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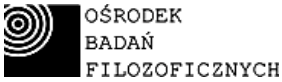

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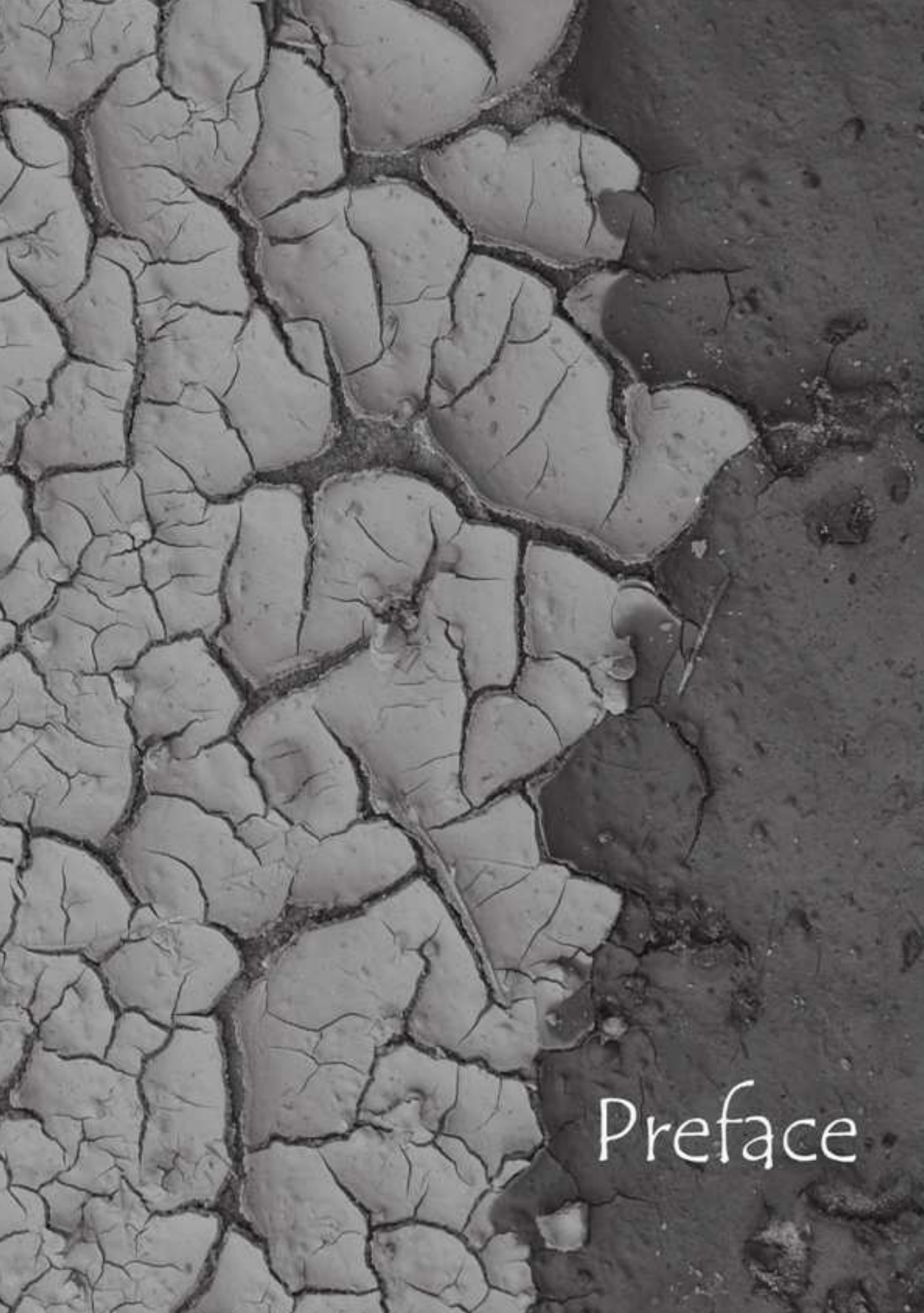

Preface

AVANT, Vol. III, No. 1/2012
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Preface

Dear Readers,

we are pleased to present the second issue of *AVANT* to be published this year. Its leading subject is interdisciplinary research into the immune system. This subject fits our broader series of issues dedicated to non-neuronal aspects of cognition. Within this concise but varied anthology, we have strived to showcase both the importance and the controversies associated with the notion of the immune self and immunity. We are particularly honoured by the contribution of Alfred Tauber, an unquestionable pioneer and authority in the field of philosophy of immunity. At the same time, we hope to return to this subject on the pages of *AVANT* in the future.

The guest of this issue's *Philosophical Interviews* is Dan Zahavi: a philosopher largely responsible for the current status of phenomenology in relation to both philosophy and cognitive studies. Mark Rowlands, the spokesperson for the so-called vehicle externalism, is meanwhile present in three ways: as an interviewed guest, the author of a paper dedicated to the problem of representation, and as the subject of commentary. The issue is rounded up with book reviews corresponding with the overall theme.

Within the section dedicated to musical practice we present a short introduction into cognitive studies on music, and particularly musical improvisation, and as a counterpoint – a conversation with an outstanding representative of avant-garde music improvisation, Matthew Shipp. Materials dedicated to the authors of the artistic content of the issue close the whole section.

We would finally like to take this opportunity to extend special gratitude to dr. Katarzyna Kuś (University of Warsaw), dr. Marcin Miłkowski (Polish Academy of Sciences) and PhD student Ewa Witkowska (Nicolaus Copernicus University) for their help regarding both the current issue and overall organizational duties related to the functioning of the journal.

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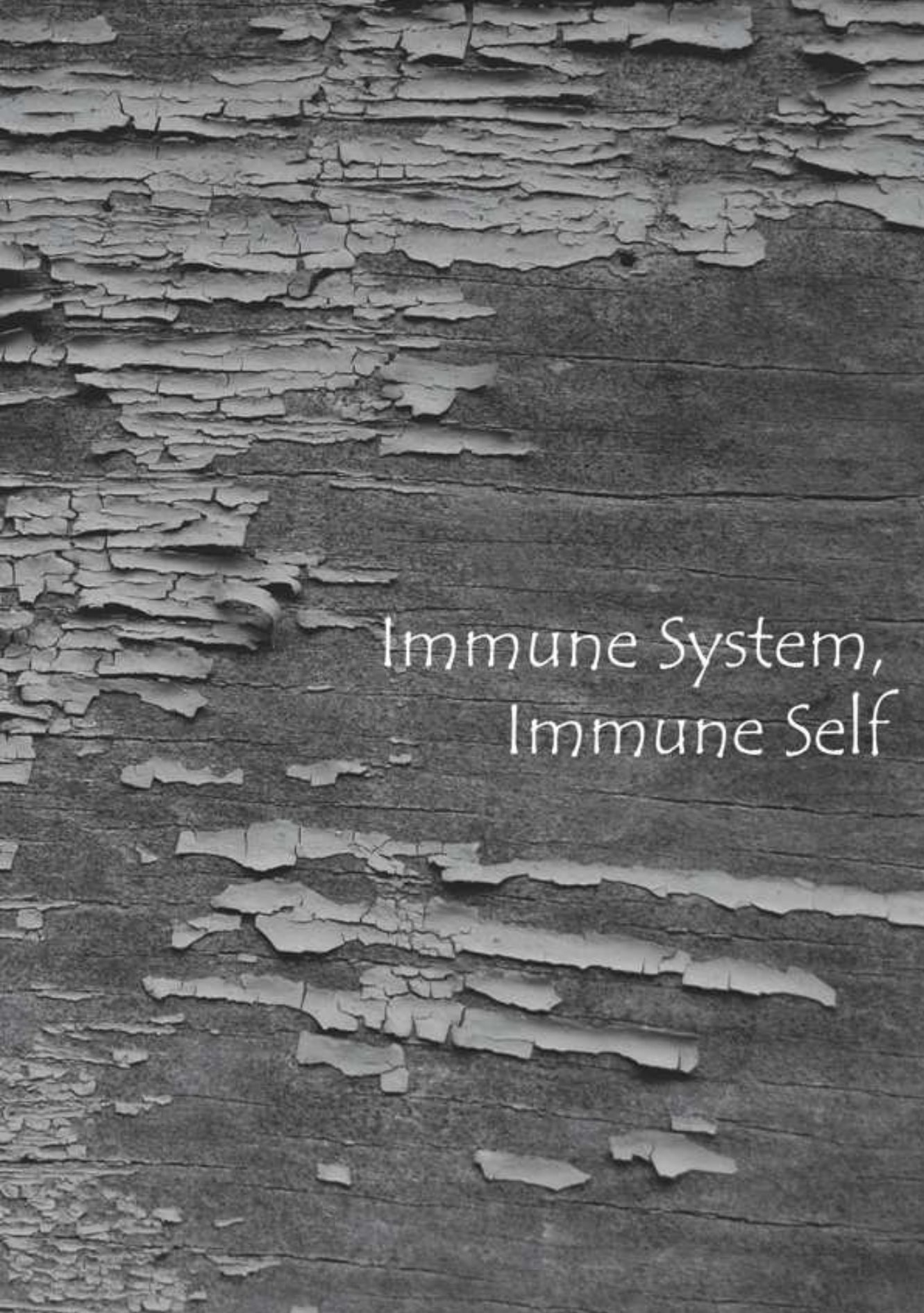
Immune System,
Immune Self

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Immune system, immune self
Introduction

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Abstract

The idea that the immune system distinguishes between self and non-self was one of the central assumptions of immunology in the second half of 20th century. This idea influenced experimental design and data interpretation. However, in the face of new evidence there is a need for a new conceptual framework in immunology.

Keywords: immune self; philosophy of immunology; self/non-self discrimination.

In the last several decades, immunology has become a subject of attention of several branches of humanities. This successful and rapidly developing branch of biology served as an exemplar of a paradigm change and conceptual development in the history of science (Silverstein 1989, Tauber 1994; Tauber & Chernyak 1991). Its political and military discourse was studied extensively in the context of political science and anthropology (Cohen 2009; Haraway 1989; Martin 1990; Napier 2003). Reproductive immunology attracted the attention of gender studies (Howes 2008), while social interactions within the field were investigated from the point of view of epistemology of science (Fagan 2007). The immune system has become a subject of philosophical reflection on the nature of an organism and the character of self (Howes 1998; Pradeu 2010; Pradeu 2012; Tauber 1994). Cognitive properties of the immune system have provoked a discussion about the nature of cognitive systems (Hershberg & Efroni 2001; Varela et al. 1988; Varela 1994; Cohen 2001).

