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Free will: A case study in reconciling phenomenological philosophy with reductionist sciences☆

Felix T. Hong

Department of Physiology, Wayne State University, Detroit, MI 48201, USA

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ABSTRACT

Phenomenology aspires to philosophical analysis of humans' subjective experience while it strives to avoid pitfalls of subjectivity. The first step towards naturalizing phenomenology — making phenomenology scientific — is to reconcile phenomenology with modern physics, on the one hand, and with modern cellular and molecular neuroscience, on the other hand. In this paper, free will is chosen for a case study to demonstrate the feasibility. Special attention is paid to maintain analysis with mathematical precision, if possible, and to evade the inherent deceptive power of natural language. Laplace's determinism is re-evaluated along with the concept of microscopic reversibility. A simple and transparent version of proof demonstrates that microscopic reversibility is irreconcilably incompatible with macroscopic irreversibility, contrary to Boltzmann's claim. But the verdict also exalts Boltzmann's statistical mechanics to the new height of a genuine paradigm shift, thus cutting the umbilical cord linking it to Newtonian mechanics. Laplace's absolute determinism must then be replaced with a weaker form of causality called *quasi-determinism*. Biological indeterminism is also affirmed with numerous lines of evidence. The strongest evidence is furnished by ion channel fluctuations, which obey an indeterministic stochastic phenomenological law. Furthermore, quantum indeterminacy is shown to be relevant in biology, contrary to the opinion of Erwin Schrödinger.

In reconciling phenomenology of free will with modern sciences, three issues — alternativism, intelligibility and origination — of free will must be accounted for. Alternativism and intelligibility can readily be accounted for by quasi-determinism. In order to account for origination of free will, the concept of downward causation must be invoked. However, unlike what is commonly believed, there is no evidence that downward causation can influence, shield off, or overpower low-level physical forces already known to physicists. Quasi-determinism offers an escape route: The possibility that downward causation arising from hierarchical organization of biological structures can modify dispersions of physical laws remains open. Empirical evidence in support of downward causation is scanty but nevertheless exists. Still, origination of free will must be considered an unsolved problem at present.

It is demonstrated that objectivity does not guarantee scientific rigor in the study of complex phenomena, such as human creativity. In its replacement, *universality* and *overall consistency* between a theory and empirical evidence must be maintained. Visual thinking is proposed as a reasoning tool to ensure universality and overall consistency through *inference to the best explanation*.

1. Introduction

Western science began as natural philosophy; natural philosophy can be construed as synonymous with natural science. Isaac Newton's 1687 scientific treatise bears the title of "The Mathematical Principles of Natural Philosophy (*Philosophiae Naturalis Principia Mathematica*)." Newton's crowning achievement helped fuel the industrial revolution. If the 17th century science can be called the golden era of physics and astronomy, then the 20th century science can be called the golden era of reductionist sciences. The advances in molecular and atomic physics as well as in molecular and cellular biology are just as spectacular. The success

☆ Dedicated to the memory of the late President Detlev W. Bronk of The Rockefeller University.

E-mail address: fthong@med.wayne.edu.

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bred a side effect: philosophy and natural science are drifting apart from each other. Objectivity, one of the most cherished values of Western science, was most readily achieved in the practice of reductionist sciences because of the deliberate choice of experimental systems with reduced complexity. Objectivity is safeguarded by the so-called Scientific Method. What is the Scientific Method, which is taught as part of the initiation rite of modern science students? Let me cite a somewhat irreverent and cynical article with unclear authorship from a website[1]:

> In a nutshell, the Scientific Method is all about formulating propositions (hypotheses), doing *empirical experiments* to test them on the basis of *data*, and then formulating conclusions drawn from the *data* by the process of *statistical inference* that might support the hypothesis, contradict the hypothesis, fail to resolve the hypothesis one way or another, lead to new hypotheses (and a new round of funding). The key terms here are *hypothesis*, *data*, *inference*, *conclusion* liberally interspersed with funding, publication, and paperwork.

According to this criterion, Aristotle's physics would not be qualified as science. This orthodox view was most prominently and somewhat viciously unleashed during the so-called Science War in the 1990s between post-modernist sociologists and those whom I call science fundamentalists [Gross et al., 1996]. The casualties include Sigmund Freud's psychoanalysis, Karl Popper's falsifiability argument, Thomas Kuhn's notion of paradigm shifts, and Bayesian statistics. The alleged common offense was subjectivity or insufficient objectivity.

