be asking what do they think about themselves in this respect? Do they agree that, to them, their hypotheses mean too much or too little? What role do their scientific efforts play in their lives? Is it just a job for them? Or something more? Why is it important for them that their hypotheses turn out to be true? And what price are they ready to pay for that? Can they say about themselves that they are fair enough in their conduct of science?

On the contrary to Nordmann's position I think that reflections of this type may allow scientists to develop their character, grow as persons and better understand meaning of pieces of scientific knowledge for them. The same is true for philosophers. So, before

moving on to the next example I would like to say a few words about the hard hermeneutics of philosophical theories.

First, we should acknowledge that philosophy is not a science. However, philosophy and science are not so different that it is impossible to see some similarities between them (Williamson, 2008). So, doing philosophy we may ask ourselves the same questions as above. When the subject of these questions is not about ourselves but about somebody else then we get some traditional questions for the history of philosophy. Was Plato fair enough arguing in favor of philosophers and criticizing sophists? What did it mean for him to be a philosopher and not a sophist? What price was he ready to pay (and actually payed) for being philosopher? Did he really believe that the ideal state is possible? And did he believe that his description of it really represented an ideal state?

The aim of these questions is to find out what philosophy meant to Plato and what his own philosophical ideas meant to him. As before, we can classify these questions as a part of soft hermeneutics of philosophy. It is an interesting part, but it does not touch us directly. We may discover something about Plato, but it may have no consequences for us.

However, if we address similar questions to ourselves as philosophers then we have a starting point for the hard hermeneutics of philosophy. What is the meaning of philosophy in my life? Am I sufficiently fair in my doing philosophy? Do I really believe in what I am arguing for (cf. Fleisher, 2020)? And if I do, what price am I willing to pay for being right (Plakias, 2019)?

Actually I already tried to answer some of these questions in another place (Frolov, 2019), and I suspect that, for example, my sympathy towards Platonism and abstract objects is closely connected with the fear of losing objects whose existence is finite. And if I argue in favor of moral realism, I do it because I want different states of affairs to be differently significant. I want this difference in value to exist and that's why I try to find arguments to support this theoretical position. And as in Mitroff's case, when moon scientists do not view the existence of personal commitments as a great problem for scientific practice, I also do not think that the existence of my philosophical preferences is a great problem for me. However, these preferences are a suitable subject for my philosophical reflections. And that is exactly what hard hermeneutics of theoretical cognition looks like to me.

PHYSICS AS THEATRE

My second example deals with Nancy Cartwright's idea of "physics as theatre" (Cartwright, 1983) that was also mentioned by Nordmann. The idea goes as follows. Imagine that we write a play for the theatre, and in one scene of this play two characters have a secret conversation in the corner of the room while other characters dance. Then, Cartwright says, "if the actors whisper together, the audience will not be able to hear them. So the other characters must be moved off the stage, and then back on again. But in reality everyone stayed in the same place throughout. We cannot replicate what the characters actually said and did. Nor is it essential that we do so. We need only adhere as closely as possible to the general sense of what was actually said. Physics is like that. It

is important that the models we construct allow us to draw the right conclusions about the behavior of the phenomena and their causes. But it is not essential that the models accurately describe everything that actually happens; and in general it will not be possible for them to do so, and for much the same reasons" (Cartwright, 1983, p. 140).

The problem is that once you start doing this, you may eventually forget which parts of your story are true and which are "true lies." And if you lose sight of the boundary between your truths and lies then it becomes difficult for you to control that your lies stay right. In that case everything starts looking right to you, even though some of your lies "cease to be right." When we remove some actors from the scene in our play we act wishfully: we want them to leave the scene and they do it. When we act in the same manner doing science we also act wishfully. Sometimes it is reasonable, sometimes it is not. And it is a hard task to distinguish between these cases.

Asking these questions is a form of hard hermeneutic process in science. It may start with the following questions: what does it mean to be true in science? What does it mean to be right? And what price are we willing to pay for being true (if it is possible) and being right (if being true is not possible)?

It returns us to the question about the attitudes of authors to their scientific texts. It is natural to suppose that there are some general norms that govern the relation between the content of the text and its author. We may call these norms 'assertability conditions.' What are they?