One leitmotif that runs through most of these humanistic studies of immunology is the question of the immune self. Indeed, the idea that the role of the immune system is to ignore self and attack non-self was central to immunology for several decades after the Second World War (Tauber 1994; 2012). It was first introduced by

Macfarlane Burnet as a part of the Clonal Selection Theory (Burnet 1959), but its implicit presence in immunology can be traced back to Elie Matchnikoff and his concern with an organismal identity in the context of immunology and development (Tauber 1994; Tauber & Chernyak 1991). The importance of the self/non-self model is illustrated by the fact that immunology has often been defined as the science of self or as the science of self/non-self discrimination (Klein 1984; Lopez-Larrea 2012; Wilson 1971).

The idea that the immune system discriminates between self and non-self is intuitively appealing. If the immune system can protect an individual from infection and pathology, it must have the power to tell the individual from the foreign, pathogenic agents. How, otherwise, could the immune system serve as a sentinel for an organism? This simple idea also seemed useful in explaining phenomena like organ graft rejection and autoimmunity. From the point of view of the self/non-self model, an autoimmune disease is a form of misrecognition of self-tissues as foreign. Infection and pathology result from the failure to respond effectively to non-self (Khalturin & Bosch 2007)

Additional support for the realism regarding the immune self came from the empirical observation that the immune system protects the individual rather than individual cells. In fact, individual cells of the body may be sacrificed to protect the self. Cytotoxic T cells or NK-cells can kill infected or pathologically transformed cells of the body to prevent pathogen spread and disease (Trambas & Griffiths 2003). Apoptosis, regulated cell death, has also been found to be an effective defense strategy in various forms of the actions of the immune system (Barber 2001). Thus, it is only multicellular organisms that can be equipped with an immune system. The presence of the system is indicative of a certain degree of unification, which, together with other distinctive features, can constitute an organism as a biological individual (cf. Ben-Neriah & Karin 2011; Domazet-Loso & Tautz 2010). From this perspective, immunogenicity could be considered as criterion of inclusion for the organism (Pradeu 2010) and the immune system might seem to be involved in protecting and defining some weakly emergent (reducibly emergent) higher level individual rather than its lower lever parts. (The idea of weak emergence was developed and applied in a biological context by Bedau 1997; 2008).

Despite its long history and intuitive appeal, the paradigm of self/non-self discrimination in immunology has been in crisis since the 1980s. The reason is not that the concept of the immune self proved to be vague or ambiguous (Matzinger 1994). (In fact, most key biological concepts like gene, organ, immunity or life are chronically ill-defined). Rather, it was the empirical evidence that undermined its credibility. On one hand, it has been found that autoimmunity is an important part of an organism's physiology (Cohen 1992; Countinho et al. 1995; Quintana & Cohen 2004). On the other hand, it became clear that the recognition of innocuous foreign bodies as parts of the organism is crucial for maintaining integrity and health. Indeed, the power to respond to non-self as self turns out to be essential in protecting an individual from allergy (McFadden & Basketter 2000); it serves as a basis for oral toler-

ance and ensures the maintenance of a defined population of commensal microbes in the gut. This unexpected, from the point of view of self/non-self model, function of the immune system also proved to be a form of a defense strategy against opportunistic microbes. If recognized as foreign, some opportunistic agents could induce inflammatory-derived tissue damage opening themselves a route to infection and colonization of the host (Hill & Artis 2010).

The crisis of the self/non-self paradigm in immunology has inspired many researchers to look for an alternative framework that could accurately capture the reactivity of the immune system. It has been proposed that instead of distinguishing self and non-self, the system is involved rather in discrimination between infectious non-self and non-infectious self (Janeway 1992). Despite being able to address some of the concerns of the original model, the revised model by Janeway was not able to take into account such phenomena as sterile inflammation, in which the immune system responds despite the lack of an infectious agent. Thus, Polly Matzinger formulated the so-called "Danger Model," according to which the immune system is more concerned with protecting the individual from damage than with discriminating between self and non-self. From the point of view of this model, the immune system recognizes and responds to molecules released during stress or tissue damage that serve as danger (alarm) signals (Matzinger 2002). This model was supported by the finding that endogenous ligands of innate immune receptors initiating inflammatory responses are abundantly present during infection and tissue damage. Nevertheless, most recent data put this model in question because there is accumulating evidence that innate immune receptor agonists can induce the receptors to promote tolerance and inhibit inflammatory responses in certain circumstances (reviewed in Kubinak & Round 2012)

One should note that most of the attempts to provide general model of the reactivity of the immune system were based on the assumption that the immune system can be either switched on or off, active or inactive. However, accumulating data indicates that the immune system is never really off and that discriminatory powers of the active system are very subtle and irreducible to a simple binary logic (Eberl 2010; Leng and Bentwich 2002; Świątczak et al. 2011). Instead of occupying two alternative states, the immune system produces uniquely tailored responses to counterbalance effects of the fluctuations in the biochemical and microbial microenvironment (Garret et al. 2010; Barbosa & Rescigno 2010). This is particularly evident in the context of the gut immune system, which is constantly involved in antigen sampling, IgA antibody release and antimicrobial peptides production. In addition, differentiation of pro-inflammatory T-cells is an integral part of tolerance induction in the immune system and it is the balance with other types of T-cells (Regulatory T cells, Th2 cells) that prevents these cells from inducing intestinal inflammation (Lohner et al. 2008).

The activity of the immune system is not limited to initiationg immune responses. It also participates in modulating strength of the intraepithelial tight junctions, in regulation of the functions of other bodily systems, and in the body maintenance

by removing dead, damaged and mutated cells. The activity of the immune system thus appears to be highly dynamic and complex. Indeed, the power of the system to neutralize the effects of biochemical and microbial fluctuations depends on a network of cells and molecules that integrate information about various aspects of the environment in a given anatomical niche (Cohen 2000). Crucial players in this systems-level integrative process are dendritic cells that collectively translate immune recognition into an active response (Rimoldi et al. 2005; Rescigno 2011; Świątczak 2012).

Since the self/non-self model is doomed to failure, there is a need for new overarching framework that could capture the function of the immune system. Cognitive approach provides one possible source of metaphors and concepts that could help to make sense of the action of the immune system and would help to appreciate the richness and sophistication of the states of the immune system. Humanities, with their abstract conceptual framework, could contribute to the ongoing debate on the conceptualization of the activity of the immune system.

The present issue of AVANT is a small step towards an interdisciplinary debate about the foundational issues in immunology. It contains reviews and review-like papers written by well-recognized scholars, whose work is dedicated to theoretical foundations of immunology. The Authors integrate extensive knowledge of the immune system with a deep understanding of social, historical, theoretical and philosphical aspects of immunology. The commentary by Alfred Tauber addresses the current status of the self metaphor in immunology. He emphasizes the need for an ecological sensibility and points out that the immune system cannot be studied in isolation from its context of interactions with commensal bacteria and other bodily systems. The interview with Uri Hershberg helps to understand the role of metaphors in immunology and addresses important questions regarding the status of the immune self. Neeraja Sankaran reviews historiography of immunology since 1999, demonstrating that it is no longer an immature field of study, but a flourishing and fascinating discipline. Yair Neuman comments on his own original approach to immune self that he consideres as an interpretative process. In the introduction to his recently published book on the development of the concept of immunity, Ed Cohen argues that the political and legal connotations of this concept are still implicitly present in the conceptual structure of immunology. The series of articles by our guests is completed with a short review of selected books and papers dedicated to the foundational issues in immunology, prepared by Jacek Podgórski.

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Who is on guard for harmony?
On harmony, phagocytes and immunological identity

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Abstract

The objective of this introduction is to outline certain historical and theoretical frames of modern immunology. Immunology as a discipline that has been shaped relatively recently attempts to explain all kinds of phenomena safeguarding the integrity of an organism. An organism is understood as a complex multi-system structure developed in the course of evolution. In the case of such a broad sense concept of immunity a penetrating discussion is required. Thus, biology philosophers as well as scientists – immunologists, for nearly 50. years have been analysing the basic definitions, which led them to interesting conclusions.

Keywords: immunological self, immunological selfhood, phagocytosis, immunological tolerance theory, Jerne's network theory

Introduction

In a standard way immunology is presented as a discipline looking into how living organisms defend themselves against infections, hazardous substances and foreign tissues. A classical paradigm assumes that an organism is capable of defending itself due to being equipped with highly specialised mechanisms classifying the encountered objects into 'self' and 'non-self' ones. The issue of organism peculiarity was also tackled by philosophers of biology. Together with immunologists they tried to provide answers to two kinds of questions. The first kind is of an ontological character and concerns the nature of immunological self: *What are the limits to*

[1] Special thanks to Łukasz Afeltowicz.

what may be seen as self?; *How to define what is self?*; *How does the immunological self of an organism change in time?,* etc. (Schaffner 1993: 8-19; Sarkar 1991: 125-138). The other kind of issues was related to the explanation procedures applied in immunology: *Do the terms and models used with regard to immunology explain the researched phenomena in a satisfactory manner?; Is the reductionist description of immunological phenomena expressed in molecular structure categories sufficient?* (Schaffner 1993: 64-89; Sarkar 1991: 138-163).

The perception of immunological phenomena in the *self/non-self* categories has prevailed since the 1950s. However, today this paradigm is more and more often contested. This results from the fact that modern research reveals the behaviours of immunological system that cannot be expressed in the category of mechanisms distinguishing the self and non-self objects (Janeway and others 2001).

In the following introductory text I am going to outline the basics of a standard immunological paradigm with its historical background, as well as point to its limitations and possible alternative conceptualisations.

However, before I do that I would like to introduce certain basic categories from the field of immunology.

Immune system

Immune system is a set of cells (including a gene-programmed network of lymphocytes), tissues and organism mechanisms, defending an organism against diseases through an identification and liquidation of pathogens and cancerous cells. These elements constantly seek various pathogenic conditions, and, by doing so, discern the healthy cells and tissues of an organism. Such activities aim at maintaining the biological balance – immunological homeostasis (Clark 2007: 3-14; Klein 1990).

In the course of evolution of species the mechanisms of pathogen detection evolved to such a degree that the defensive cells are now able to 'learn' and react adequately to the surroundings. As an example, each simple single-celled organism (e.g. bacteria) has a specified enzyme system protecting it from viral infections. Human immune system is composed of multiple protein types (e.g. cytokine), cells (e.g. lymphocytes T and B), tissues (e.g. mucous membrane tissues, nasopharynx) and organs (e.g. thymus, spleen) that interact in a complex and dynamic way, creating a complex system of structural interlocking (Janeway and others 2001; Howes 2008). The organs of immune system may be divided into central (primary) and peripheral (secondary) ones.

The immune system of mammals consists of two interrelated subsystems: innate and acquired immunity (Clark 2007: 3-7). Innate immunity is a system of primitive mechanisms and physical barriers – a sort of a first-line defence. Those barriers are constituted, among other things, by various tissue types that prevent pathogens from having access to an organism. If a pathogen manages to break through the

said barriers, innate immune system will recognize it and remove it; however, it is not capable of remembering the pathogen pattern, nor prepare itself for a similar infection in the future. In other words, innate system is deprived of immunological memory.