As reductionist sciences soared, the role of philosophy in scientific enterprise diminished accordingly. For me, a casual conversation with a mild-mannered colleague revealed a view of what philosophy is from an average scientist's point view: “Philosophical arguments are little more than mere opinions of individual philosophers. They discussed and argued, and then went home with an agreement to disagree.” Even Stephen Hawking [Hawking, 1993] once derided [science] philosophers as “failed physicists.”[2]

In the meantime, the advance in molecular and cellular neuroscience has reached the stage which makes it ripe to tackle the “hard problem” of human consciousness, thus bringing reductionist scientists on a collision course with phenomenological philosophers. Phenomenological philosophy aims at studying human consciousness as experienced from the first-person perspective. Although it has been practiced for centuries, its modern version was launched in the early 20th century in the work of Edmund Husserl, Martin Heidegger, Jean-Paul Sartre, Maurice Merleau-Ponty and others [Gallagher and Schmicking, 2010]. Recently, there have been efforts to naturalize phenomenology, i.e., to make phenomenology attain scientific rigor, loosely speaking. This trend brought up the question of whether it is possible to do so. We must bear in mind that there is a wide gap between the two camps which grew in part out of the spectacular success of reductionist sciences. The naturalization attempt could be D.O.A. — dead on arrival — if one insists upon objectivity as the *sine qua non* criterion of natural sciences. On the other hand, there is a legitimate question as to how *subjective* human experiences can be studied *objectively*. Furthermore, it is also legitimate for anyone to ask the question: Are reductionist sciences genuinely objective? Science lives in human consciousness. After all, science is meaningless without human consciousness to appreciate it, much less to contemplate it, although there is no reason to believe that physical reality vanishes upon cessation of consciousness of all humans.

For the time being, reductionist sciences may survive and flourish without the help of phenomenology or philosophy in general. But phenomenology cannot afford to contradict reductionist neuroscience unless independent evidence can be provided to question the validity of conclusions drawn from reductionist neuroscience alone. However, it is not really a zero-sum game. Perhaps, it is possible to reconcile, at least, part of phenomenology with neuroscience, while leaving the difference as an initiative or impetus for future progress on both sides.

One subject that is particularly suitable for such a treatment is “free will.” This is because the phenomenology of free will is directly challenged by its encounter and confrontation with reductionist sciences. There is a long history of the conflict of phenomenology of free will with physics. In recent decades, a huge divide has appeared between philosophers and reductionist neuroscientists, although both camps have considered free will to be an important problem. As Balaguer [2014] pointed out, although most philosohers favored the existence of free will, such consensus ceased to exist outside of philosophy departments. In recent years, the opposition has arisen mainly from the camp of neuroscience. Reconciling the two opposing views must be a daunting task.

As a bystander uninvolved in the dispute initially and as a reductionist by training and by practice during most of my scientific career, I have been intrigued by free will deniers' overt self-inconsistency in spite of their emphasis on objectivity. Objectivity is unquestionably a virtue, but it is only a means to an end, whereas consistency is one of the ultimate goals of all scientific enterprise. In addition, as an outsider to begin with, I have never questioned my initial conviction that I do have free will. Therefore, the dispute matters to me in regard to my own world view. However, reconciling something subjective with some other thing objective seems harder than fitting a square peg into a round hole. I began to ponder what went wrong with objectivity, and I was drawn to the deeper part of science and its epistemology.

My own casual and unplanned encounter with human creativity also forever changed my view about subjectivity. In the late 1990s, I was intrigued by a bright student's inability to solve a problem that required recombination of facts already known to him — sort of “putting two and two together.” The answer to this puzzle was an overnight revelation to me: It dawned on me that he was thinking like an expert system of digital computers (rule-based reasoning) when he was supposed to piece together known pieces of fragmented knowledge as in a jigsaw puzzle (picture-based reasoning) [Hong, 1998a; Hong, 2003a]. I was thus prompted to consult the creativity literature, and I was immensely benefited by introspective reports by Einstein [Hadamard, 1945], by Henri Poincaré [Poincaré, 1908] and by Wolfgang Amadeus Mozart [Holmes, 1991], who all practiced picture-based reasoning, a.k.a., visual thinking. Subsequently, a psychiatrist friend warned me about the unreliability of subjective accounts or introspections. Pitifully, it was a warning coming too late, because I had unwittingly violated the psychology taboo and my “eureka” moment had already been a thing of the past; I simply could not unlearn my newly gained insight and forget the sweet taste of violating a scientific taboo. This episode served as a wake-up call for me to re-evaluate my conventional view about subjectivity. I came to seriously doubt whether the psychology of human creativity, as practiced in contemporary academia, is really objective as claimed [Hong, 2013a; 2013b]. This latter observation calls for reconsideration of what makes natural sciences scientific. The above-quoted Scientific

[1] http://www.phy.duke.edu/~rgb/Philosophy/axioms/axioms/node44.html.

[2] Hawking's remark was made at a weak moment when he felt besieged because of his critics' tactic of “refutation by denigration.” Perhaps it should not be construed as Hawking's judgment on philosophy or philosophers in general at a calm and serene moment.