First of all, we may agree with Cartwright and admit that literal truth is not among such conditions. Not everything what we claim in scientific texts needs to be literally true. However, truth is essential to all factive attitudes such as knowledge. So, knowledge that *p* is not among the assertability conditions for asserting that *p* (cf. Williamson, 1996). We may say about some claims in our texts that they are not true and that we know that fact. For example, we may say that pancreas sends some messages to the brain, even though we know that pancreas does not use any language and, presumably, does not possess any intentional states with any intentional content. So, we do not believe and do not know that pancreas sends any messages to the brain. However, having such knowledge is not a necessary condition for assertability of corresponding claim.

The best way to characterize assertability conditions for *p* is to say that these conditions are satisfied if and only if we have some reasons to assert that *p*. These reasons may be different and sometimes we deal with instrumental reasons that allow us to assert some *p* not for the sake of this *p* but for the sake of assertion of *q*. This is the case when we make some true lies. However, we should be very careful here, because doing so it is very easy to stop making reasonable lies and to start asserting unreasonable lies. And I think that this work of being careful can also be characterized as hermeneutic work.

This situation is similar with doing popular science. When we deal with some professional text written in the style of popular science it is useful to make clear distinctions among three types of claims: established scientific knowledge for which there is general consensus among all the specialists; science at the very forefront of discovery where there is considerable room for disagreement among peers; the author's personal view and preferences. We should try to make this distinction as readers, but especially as authors we should try to draw these distinctions as clearly as possible when we write

popular science. And I think that these efforts are also a type of hermeneutic process. We try to divide what we know, what we suspect, and what we hope for. Doing so we realize where these boundaries are. And this understanding may influence us and may provoke change in us.

CONCLUSION

One of the crucial metaphors in hermeneutics is the notion of entering. We see something external as a world we can enter into. However, to do this we need to overcome the resistance of this new environment. This resistance is a result of our lack of understanding of this new environment. So, to get deeper we need to understand it better. However, it is not true that for that purpose we need to deal with something external. Sometimes we can get deeper in our own knowledge, theories, and conceptions. We can build them first, and after that we can enter them and see how they are related to other elements of our inner world – our hopes, fears, desires, emotions, and so on. Doing so we better understand what these theories and conceptions mean to us. And at the same time we better understand who we are, how fair we are, and what is the role of knowledge in our lives. It seems to me that all of these issues can be crucial elements of hermeneutic efforts in science.

REFERENCES

Abdel-Hamid, M. A. (2017). Ancient Egyptian Aeroplane Modification. *2nd IUGRC International Undergraduate Research Conference, Military Technical College* (pp. 1–9). Military Technical College.

Cartwright, N. (1983). *How the Laws of Physics Lie*. Oxford University Press.

Desmond, K. (2018). *Electric Airplanes and Drones: A History*. McFarland.

Fleisher, W. (2020). Publishing without (Some) Belief. *Thought: A Journal of Philosophy, 9*(4), 237-246. https://doi.org/10.1002/tht3.466

Frolov, K. (2019). Why I am a Platonist. *Vox. Philosophical Journal, 27,* 283-294. https://doi.org/10.24411/2077-6608-2019-00031

Hallion, R. P. (2003). *Taking Flight: Inventing the Aerial Age, from Antiquity Through the First World War*. Oxford University Press.

Messiha, Kh. (1972). Flying in Ancient Egypt. *Egypt Travel Magazine*, *159*, 24–29.

Messiha, Kh. (1991). Aeronautics: African Experimental Aeronautics: A 2000-Year Old Model Glider. In I. van Sertima (Ed.), *Blacks in Science: Ancient and Modern.* (pp. 92–99). Transaction Books.

Mitroff, I. (1974). Norms and Counter-Norms in a Select Group of the Apollo Moon Scientists: A Case Study of the Ambivalence of Scientists. *American Sociological Review, 39*(4), 579-595. https://doi.org/10.2307/2094423

Nordmann, A. (2023). Machine Hermeneutics. In A. Grunwald, A. Nordmann, and M. Sand (Eds.), *Hermeneutics, History, and Technology. The Call of the Future* (pp. 193–215). Routledge. https://doi.org/10.4324/9781003322290-14

Plakias, A. (2019). Publishing without Belief. *Analysis*, *79*(4), 638–646. https://doi.org/10.1093/analys/anz040

Williamson, T. (1996). Knowing and Asserting. *The Philosophical Review*, *105*(4), 489-523. https://doi.org/10.2307/2998423

Williamson, T. (2008). *The Philosophy of Philosophy*. Wiley-Blackwell.

Zierow, M., Lesemann, L. (2023). Aerodynamic Investigation on the Artefact “Bird of Saqqara”. *Acta Mechanica et Automatica*, *17*(3), 405-409. https://doi.org/10.2478/ama-2023-0046

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