In the situation when an 'intruder' manages to successfully avoid the response of non-specific (innate) immunity, mammals may make use of another protective barrier, i.e. an acquired or adaptive immune system. Such a subsystem is able to remember subsequent infections and improve its response to them in the future by recognising a previously eliminated pathogen. When an 'intruder' is destroyed, the subsystem 'learns' its response. This allows it to faster recognise and destroy this type of threats in the future (Clark 2007: 43-60).

As we may see on the example of the above description, immunology is dominated by the metaphor of a military conflict, where 'enemy forces' are clearly distinguishable from an organism's 'own army' as if they were uniformed soldiers and marked vehicles. However, the problem rests in the fact that such a metaphor is more and more frequently subject to questioning. It is difficult to point to an object that could be an equivalent of a clear and always recognisable marking (Howes 2008: 280-284). An example is the host-friendly intestinal bacteria that are not fought by the immune system, although in their structure they remind of pathogens. Immune system 'leaves' its own cells 'alone', however starts to treat them as 'hostile' as soon as they die or become damaged. An interesting example is organ transplantation. Before the surgery doctors check the number of the so-called compatible tissue markers between the donor and the recipient, while chemically supressing the immune system of the recipient. Still, at times the markers fail – a seemingly compatible organ may be rejected by the recipient's organism. This happens supposedly due to the fact that at the moment of operation the organism is 'in distress', which results in a strong immunological reaction (Wood 2006). Another mystery is found in numerous immunological diseases which – generally speaking – consist in the immune system's attacking and destroying the cells of its own organism. Because of the above doubts, immune system is now commonly perceived as a network, a cognitive system or even an interlocutor maintaining a dialogue with the organism (Cohen 2001).

Let us now proceed to a historical reconstruction of the self/non-self paradigm development as well as modern attempts to move beyond its limitations.

The self/non-self paradigm and beyond it

The historical background of the paradigm should begin with works of Claude Bernard (1813-1878), a French doctor and physiologist (Silverstein 1989). It was him that posed the following question: *How do we define particular metabolic limitations necessary for a regular functioning of living organisms?* In his depiction, the

body was composed of clearly divided modules, where the autonomy of the whole depended on the balance of 'internal elements'. This form of physical atomism radically changed the perception of the functions of an organism relying on an internal architecture of a limited environment (Tauber 1994: 51-53). Another of Bernard's innovations consisted in the introduction of a military metaphor when considering immunity. According to Bernard, in order to reach the state of homeostasis an organism uses its 'military forces' to attack and destroy the 'enemy' that is disturbing its balance.

Another important phase was the research carried out by Élie Metchnikoff (1845-1916) on phagocytes' behaviour and significance for the immunity. This is how he described immunity: for an organism to function properly it is required to be equipped with a regulatory system, i.e. a system providing an order to 'everything'; the 'harmony' of an organism is disturbed by foreign factors, and what is responsible for its restoration are specialized individuals shaped in the course of natural selection (Tauber 2003: 897). Such an individual was seen in a phagocyte researched by Metchnikoff, whose function rested in the absorption, and at the same time, neutralization of 'non-self' or damaged cells (Tauber 2003: 898-901). The phagocyte played the role of a 'guard' distinguishing and separating what was self (friendly, functional) from what was 'non-self' (toxic, damaged) (Tauber, Chernyak 1991: 135-175).

In the first half of the 20th c. immunology focused on an attempt to determine the chemical base of immunological reactions. After World War II the main research objects were transplantology and autoimmune reactions, as well as widely understood genetics. Also at that time, in one of his numerous publications, Sir Frank Macfarlane Burnet (1899-1985) introduced the term of 'immunological self'. This category, derived from psychology, gave rise to the theory of immunological tolerance (Burnet 1957: 67-69). Burnet described immunological reaction process in the following way: an organism has a certain biological identity acquired as early as in the prenatal period; such an identity has a genetic base. Each cell characterised by a proper pattern will be tolerated by immune system as friendly, whereas other objects, which do not have the said pattern, will trigger off an immunological reaction.

In that period immunology concentrated on the examination of lymphocyte structure and function. Burnet proposed a hypothesis according to which these cells were related to the mechanism of acquired immunity (Burnet 1959). This hypothesis was developed and tested by other researchers. Burnet spoke about immunity in the categories of immunological memory of cells that remember the intruder in order to be able to recognise it sooner in the future. Such a perception, in a way extending the previous concepts, became known as a clonal selection paradigm (Silverstein 2002: 793-796). It was to explain, among other things, the phenomenon of autoimmunization underlying autoimmune diseases.

A different approach was proposed by Niels Kaj Jerne (1911-1994). The central category of his explanatory model was an immunological network, i.e. a set of interrelated cells belonging to immune system, whose task was not to protect an organism against the non-self but rather to regulate – inhibit or strengthen – its own reactions (Jerne 1974: 373-389). We may say that Metchnikoff and Burnet focused on single cells, whereas Jerne pointed to interrelations between specialized agents. For instance, he pointed to the activity of antibodies (their production, formulation and adjustment). Following his idea, an antibody not only recognises a foreign antigen, but it is also capable of recognising particular antigens characteristic for its own structures. This means that depending on the situation, a 'recognising' element may at times prove to be the 'recognised' one. In simpler words, recognition of the self/non-self depends on the elements involved in the 'discussion' subject to particular 'grammatical' rules of constantly transforming immunological biology (Jerne 1984: 5-24).

Conclusions

It is necessary to point to three key moments in the history of immunology (Sarkar 1996: 125-170). First, Metchnikoff stated that immune system fulfils two functions: it defines an organism's identity and maintains its integrity – wholeness. The second important moment was formulating by Burnet the mechanism of differentiation of the self/non-self. The third moment was the description of the phenomenon of immunity by Jerne as 'flexible' and 'discursive' (Varela 1994: 31-40). In his proposal, the way of describing immunological phenomena may not be limited to the stiff logic of distinguishing the self/non-self. According to him, it should illustrate the system's cognitive capabilities that are subject to changes in a given biological environment (Jerne 1985: 439-451; Cohen 1992: 490-494).

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Edward Jenner
1749-1823

Louis Pasteur
1822-1895

Eli Metchnikoff
1845-1916

Paul Ehrlich
1854-1915

Karl Landsteiner
1868-1943

Peter B. Medawar
1915-1987

Frank Macfarlane Burnet
1899-1985

Niels K. Jerne
1911-1994

Polly Matzinger
1947

from 1700 - 1850 — experimental immunology era

1718 Royal experiment by Lady Mary Wortley Montagu
1798 Edward Jenner, Smallpox vaccination
1857-1870 Louis Pasteur, Confirmation of the role of microbes in fermentation
1862 Ernst Haeckel, Recognition of phagocytosis

1875

1879 Louis Pasteur, Attenuated chicken cholera vaccine development
1883 Elie Metchnikoff, Cellular theory of immunity
1885 Louis Pasteur, Rabies vaccination development
1894 Richard Pfeiffer, Bacteriolysis

1900 — modern immunology era

1900 Paul Erlich, Antibody formation theory
1901 Karl Landsteiner, A, B and O blood groupings
1906 Clemens von Pirquet, coined the word allergy
1907 Svante Arrhenius, coined the term immunochemistry
1917 Karl Landsteiner, Haptens

1925 — pre-wars years

1938 John Marrack, Antigen-Antibody binding hypothesis
1944 Peter Medwar, Immunological hypothesis of allograft rejection
1949 Frank Macfarlane Burnet & Frank Fenner, Immunological tolerance hypothesis

1950 — post-wars years

1953 Medwar, et al., Immunological tolerance hypothesis
1955-1959 Niels K. Jerne, et al., Clonal selection theory
1959 James Gowans, Discovery of lymphocyte circulation
1961-1962 Jacques Miller, Discovery of thymus involvement in cellular immunity
1971 Peter Perlmann & Eva Engvall, invented ELISA
1974 Rolf Zinkernagel & Peter Doherty, MHC restriction

1975 — contemporary immunology era

1983 Luc Montagnier, Discovery of HIV
1986 Hepatitis B vaccine produced by genetic engineering
1974 Niels K. Jerne, Immune Network Hypothesis
1994 Polly Matzinger, 'Danger' model of immunological tolerance
1996-1998 Identification of Toll-like receptors

2000

2001 Discovery of FOXP3 gene

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Uri Hershberg

The researcher whom we have had the pleasure to interview is a representative of a new and comprehensive approach to the biology of cognition. This new trend seeks to establish a new theoretical plane of research on the cognizing organism, accounted for not in a reductionist, but in a holistic and complementary manner. Such a multi-disciplinary sphere is now immunology, combining the achievements of microbiology, organic chemistry, physics and genetics, along with all the evolutionary baggage and philosophical context.

Uri Hershberg is a theoretical biologist, occupying the position of Assistant Professor in the School of Biomedical Engineering, Science & Health Systems at Drexel University (Philadelphia, USA). He received his doctorate in the field of computational biology (bioinformatics) at the Interdisciplinary Center for Neural Computation in Hebrew University in Jerusalem. He also has philosophical and psychological training. He is associated with a number of laboratories and international research projects (Yale School of Medicine, PRIME and others). He is a student of the eminent immunologist Irun Cohen, with whom he worked on the theory of homuncular antigens. In his research he deals primarily with immunology in terms of systems biology, the concepts of gene stability and transcription, mathematical modeling and computational bioinformatics. He has published in various scientific journals: *Proceedings of the National Academy of Sciences, Immunity*, *Journal of Immunology*, *Molecular Immunology* (co-author: Irun Cohen) and others.

System Immuology Lab: *http://simlab.biomed.drexel.edu*

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Picture source: Uri Hershberg's archives.

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Life as a meshwork of selves

Interview with Uri Hershberg

Jacek S. Podgórski, Witold Wachowski

It seems that the most fundamental question in philosophy of immunology is the matter of the essence of the immune system. In many handbooks this essence has been defined by 'self' – a term introduced by Frank Macfarlane Burnet. Could you tell our readers in your own words, in short, what this is? How can 'self' be characterized most adequately for non-specialists?

I think that self is a temporal definition and highly context dependent. It is a set of living cells or systems that compiles your body in a healthy state. I think it is something which is always in the process of being defined. I gave a talk on this topic recently. There was a meeting in Paris this summer (August 2011), the European Congress on Artificial Life. We were talking about *autopoiesis*. One of its characteristic of this theory is what is a unit, what is a biological unit. In those systems they define the picture as Varela drew it – unit is a sort of Oroboros – the snake that bites itself. This is Francisco Varela's definition of self – closed loop - and they (Varela and Maturana) always try to use this definition to describe self, in cognitive sense. This is the system that allows you to make closure of self.

My suggestion was that the system is totally dynamic. It never reaches ultimate conclusion. The system, according to me, when I think about it, is some sort of temporary definition, of me, right now, of my current context. What happened is that you try to reach this (Uri points at border of the drawing with closed loop), but the definition of self changes. Then you reach the next one and the next one, and so on. It is cycle that never stops. Constantly, your immune system is coming to grips with the definition of self. It is like your identity – it is not something static. Like, *who you are now* is not *who you were years ago*, even though you feel a lot of sympathy to this person, maybe. An immune self in a given time is a collection of molecular characteristics that allows you to maintain health. The exact characteristics though, in fact you can measure the chemical set of self, it would not be the same as ten years before. The same has to do with the bacteria that you live with, which change and due to the fact that you develop, you are different, If you are a child, you are different. And the extreme case is that when you are an infant in the womb – both you and your mother are undergoing lots of changes. The reality is that it is hard to make a static claim *what is self*. Self is a changing phenomenon.

Is 'self' a notion rather philosophical, or rather scientific?

I think 'self' is a philosophical concept that stands on individuality and what individuality means or how important it is. It recalls on what you do in science. So I think it is a philosophical concept but it has direct implication on the way you ask the question. Self is a very ill-defined parameter. Its borders are not so clear-cut as we would like. It is very context dependent.

What has changed in your approach since the article "The Immune System and Other Cognitive Systems", namely in the last 10 years? Who was the most remarkable of your co-workers in the meantime?

That is a tough one. I would say that for me as a scientist I am focusing on more specific biological questions so I was less philosophical in these last years, I have been doing things at least for me based on data, asking specific questions on biology and this has led me to study more on immunity than on cognition because some of the things I thought about in cognition were very hard to test experimentally. It is funny for me now, because over the last 10 years I have spent a lot of my time in medical schools. And medical schools are not very philosophical places, because they involve their time to save people's lives, so it is not a very philosophical place. But recently I started a position in a medical bioengineering department and it is a more entrepreneurial place; there is some leeway to allow you to do other things, so I started such things again. So in last ten years I would say I started looking at more basic phenomena, but recently I started to go back and look at things I stopped ten years ago. Maybe because you guys emailed me, I don't know. One thing that I realized by myself is that in the paper from 2001 I was speaking mostly on the beginnings, and how things form and how cognition starts and begins to be amazing, essentially. Maybe because I am getting older in this second round I started to think of limits why cognition stops working. As to the second half of your question, it is a very hard question to answer. I would say that one person that mostly it was people I already talked a lot with at that time, people who inspired me to write this paper. These were people who I was acting with then and they stayed with me to some degree, so my two PhD supervisors Irun Cohen and Sorin Solomon and in this context I would say especially Irun Cohen. When you do a PhD, you don't realize if you do something that is very strange or not, because you think that everybody does what you do for your PhD. And what I have been realizing since my PhD is that they gave me a very strange outlook on the world and sometimes really what I had to do to make things different it is just bring that outlook. I learnt this outlook from Solomon and Cohen. So these are two people I would say. Another person who inspired me was Prof. Anat Nino, who studies language development in infants and who gave me both insight (and courage) to make a connection between immunology and language (and talk about it out loud). Finally, the last person without whom this would not have come about is Evelyn Andreewsky, who taught me many things about the society of science. In another

context of more practical research and the way I later continued – this paper talks about cognition and cognitive systems and even then I already thought in my head that this line between biological systems and cognitive systems is a fake one. What cognition does that is different from biology – it is not categorical difference, it is a mental extension. Even a single cell that needs to act in the world does not do it like a machine. It acts with signals, with meanings. I am not saying that cells have abstract thoughts the way we do. They do not have high cognitive potential. But the way we manage to manipulate those is that we have senses. Even a single cell organism does not really have sensors. They have senses. And I think that trying to think about that biology is what I have been doing since then, even though I think my papers were on different things. But it is really about the fact that whenever you look at the biology context it is what is important. In this sense I think that a lot of interesting things I learnt from Gunter Wagner (Professor of Ecology and Evolutionary Biology at Yale University), who is a professor at Yale, and also from Mark Shlomchik (Professor of Laboratory Medicine and of Immunobiology at Yale School of Medicine, Yale University), with whom I did my post-doc. I don't know if he agreed with my 'philosophizing or if he thinks about cells like this. He is more practical or at least gives that impression. But he thinks very deeply on how immune systems work. And actually there is another person, but the list is too big! Still I would say also Phil Hodgkin (Professor of Immunology at The Walter and Eliza Hall Institute of Medical Research, Melbourne, Australia). He is, I would say, the most important immunologist in Australia (a country that likes immunology). We know that Australia is the source of clonal selection theory. What Phil Hodgkin has done which I think is amazing is that he has added some physics to his lab and what he is trying to show is that stochasticity is an essential part of how eventually you get your robust behavior. What is interesting in what he has shown is that it is not noise. So the fact that each cell behaves slightly differently and nearly every parameter you can think of proliferation and differentiation is not hard coded. He has essentially shown experimentally that this competition of stochastic things leads to the immune phenomenon you can see at the end. He is also a guy who is really easy to talk to, which is always nice. He has managed to convince them to do a set of experiments, he is essentially growing individual immune selves in separation so you can really see which population is the source of which cell and then you separate them again, so it is a very difficult experiment to do and very time consuming. But they have shown this amazing thing which only people who care about systems biology would care about and usually people would not do, because most immunologists unfortunately are not system biologists other than Phil Hodgkin. It is very hard to pick one name. Let us go on to the next question.

The theory submitted by you and your colleagues seems to be one of the most timely alternatives for studying the essence of the immune system. It has become famous, and has provoked new discussions among immunologists

(Cohn, Coutinho etc.). Could you briefly characterize this theory? To what extent does your approach differ from the classic notion of immunity?

The idea of this theory is essentially based on Irun Cohen's theories, my PhD supervisor. So the idea is that immune system does not make a hard coded self – non-self discrimination. Rather, it uses the self as kind a background signal to educate self about molecular biological systems. And then it contrasts dynamics of the system – things that it sees - it makes decisions for action. So to take an example from the visual system – we don't make light and dark illuminations, we use patterns of light and dark and the phenomenon of what is background light in whenever we are and we see the specific content. So this is the essence – something that I realized. And this is very different from Melvin Cohn's view and even Danger Theory. Because we know that there is no signal for any one characteristic. Everything has to be context dependent. And context is mostly based on self. Another aspect – we called it cognitive. And it was also used by Francisco Varela and Antonio Coutinho has also used this in his book, but what we also realized years after we published this is that our definition of the cognitive is more radical. When we say "cognitive", we don't mean that we need a multi-cell definition of border – we mean that there is no hard coded vision of border. Your define identity through acting with the fragments. This is most essential thing and what we said in the paper[2] and what I think about now is that all of the systems, you can't make them otherwise. If you try to make them hardcoded it would not work. And it would not be adaptive. So this is our theory in one short description.

Similarly to the followers of psychoneuroimmunology, you aim to study the complexity of the body – with one exception: for you the relation between the immune system and the neural system is essential, whereas for PNI the key relation is between the immune system and mind. Is there a possibility to describe such an extensive structure and effects of its activity by means of a relatively simple explanation based on cause-result?

I think that essentially the answer is "yes". But we have many technical issues before we can do that. One is that we understand little of these systems, so we don't know how these systems works. And especially neural system is very segregated. So the reality is when a body functions, it functions as a single unit. The system has a set of definitions that we make – well up to a point. The reason why it is not so easy to do this, especially with the neural system, is that it is so segregated. But the reality is that a lot of signals are not so clear. I will get to the immune system later, but first I want to emphasize something about the whole idea of separating and then trying to combine them. When you think of many automatic functions like

[2] Hershberg, U. and Efroni, S. 2001. *Układ odpornościowy a inne systemy poznawcze*. Avant, T/2011: 129-145, http://avant.edu.pl/wp-content/uploads/UHSE_Uklad_Avant_T_20111.pdf

walking. You walk because your brain tells your feet to move. But when you are walking in standardized ways, you are getting input through a pattern generating system. And people realized that this patterns are generated not only in the brain. You can use it even if your brain is disconnected from your spine. And there is also a pattern generated in your brain. They collaborate with each other. But the point I am trying to make is that there is a feeling that we have that everything neural happens in the brain. The brain does more complicated functions. But neural system is everywhere and to some degree it is in a state of flux and feedback. Today I heard example about the heart. The heart is also a huge neural system. It is highly innervated and generates complex electrical patterns. And apparently it is capable of making many complex calculations. So if you transplant heart to a person, you don't innervate it to the local neural system. The heart is autonomous. Despite this it starts to acquire the pattern the person had before. So it somehow calculates what it is meant to do and it becomes more like a heart that the person had before. So the point is that this was another aspect of what I said about self and non-self. If we understood it correctly this way, is that these systems communicate with each other, we would automatically understand it as a single system. The systems you ask about in your question are a false form of division, because if you want to study a simple movement, you don't need to look at the whole brain, you look at a cerebellum. If you want to study an inflammatory response to a vaccine, then you can look in a lymph now. There are very many things happening in the brain. Maybe there is no point to look at them. If you look at the interface, once we do this question, you will see that the interface is very fluid. I will give you an example I am sure you probably know about. Cytokines are probably very good neurotransmitters. It is not only used in immunity. It is also used in neural system. The problem is that anything I can give you will be anecdotal. We still don't know much about these systems and how they communicate with each other. So until we find this out and the way they combine there will be more confusion than useful research. Not because it can't be done. The immune system does communicate with the neural system. Whenever you are sick, one of the main things that happens is that you have a fever, controlled by your neural system, and you feel like going home and not talking to anyone. All of these things are phenomena created by your brain, acted by immune system. So it is not the question: if the neural system talks to your immune system and vice versa – that definitely happens. But going beyond that and doing research on it. There are many questions before that. There is a lot to do before we get to that.

What practical means does your theory offer to scientists?

I don't know. That is not why I did it. I wrote some things I thought came out of it and I have seen people write about it and what happens to me, is that I am surprised when I see what they actually think it means. In general I think "practical" means different things to different scientists. Generally in biology and also in the creation of robots and artificial life it is demanded that scientists ask questions that

are usually hard for them to ask. Sometimes it pushes scientists to things that are difficult to do. This is how things move forward into the unknown. I think that what I tried to write in these papers is that if you really want to understand how a specific dynamic works, you have to look at the environment in which it is working. And we have to contrast similar dynamics in different environments. Only then we can really understand what happens. I am not, in this paper, saying how to do it, because I did not think I needed to. The main point in the paper for those doing research on artificial life, was to say – if you go another path, ignoring the environment and its influence on dynamics, you will waste a lot of time and it won't work. And I think of examples of that, people who try to do expert systems in a kind of a subset in the environment. I think that generally this has to be a failure. In immunology, there was a lot of arguments about self and non-self but one of this funny things that happened is that all immunologists now agree that for a specific kind of response for the self part of MHC that this regulation of self and non self is not absolute. So claiming a fluid border of self and non self has become much more mainstream in the realm of immunology. So experimental immunologists today are much less likely to argue my paper then they were when it came out in 2001.

Some time ago I read a study and I found some papers about artificial immune systems that are applied in antivirus programs. And this research programme is very big. I was very astounded. Have you heard about that?

So I know about it and I have to say I have not seen one that I found theoretically sound. If I ever did, I would talk about it a lot. I often have two issues with them. One is that they often use immunology as a metaphor, some immunological model that nobody believes anymore which is fine if it helps, but it is not immunology. And the other thing that I sometimes see is that they overdo it, in terms of claiming the utility of adaptive immunity. One of the reasons we need immune system is that environment is very complicated. It would be maybe cheaper if we could as living systems do it, somehow tag all bad things with a sign saying "you are bad". It would be better than to have all this cognition but we can't do it. It is not viable. And sometimes I feel that all this anti viral immune models are not clear to me as they should, we could do it with a simpler tool – this is two. So if you are going to do things in a very complicated way, you have to really show that it is necessary, if you are making something. So I have to say that I haven't looked at this recently, maybe because of these two reasons but the last time I looked at this direction of research and it was full of things that were very… I wish it was better – let us leave it at that. Do you like cyberpunk?

Yes.

So you know William Gibson and Bruce Sterling. William Gibson is really super cool. But he is a fantasist. This is magic. The way he describes a computer is the way like someone who has never seen a computer. Bruce Sterling shows things that will happen in fifteen of fifty years and it shows you how information struc-

ture will change and what you think about the world. And I think that people who do immune system antivirus, they think that this cyber structure is much more complicated than it is. It would be a good environment to make living things, but right now I am not sure if it is complex enough.

What tool is the most useful in your research? To what extent do computational modelling and visualization determine the results of this research?

Everything I do is based on computational model. And these days a lot of statistics and analysis goes on in my research. But I have to admit that I am actually doing a lot of reasoning thinking, about phrasing the questions so most of the time, things I do are based on coding and programming are not very complicated. This may change a little bit cause I have a lab. And some of my students are really good in programs usage. Everything I do is based on visual thinking and visualisation, but it is usually simple visualisation. I have never done a 3D map of the thymus. The closest I would say to have, the visualisation that really made me think of the idea was in paper I published in 2006. I made this small networks that represented codons and Amino acids. The whole paper came about because I was obsessed with making this visual things and then I found some other things and I did some small physical analysis, but I would not think about those things if I didn't try to get the visual. I was obsessed with the idea that the genetic code really limits to some degree what you do next – so if I am already one amino acid, I can't really go to another. And this is again a context thing, so that was the visualisation that I really used one time. So I think very much visually, but my visualisation at the end tends to be very simple. It is something that you can do on a piece of paper if you wanted.

It seems that the key point of cognitive immunology is auto-aggression. What happens when an organism starts to attack itself? And more generally: what is the position of auto-aggression in your research? In your doctoral thesis you wrote about HIV as "a (cognitive) immune system's conceptual mistake".

By auto-aggression you mean self reflectiveness or self attack?

Self attack.

What I am going to tell you know is a thing I was thinking about last month, but some of these is older. So in general my feelings on autoimmunity as you call it – auto-aggression is a cognitive mistake. The reason why my thesis didn't talk about it and the example I gave was HIV is that I was trying to shy away from it. I think that to some degree we are over obsessed with it.

So the point I am trying to make is the fact that we have biological cases of auto-immunity is not surprising. What is surprising is that we have very few of them. The problem in immunology is that we focus on pathological cases, but when we

really want to see how immune systems functions when it is not pathological. I guess that it is another aspect of theory which I also think it is held by others but I think it is definitely not in Melvin Cohn's and Frank Burnet's theory, so it is a immune system that is always active. So if you think of immune system as it is always active and you see how seldom we have autoimmunity, then you see the way it is – it is a mistake. If you think about a speech. Even when we talk on Skype, when we speak in language which is second to both of us, we make very few mistakes. And information comes to us, even though we make some mistakes. Let us say - The system is busy and the likelihood of having autoimmunity is zero. We can't build system that way. The immune system as a system is trying to minimize autoimmunity. So it is top – down. The idea that segregating cells move all kinds of thing, but it is a self police but in case when you have a police, this police is getting against the police itself and then you get autoimmunity. But it really is only one example of cognitive mistakes that immune system can make and I think is relatively rare and pathological. I mean that it is very important to study for medical reasons, and also because it tells us about limits of the immune system, but I would like to study healthy immune systems.

Now there are many ongoing studies in the world related to the notion of group immunity or collective immunity (for example: research on malaria). Is this an object of your science interests, and if so, to what extent?

I think it is very, very interesting, and unfortunately I have never done any research on something like that. I am now talking with collaborators looking at how different people in different biomes... how that relates to the immunity. In ten years or so when the technology of doing sequencing of DNA will have become much cheaper we will be able to actually do studies like that. Right now, like several years ago, we would never do a study like that - in terms of immune system you could not really sample diversity in any meaningful way. Now I can determine diversity of few people. So instead of starting looking at one, which is really weak, I can look at many people and identify things that are relevant to immune system. If I was to study this, I would need to sequence and I would not do it on humans, because no one would give me all of their immune system. If I sequence a million cells. So first I would need to million of them, if not more, and then would need to, I would only be able to see things existing in a thousand cells. So answering these questions is right now practically impossible But I would study if it becomes possible.

The language of immunologists is rather figurative and full of metaphors. For example: Ilya Ilyich Mechnikov used military metaphors, Claude Bernard – economic metaphors; among contemporary scientists, Polly Matzinger used the metaphor of being threatened, Irun Cohen - the metaphor of immunologi-

cal homunculus. To what extent is this metaphorical language adequate, and to what extent can it darken the point of the matter?

I think that this is a good question for any discussion on science, not just immunology. I met a lot of people who like metaphors. I think that you have to be careful using them but I think that to some degree everything we say is a metaphor. Everything except a specific level of something is a metaphor. Even if we make a small extrapolation, it is to some degree a metaphor. So I think metaphorical language is not adequate on its own, but it is very hard to say anything without using metaphors. So I like metaphors. And people who say they hate them – I think they just use boring metaphors instead of being more careful with that.

Continuing the subject of science metaphors: some people point out the predominant language of aggression and war in the medical and science descriptions. In their opinion this fact can have negative resonance for e.g. social relations. Do you see any alternative language acceptable both for scientists and for critics?

I think it is a very bad thing and it also goes to other things. People say things like when they sell you a yoghurt and they tell you: these are good bacteria. This is good, because they found significant good result. This kind of situation which are bringing good and evil into biology I think they are very bad. The problem is that it is much easier to think like that and also this is catchy. We need to be more careful about the language we use, which is a more context dependent language. One way that I like to do it, especially when talking about bacteria or the immune system is by using examples to show what things are good or bad for you. So when you get one type of bacteria from yoghurt and you bring it to the blood system, you will have septic shock immediately. The fact that your immune system rejects some things is good, but not when you have an organ transplant. These are signifying words – it is not so much about a wall between things, it is about saying this guy is a good guy and this guy is a bad guy. The reality is that it depends. Sometimes we can use viruses for good reasons. A lot of genetic things for living systems are transferred by virus. So it is not good or bad. In that context people are very happy to have something statistically significant. If it is not statistically significant, they are sad. People are very focused on finding good or bad. Significant – not significant.

Are the questions concerning immunity still underestimated?

There are many, many unquestioned theories. I will give you the worst one: we don't know why vaccines work. Most of vaccines we have we know they work, because they are proven effective over billions of people and multiple generations. We don't know how cells cooperate. We know the influences, but we don't know accurately how it happens. How the signal allows your cells to protect your body

and retain memory. We don't know how the cognate immune signal works. It is a really surprising phenomenon – you have two cells and they are reacting with different antigens and they associate with each other. You observe things that temporarily happen in the same time and your brain is very interconnected so you associate it. How it is actually physically done – we don't know. And there are many questions like that – we have theory and we have many incidental evidences showing that this theory is probably correct, but when we try to explain how it result to action – how multiple cells cooperate together without being controlled by third one – we don't know.

Ten years ago you and Sol Efroni wrote : "It is in treating the immune system as cognitive that we believe that our theory is most controversial (...)". For many philosophers and for some scientists the notion of the immune system being a cognitive system is still notional abuse. Is there any one non-functional argument worth using before orthodox approaches? You suggested the following criterion of system difference: "cognitive systems need an interaction with their environment to define the system's exact sensitivities".

I wanted to explain why I said that there is no functional definition, and I am not alone in this. It is about cognition and active process. So I don't think we have a priori a function. Eyes do have a function, the immune system does have a function. But what the immune system does – it acts (it functions). All cognitive systems are active things. So you can't make a definition that does not involve an action.

Is science immune against philosophy? Is philosophy defenceless in the face of science?

Only in the minds of bad scientists ☺ There is no such things like "science" without "philosophy". Why I chose my PhD supervisor was that the other ones thought that you can make a science without a philosophy. And I thought that they were lying to themselves. I think that philosophy is the status of what we think about the world, to inform how we ask the questions and to inform what questions mean. I don't think that these things are disconnected. The greatest scientists are those who are willing to philosophize. And the philosophers I like the most from 21st century were philosophers who were talking about science, so I think these are very interconnected things.

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The pluripotent history of immunology
A review

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Abstract

The historiography of immunology since 1999 is reviewed, in part as a response to claims by historians such as Thomas Söderqvist the field was still immature at the time (Söderqvist & Stillwell 1999). First addressed are the difficulties, past and present, surrounding the disciplinary definition of immunology, which is followed by a commentary on the recent scholarship devoted to the concept of the immune self. The new literature on broad immunological topics is examined and assessed, and specific charges leveled against the paucity of certain types of histories, e.g. biographical and institutional histories, are evaluated. In conclusion, there are compelling indications that the history of immunology has moved past the initial tentative stages identified in the earlier reviews to become a bustling, pluripotent discipline, much like the subject of its scrutiny, and that it continues to develop in many new and exciting directions.

Keywords: Biographical history; Continuity model; Danger Model; Historiography of Immunology; History of Immunology; Institutional history; Self vs. Non-self model.

Introduction

Two decades ago, in the summer of 1992, the Naples Zoological Station's summer school in the history of the life sciences, a roughly biennial event since the mid-1970s, chose to focus on the history of immunology. Whether the meeting achieved its stated purpose of facilitating dialogue and exchange between immunologists and historians appears to have been a matter of some contention among the attendees (Judson & Mackay 1992; Söderqvist 1993). But for the historians in attendance, the meeting seems to have served as a wake-up call, alerting them to the paucity of serious historical scholarship on the discipline of immunology. Within a few months these scholars organized a second symposium in Boston - this time, pri-

marily for the humanists - where the aim was to "foster the development of a history of immunology that would generate its own questions," (Cambrosio et al. 1994: 376). The proceedings of this second meeting were published shortly thereafter in a special issue of the Journal of the History of Biology (1994, Vol. 27, number 3) which was subtitled "Immunology as a historical object." A third meeting followed in 1995, the outcome of which appeared yet again in the Journal of the History of Biology, this time as a special section in the fall 1997 issue (v30: 317-440). Meanwhile, not to be outdone by their humanist colleagues, many of the scientists who had attended the 1992 meeting published their own version of the history of immunology (Gallagher et al. 1995). However, despite this flurry of activity within a relatively short span of time, the historian Thomas Söderqvist, a prominent presence at these meetings, opined in the title of his 1999 essay that "The historiography of immunology is still in its infancy" (Söderqvist & Stillwell 1999).

By invoking Söderqvist and Stillwell's claim I might be justifiably charged with creating a straw man to combat, because any field of study by virtue of its very existence is open to historical analysis. Regardless, I believe their review provides a good starting point for a new review of the history and historiography of immunology, not only because of the comprehensiveness of its coverage until that time – the article reviewed a dozen books on different aspects of the history of immunology published between 1991 and 1998 – but also because the criteria by which the authors assessed these books offer useful guidelines for assessing the progress of the field since then. Most of the work on the history of immunology until that time, their review charged, offered perspectives that were rather narrow and "internalist," or else "quite conventional, approaching their subject matter as intellectual history" (215). While I hesitate to dismiss either internalist analyses or intellectual histories as narrow or conventional – I prefer to characterize them as focused and rigorous – there is no doubt that Söderqvist and Stillwell's suggestions for broadening the scholarship on the development of immunology to include institutional histories, biographies and studies on sociopolitical contexts would only enrich the history and historiography of the field. An evaluation of whether the historiography of immunology has widened its scope to include such methods and narratives is one of the major aims of this review.

Defining Immunology

A good place to begin a historical and historiographic evaluation of any discipline would be with a definition of the discipline; but such a task is not easy in the case of immunology. Indeed, as a survey of the recent literature reveals, a considerable portion of the existing historical scholarship about immunology analyzes and comments on the issue of disciplinary definition. Modern textbooks and dictionaries usually describe the subject as "the study of immune system," but this definition is dissatisfying not only because it is self-referential, but also because, as the historian Anne-Marie Moulin (1989: 221) has pointed out, the phrase "immune sys-

tem" did not appear in the writings on immunity until the late 1960s, whereas textbooks bearing the word "immunology" in their titles were in evidence decades earlier (e.g. Zinsser & Tyzzer 1927; Dougherty & Lamberti 1946). Simply perusing the table of contents sections of contemporary immunology textbooks or the titles of the various books and articles cited at the outset of this essay will reveal the great diversity of the technical and theoretical topics and problems studied under the disciplinary heading of immunology today: the thymus gland, lymphocytes – the B and T cells, helpers and suppressors – hemolysis, monoclonal antibodies, organ transplantation, antibodies, the articulation of the "self," yellow fever, plaque assays, immune cognition and inflammation are just some of the topics in these volumes. The picture is complicated further if we look at immunology in earlier periods (e.g. Mazumdar 1972).

The difficulties in establishing a definition and disciplinary identity for immunology are also evident in the historical analyses rendered by humanists scholars attempting to study the field. The philosopher-immunologist Alfred Tauber, for example, noted that "[a]t an important nexus of pathology, clinical medicine, and basic biology, immunology has served several research agendas and thus defies a single, unifying experimental framework," (2010: para 1). Anderson et al. (1994: 575) assigned a "putative origin" to the discipline, asking how the corpus of work constituting "modern immunology" was shielded by the memory of the discipline. One of the primary foci of their commentary was the definition of immunology as it had come to be articulated in the 1940s and 1950s by such famous immunologists as Frank Macfarlane Burnet and Niels Jerne. These men saw immunology as a science of "self-nonself discrimination," (Atlan 1998: 125) or the study of the way in which organisms (mainly, but not exclusively, humans) were able to maintain their own integrity and fend off unwanted outside threats such as pathogens and allergens. Such a definition allowed various issues – as apparently disconnected as infectious diseases, allergies and organ transplants – to be studied within a unified system. This definition has persisted, though not without criticism, until modern times, as exemplified in the titles of such books by the practitioners of this field of study as Immunology: The Science of Non-Self Discrimination (Klein 1982) and In Defense of Self: How the Immune System Really Works (Clarke 2008).

By the mid-1960s, the original authors of this vision of immunology had already predicted the end of their field on the grounds that its principal questions would have been addressed, if not answered, within a matter of a few decades (Burnet 1964, in Anderson et al. 1994; Jerne 1967). According to Anderson et al. (1994: 576), this act of positioning themselves at the end of history served as a "powerful (if unwitting) means of defining the boundaries of one's discipline, and of securing the legitimacy of one's knowledge". On the other hand, as Anderson et al. argued, it was problematic for historians to accept the scientists' ideas uncritically because the demarcation they suggested carried with it the danger that "the contemporary boundaries of immunology come to appear natural and inevitable," rather than as constructions in need of reevaluation and reparation (1994: 576). The risk of buy-

ing into the scientists' definition is to, thus, end up with a "perfunctory history of past error and then testimonies to the origin of a science without social connections" (1994: 579). While such renditions may serve the function of providing scientists with a chronology of events in their discipline which would make its boundaries indeed seem natural, they would likely lack the richer insights into the development of the discipline and workings of science that historians seek. Thus, it would seem that by calling for an "unnatural" history of immunology, Anderson et al. are pushing historians of medicine and science toward historicizing its very definition.

This challenge to historicize the definition of immunology, whether intentional or not, is taken up in the writings of Tauber, who in a 2004 essay declared that "[f]or me the history of immunology is precisely the very attempt to define such an entity [self]," the very concept of which, he charges, was "an artifice, a conceit, a model at best" (2004a: 202). The principal author of three of the dozen books reviewed by Söderqvist and Stillwell, Tauber was also, according to these reviewers, "the most philosophically-inclined member of the former immunologists crowd" (1999: 211). He has also been one of the most consistently prolific scholars since that time and is, hence, in a position of some authority to make such a broad claim about the history of the discipline. It is, therefore, towards his oeuvre that we will first turn in the discussion of the immune self, a concept whose historical significance he has acknowledged, even as he criticized its centrality within immunology:

> *Underlying each branch of immunology, the concept of an identified and protected "self," a theoretical construction and fecund metaphor, has served as the central theme which integrates this diverse discipline. Indeed, the fate of "the self" in immunology offers a historical understanding of how the science has evolved* (Tauber 2010: 1: para 1).

A Critique of the Immune Self

Tauber's view of the history of immunology shifts its disciplinary scope from the discrimination between self and non-self to what he described, in a self-admittedly heterodox fashion, as the appropriation of "the task of defining the organismal self" (2004a: 201). His criticism was, in fact, the continuation of an argument he developed in the early 1990s and first explicated in The Immune Self: Theory or Metaphor (1994b), the second part of the "trilogy" of books reviewed by Söderqvist and Stillwell (1999). According to Tauber, the notion of the organismal selfhood – a metaphor introduced by Burnet in order to explain how the immune system worked, which quickly changed in status to a theory and then to a dominant paradigm – served to the detriment of immunology because the paradigm ignored "a vast body of data and explanation" that makes up the discipline today (Tauber 2010: para 6). "The designation 'self' and the 'other' ignores how neat divisions or

boundaries were adopted, or at best, were drawn with a certainty that remained problematic" (2010: para 5), he contended, recommending that immunologists themselves strive to problematize the objectives of their discipline and widen its scope. Tauber's position is also evident in his other writings; for example, in an essay review of the Norwegian microbiologist Elling Ulvestad's book Defending life: The nature of host-parasite relations (2007), which is, tellingly, entitled "Expanding immunology" (Tauber 2008). An underlying assumption in Ulvestad's book was that "the immune system depends ontologically on the ecosystem in which it is embedded" (2007: ix). Tauber honed this idea to suggest that the discipline needed to open itself to ecological considerations and "reorient itself to address more effectively not only the molecular mechanisms of immune reactions, but also their regulation and organization" (2008: 271).

Around the same time that Tauber launched his criticism of the selfhood paradigm, the immunologist Polly Matzinger posed a challenge from within the disciplinary ranks to the notion that the discrimination between self and non-self was the primary driving force in mediating immunity (Matzinger 1994: 991). She provided an alternative explanation with her "Danger Model" which was predicated on the premise that "the immune system is more concerned with damage than with foreignness, and is called into action by alarm signals from injured tissues, rather than by the recognition of nonself" (Matzinger 2002: 301). Now, Matzinger's model did not deny either the existence of self / non-self discrimination, or its significance for immunology. In her words, "[t]he critical need to discriminate is the evolutionary selection pressure behind the complex set of mechanisms that endow T cell receptors (TCRs) and antibodies with their enormous range and exquisite degrees of specificity" (Matzinger 2002: 4). Where the two models parted company, she went on, was that the Danger Model did not assume that the discrimination was "the critical element in the decision to initiate an immune response" (Matzinger 2002: 4).

In the years since Matzinger first proposed the Danger Model, it has provoked lively debate and discussion – as all good scientific theories should – within the immunological community. That it continues to hold a prominent place in discussions is a clear measure of its dynamic nature. Given his perspective on the immune self, it is not surprising that Tauber has been more sympathetic to Matzinger's model than to the immunological models of other immunologists such as Melvin Cohn, one of the authors of the "two-signal" hypothesis (Bretscher & Cohn 1970), which modified and expanded upon Burnet's original theory (Tauber 1998a; 1998b; 2000). In particular, Tauber lauded the Danger Model for replacing self / non-self discrimination with a "contextualist scheme" and for being "fundamentally a process driven, functionally conceived model [that] builds on the antigen-presenting cell as the arbiter of immune reaction, a cell that cannot distinguish self from nonself in traditional terms of lymphocyte recognition" (1998a: 470; 1999: 468). But he took a much more extreme position than Matzinger in his criticism of selfhood, regarding "the evidence as increasingly showing that 'the immune self' cannot be defined as

an entity, and not even as a function," and further arguing that the self was "an impediment to furthering the conceptual horizon of immunology" (Tauber 2000: 242).

Even as he praised Matzinger for having "cast the net of immunology well beyond lymphocyte biology alone" (2000: 246), Tauber categorized her intellectual contribution as something that "redefines immunology's 'facts' within an alternative framework to the Burnetian scheme" (2000: 247). In his view then, Matzinger's Danger Model is "exactly that, a model, not a new theory," and he accords the exalted status of a theory or "theoretical development in immunology" to only two events in its history. "The first was made by Metchnikoff in establishing that immunity had the dual activity of first establishing organismal identity and then protecting its integrity" (2000: 246). Burnet's articulation of the self metaphor was, in Tauber's view, a reintroduction, albeit a fuller articulation, of Metchnikoff's notion of the primacy of identity. The only other contribution that Tauber conceded was a genuine theoretical advance in immunology was Jerne's idiotypic network theory, which, he argued, "moved past the identity issue altogether" to propose that "the immune system was fundamentally organized unto itself," and its protective abilities a side benefit rather than its raison d'être (Tauber 2000: 246).

The same prompts and cues that led Tauber (2000) to suggest a move beyond the immune self, however, elicited quite the opposite recommendation from the philosopher Moira Howes, whose earlier work had compared the self concepts in philosophy and immunology (1998). According to her, "there are a number of conceptual reasons to preserve self-concepts in immunology" (2000: 249). Her main argument seems to be a rather pragmatic one for rendering scientific explanations; "[u]nless a biological mechanism can be understood to be about something, it is not understood" (Howes 2000: 251). According to her, stripping immunology of such intention-conveying terms as "self" and "danger" is "an oversimplification that obscures" the biological processes being described (2000: 251).

> *...all of the metaphors used in immunology are intentional terms. Possibly, immunologists could find other metaphors to use, ones that are non-intentional. I have a hard time imagining what these metaphors would be...* (Howes 2000: 250).

Where Tauber saw a danger of the metaphor of the self achieving the status of a theory, however, Howes contended that "when immunologists use these terms they implicitly empty them of intentionality" (2000: 250), and, therefore, that the metaphor did not imply that the immune system possesses any conscious intentions or goals.

Like Tauber, Howes observed that the Danger Model was important in showing that the "discrete separation of self from nonself in immune function is not the entire basis of the immunological self," but, rather than criticize Matzinger's model, she emphasized the fact that it did not "mean that tolerance to self is unimportant" (2000: 256). Her main point of contention with Tauber seems to lie in the im-

plications of the network model – expanded and developed since Jerne's original formulation by the immunologist Antonio Coutinho (1984; 1989; 2005) – for the concept of self. According to Howes, the theory does not so much obviate the need for the immune self as argued by Tauber, as it does the discrimination between self and non-self:

> *[In the network model] the immune system does not regulate itself by first discriminating between self and nonself [...] Rather, immune regulation is achieved by discriminating between unperturbed and perturbed states of immune connectivity. The immune system is busy interacting with itself and with the body all of the time and the appearance of foreign antigens causes a perturbation of this activity. Because nonself is viewed as a perturbation of the system, it is not really viewed as "nonself" by the immune system. There is only "self" and its perturbations; and hence, we have a theory about how the immune system reacts to the self rather than a theory focusing on immunity to nonself* (Howes 2008: 278-279).

Thus, as Howes went on to argue in her commentary, Tauber's claim that the self was no longer useful in immunology was premature, and that while the issue was "complex and controversial," it was by no means obsolete. "On the contrary, the question of immunological selfhood appears to be on the cusp of renewed and vigorous inquiry, with revised models of self–nonself relations replacing dated versions" (Howes 2008: 284).

Giving credence to her claim of the endurance of the self, even as they vigorously and radically challenge the concept are the contributions of another philosopher of biology, was Thomas Pradeu, a relative newcomer to the selfhood debate in immunology. Pradeu collaborated with Edgardo Carosella, an immunologist, to criticize the "self" concept on both philosophical and scientific grounds, and to suggest an alternative framework for understanding immunity based on a notion of "continuity" (Pradeu & Carosella 2004; 2006a; 2006b). Pradeu's engagement with immunology stems from an interest in the issue of defining biological identity, the study of which, as he claimed, echoing Tauber (2004a: 201), modern immunology has appropriated almost exclusively as part of its domain (Pradeu, 2012: 1). His description of a living organism's identity encompasses a much broader terrain:

> *A being is defined by two aspects: first, the individual characteristics that make it distinct and different from everything else [...]; second, the fact that, in spite of the changes that occur to it, it can be said to remain the 'same' being* (Pradeu 2006a: 245).

He describes biological identity as being a more 'open' concept, one that deals "with both endogenous and exogenous elements in order to determine eventually the combined, and always precarious, nature of a given organism" (Pradeu 2004: 484).

Pradeu's characterization of the nature of an organism as 'precarious' confers a temporality in addition to the corporeal aspect on the notion of biological identity. This temporality, in turn, renders the concept of selfhood inadequate, if not meaningless, because, with the organism's ability to change at any instant, there is no defined limit or boundary between the self and the so-called non-self at the molecular level (Pradeu & Carosella 2004: 483). Thus, an immune reaction is viewed as "a sudden appearance of antigenic patterns in [an] organism that differ strongly from those with which the immune system is continuously interacting" (Pradeu 2012: 132). In other words, immunity is a reaction to any sort of disturbance in "the spatio-temporal continuity" between the receptors present on the surface of the immune cells of an organism and the specific antigens – irrespective of their source – to which these receptors react (Pradeu & Carosella 2004: 483). According to Pradeu and Carosella, their theory for immunity is able to consistently explain a much wider set of immunological reactions than the selfhood model, which resorts to exceptions. For example, the selfhood model is unable to explain why immune cells called phagocytes are able to engulf and degrade cells after they have died, even though these cells were protected as "self" while still alive (Pradeu & Carosella 2006: 243). The continuity hypothesis, on the other hand, simply explains the death of the cells as a break or disturbance in molecular continuity, to which the immune cells then react.

The continuity theory is still quite new, with Pradeu's monograph in English literally hot-off-the-press, making an assessment of its impact on either the science or historiography of immunology premature and inadequate at this time. Already, however, some researchers have begun to invoke its explanatory power – for example, to understand interactions between cancer and the immune system (Blankenstein et al. 2012). Certainly, continuity is an exciting and provocative idea – a break in the continuity of the discipline, to borrow the model itself as a metaphor – and its effect on future debates about immunology and issues of identity promises to be significant.

One issue that is perhaps underplayed in some of the philosophical critiques of the self is the way in which the concept itself has evolved and changed in the years since Burnet first formulated his idea. A contemporary textbook on immunology, while giving due credit to Burnet for the origins of idea, will contain a recognizably different description of the immune self. Many of these changes are due to the dramatic changes in our understanding of genetics and molecular biology, the latter of which Burnet notoriously admitted feeling "positively schizophrenic" toward (1968: 175). Irun Cohen's introductory description of the immune self in his book Tending Adam's Garden: Evolving the Cognitive Self (2004) in contrast, defines the immune system as the "biological system that defines the individual," (2004: 5) in language that is entrenched in the language of molecular biology, although the fundamental notion of immune function has remained stable. His description continues as follows:

> *The immune system has nothing to say about the spiritual, logical, legal or poetic self, but the immune system has much to say about the molecular self. By its acts, the immune system defines the material components that make up the self. The immune system is the guardian of our chemical individuality; [...] By deciding which macromolecules and cells are allowed residence within us, the immune system establishes the molecular borders of each person* (2004: 5).

In order to maintain the robustness of their critiques of the self, then, philosophers must take into deeper consideration the historical changes in the conceptions of said self.

Other than the self: alternate approaches and other immunologies

If the immune self has dominated the scene thus far in this essay, it is because it has been one of the busiest areas for scholarship on immunology by those not engaged hands-on in laboratory or clinical immunology. For instance, aside from the Pradeu translation and an expanded second edition (2009) of Silverstein's seminal A History of Immunology (first edition 1989), there seem to be few single-authored books about the history of immunology published in the last decade. Thus, Söderqvist and Stillwell's charge (1999: 215) that the historiography of immunology lacked any "sustained attempts to place the development of immunological thought and practice" in broader scientific, social and political contexts, still appears to be mostly true, though not entirely so. The 2003 abridged translation of Söderqvist's own biography of Niels Jerne, Science as Autobiography, originally published in Danish in 1998[3] is an exception, but an anomalous one, in part because the author published the original before he wrote his commentaries about the history of immunology, and, in fact, drew his ideas about the discipline from his biographical project rather than the other way around. "I actually had been on the lookout for an interesting person to write a biography about when Jerne showed up by accident," he wrote later (Söderqvist 2006: 100).

The most notable example of a book attempting to offer a systematic argument about the field of immunology is Crafting immunity: Working histories of clinical immunology (Kroker et al. 2008), the outcome of a 2004 conference at the University of Toronto. The organizers of the conference had initially issued a call for papers "that sought to understand the diverse ways in which immunological knowledge had been articulated in clinical medicine," an attempt as it were, to examine the historical links between the "bench and bedside"[4] (Kroker et al. 2008: 1). According to the organizers, however, the results of the conference (attended almost exclu-

[3] The title of the Danish version of this book is Hvilken kamp for at undslippe, which translates as "what struggle to escape," a line from "Ode on a Grecian Urn" by the nineteenth century English poet John Keats.

[4] This phrase, which comes from the title of Illana Löwy's 1997 book (and which was part of the cohort reviewed by Stillwell and Söderqvist in 1999), was deliberately used by the conference organizers, with due credit to the author (Kroker et al. 2004: 1).

sively by historians and philosophers of science) were somewhat unexpected: "[i]t was not so much the pretense of immunology as a branch of biological knowledge with clinical applications that came under scrutiny as it was the very fact of immunity itself" (Kroker et al. 2008: 1). Presented as a series of thirteen case studies by the conference participants, organized in thematic clusters ordered more or less chronologically, the book does an admirable job of developing a "systematic argument," (Gradmann 2010) that immunity was "crafted" over the course of two centuries. What makes Kroker et al.'s argument particularly effective, I believe, is the broad time span and the variety of contexts in which the different contributors have demonstrated how "immunity served its interlocutors as both idea and experience, as telos and as technique" (Kroker et al. 2008: 1). But as a series of case-histories, the book is limited in that lacks a broader synthetic argument about the history of immunology against the backdrop of biology.

The second edition of A History of Immunology (2009) deserves at least a passing glance here if for no other reason than that the original version in 1989 was the first book-length treatment of the discipline of immunology from a historical perspective. As he was an immunologist who became interested in the history of his field, Silverstein's purpose in expanding his earlier effort was not only to "clarify further the conceptual developments of the field," but also to incorporate his growing historical consciousness of the "important contributions of more sociological factors to the development of a science" (2009: xvii-xviii). Readers familiar with the first edition will find it reproduced in its entirety, albeit somewhat reorganized, within the pages of the second edition, along with ten new chapters. Where the first edition was organized chronologically, the new version is, roughly speaking, divided into two halves. The first part covers the intellectual history, while the second half is largely devoted to the sociological influences on the development of the field. The extent of Silverstein's transformation from a scientist to a historian is a matter I prefer to leave to the readers' judgment, but the broadening both of his perspective and of the treatment of the discipline is difficult to dispute, not only when we compare the two editions, but also when the later edition is juxtaposed with his 2002 monograph about the immunologist Paul Ehrlich, Paul Ehrlich's Receptor Immunology: The Magnificent Obsession.

Based on a detailed analysis of the antibody side-chain or receptor theory which Silverstein holds to be the conceptual foundation stone of Ehrlich's immunology, The Magnificent Obsession qualifies as the type of "internalist" intellectual history described at the outset of the essay. Historians reviewing this book have concurred that while it furnishes a wealth of scientific and medical detail about Ehrlich's intellectual development drawn from a detailed reading of Ehrlich's papers, Silverstein failed to provide a broader social or cultural contextualization for Ehrlich's ideas and work (Prüll 2003; Söderqvist 2003). "Silverstein writes mainly from the perspective of an immunologist," observed Prüll (2003: 267), while Söderqvist stopped short – but only just – of characterizing the book as hagiographic.

As far as it is no biography, it is no hagiography either, of course - but the author's obsession with Ehrlich's magnificent obsession is at times eulogistic to an extent that rings somewhat strange to an ear trained in the historiography of science and medicine of the last decades (Söderqvist 2003: 450-451).

Given Söderqvist's love-hate relationship with his own subject, Jerne, which is evident in both his book and subsequent writings, it is not surprising that Silverstein's uncritical attitude toward Ehrlich irritated Söderqvist. Consistently with his overall discontent with the ways in which historians have or have not treated immunology, he described The Magnificent Obsession as "no biography," a characterization that may tell us more about Söderqvist's notions of what biography should be than about his evaluation of Silverstein's book. In contrast to Silverstein, who was an immunologist first and came to Ehrlich through his interest in the latter's research, Söderqvist entered the history of immunology through his interest in Jerne as a biographical subject (2002; 2006; 2011).[5] Consequently, Söderqvist's view of the history and historiography of immunology was heavily colored by his perspective as a biographer. In his view, for the history of science the value of writing biographies of recent scientists – i.e., "[s]cientists active within the life-span of the biographer" (2006: 99) – is manifold, with other uses than simply functioning as histories of science "by other means," (Söderqvist 2011: 634). He identified no less than six purposes for scientific biographies besides that of serving as contextual histories or "ancillae historiae" (2011: 635-637). Of these, two others, which are probably most relevant to the discussion at hand, include serving, first, as ways to understand how scientific knowledge is constructed (2011: 637-639), and, second, as conduits for the public understanding of science (2011: 639-640). Although Söderqvist approached his project as an existential rather than scientific biography (2003: xi), focusing on Jerne's life, of which his science was just one albeit an inseparable part, Science as Autobiography succeeded quite admirably in providing a contextual history of mid-twentieth century immunology, a window into the way immunological knowledge was constructed by Jerne and his contemporaries. It also made aspects of the discipline more accessible to a wider public, even if unintentionally: "I had no particular wish to inform the general reader [...] But as it turned out, some reviewers nonetheless noticed its value for the public understanding of immunology" (Söderqvist 2011: 640).

Considering Söderqvist's success, it is rather surprising that other historians of immunology have not followed suit and produced biographies of other immunologists. One particularly apt subject for the type of detailed contextualizing biography that Söderqvist has advocated would seem to be Burnet. So inextricably is his name linked with the shaping of the discipline that even as Anderson et al. criticized the demarcation of immunology by its practitioners and the reductionist nature of the histories to emerge, they conveyed a tacit acknowledgement of the place of these practitioners in both the history and definition of the field: "Putting it

[5] The 2011 paper is a "revised and shortened" version of the 2006 chapter and will be used in this discussion because it presents the ideas and arguments more concisely.

bluntly," they remarked, "to do 'immunology' seems inevitably to do what Burnet and his followers were doing" (Anderson et al. 1994: 579). Yet there is nothing more recent about Burnet than a rather traditional biographical monograph (Sexton 1992) updated on the occasion of his centennial (Sexton 1999) by someone who was neither a historian nor a scientist. Peter Medawar, who shared the Nobel Prize with Burnet, is another fitting biographical subject, but his life, too, has been largely neglected by the historians of science.

Institutional histories, as pointed out by Söderqvist and Stillwell (1998: 212), present another underexplored area in the historiography of immunology. The Walter and Eliza Hall Institute (WEHI) in Melbourne, Australia and the Basel Institute of Immunology in Switzerland, associated with Burnet and Jerne respectively[6] are obvious candidates for such treatment, but thus far any serious historical scholarship about these or other institutes are lacking. As with individual immunologists, there is no dearth of candidates for such institutional histories, but, unfortunately, a reviewer cannot do much more here than remark on the lacunae in scholarship.

Conclusion: Is the historiography of immunology past its infancy now?

The issue of gaps in the historiography brings us back to Söderqvist and Stillwell's 1999 essay, which, on the basis of the lacunae in the field, concluded that the historiography of the discipline was still too young at the time. While it is true that some of the gaps they identified still exist, their claim regarding a general lack of historical scholarship about immunology cannot be said to hold true any longer, if indeed it ever did. For one, there was a certain prescriptiveness to their critique and just because the type of histories they suggested have not been written, it does not mean that scholarship has not grown in other, perhaps unexpected, directions. Such immunological sub-fields as allergy and autoimmunity, for example, which this essay has bypassed almost entirely – both due to space constraints and more importantly, the specialized nature of these topics – have been subjects of rich and varied scholarship (e.g. Löwy 2003; Parnes 2003; Jackson 2003; 2007; 2009; Smith 2009; Jamieson 2010). Meanwhile, although famous figures may not be the subjects of stand-alone biographies, the work of Burnet, Medawar, Jerne and Jules Bordet, to name but a few, continues to receive historical scrutiny not only in immunology, but also in other disciplines and contexts, which integrate the history of immunology into the broader fabric of the history of medicine (Park 2004; 2010a; 2010b; Pasqualini 2009; Schmalstieg, Jr. & Goldman 2009; Sankaran 2010). The history of immunology is embedded in the histories of the disciplines such as chemistry and biology, and while the extant literature appears to be missing work that explicitly

[6] Burnet was director at WEHI from 1944 until 1965 and it was under his directorship that "[a]lmost overnight, immunology became the major preoccupation of the institute and over the next 10 years or so it contributed almost 50 per cent of the world immunology literature," (*http://www.wehi.edu.au/about_us/history/the_burnet_era/*). Jerne was the founding director of the Basel Institute of Immunology.

looks at the development of the field in these broader contexts, one might well find hidden histories of immunology in the historical literature of those broader fields – a historiography that is well beyond the scope of this review. Also not to be overlooked is the fact that immunology is a field whose practitioners remain active in writing their own historical analyses in many of their scientific journals. These accounts, in turn, constitute an area for potential scholarship among historians and philosophers.

In light of these different histories, then, one cannot help feeling that it is perhaps time to drop the age metaphor in considerations of the historiography of immunology. Instead digging into the discipline's own history and ranks, we might borrow a property of immune cells used in classifying the cells in the bone marrow and lymphatic glands to describe the state of the history of immunology. Unlike most other cells in an adult body which divide to form replicas of themselves – skin cells, for example, will give rise to skin cells, and muscle fibers to more muscle fibers, the early generations of these stem cells are "pluripotent" and have the potential to become one of several different types of mature immune cells as they undergo cycles of cell duplication and division. It is only after a few cycles of cell division that these stem cells lose their pluripotentiality and become committed to becoming one specific type of immune cell, e.g. a B or T lymphocyte, a granulocyte or a monocyte. The history of immunology seems akin to these pluripotent stem cells; while not yet committed to any single path of development, it is prolific nonetheless, brimming with the potential to grow in diverse directions.

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The Immune Self: Practicing Meaning *in vivo*

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Abstract

The immune self is our reified way to describe the processes through which the immune system maintains the differentiated identity of the organism and itself. This is an interpretative process, and to study it in a scientifically constructive way we should merge a long hermeneutical tradition asking questions about the nature of interpretation, together with modern understanding of the immune system, emerging sensing technologies and advanced computational tools for analyzing the sensors' data.

Keywords: cognition; contextualism; immune self; interdisciplinary research; meaning-making.

1. A philological prelude

The online Etymological Dictionary [http://www.etymonline.com/] teaches us that the root of "self" is "separate, apart", which means that the Proto Germanic source of the sign "self" designating "one's own person, same" is grounded in the activity of producing a "difference that makes a difference" (Bateson, 2000).

The first definition of "self" in the Oxford English Dictionary teaches us another important lesson about the way in which the meanings of signs have evolved through the rather short period of our cultural evolution. The OED defines self as: "A person's *essential* being that distinguishes them from others, especially considered as the object of *introspective* and *reflective action*" (emphasis mine). While the Proto Germanic source says nothing about "essence", the OED's definition is a product of reification in which the most basic activity of constituting a difference that makes a difference turns into a mysterious essence, which is also the object of introspection and reflection by another no less mysterious "essence". This essentialist definition of the self could have not been produced other than in Europe, where the monitoring and regulating function of the Catholic Church has been

replaced by an internal compass, a super-ego that introspects and reflects on man's soul, which is in its turn "self-conscious" in a very unique European and Protestant sense.

One may question of course this "cultural relativism" in which the meaning of "self" is determined by a symbolic network of a given historical period. Why do we need this cultural relativism one may ask? Can we imagine a person without a self? Can we imagine a person without motivation? or consciousness? Can we argue that people got their self only when this term has been baptized in the Protestant Churches of Europe? The naive realist may further use the doomsday weapon: The analogy to Newton's law of universal gravitation. Do you believe, he may poignantly ask, that Newton's law existed only after Newton had formulated it? Did apples fall differently before the brilliant Sir Isaac formulated the law in mathematical terms? You would probably not offer such a foolish argument, so why argue that the European culture has invented something that probably exists in each and every human being? My dear naive realist, we may reply, haven't you realized the difference between an apple and a human being? While an apple exists "in and for itself" a human being thinks, is motivated, and behaves according to the intricate symbolic Web in which s(he) is woven. As argued by Bakhtin, we are all unique but never alone, and as we are always interacting with others who bring us to the world and frame our perspectives, we are obliged to reflectively acknowledge the schemes that frame our mind. For the ancient Greek the most powerful motivating force was the code of honor. Was he "motivated" the same as the rational capitalist who considers his motivation in terms of maximizing profits? The answer is probably "No" and the reason is that the ancient Greek did not behave indifferently to the cultural frames that guided his behavior and the understanding of his behavior.

This short philological prelude in a paper that deals deal with the immune self does not aim to propagate a form of cultural relativism that I totally reject, but to reflectively and critically point to the cultural and contextual nature of the concepts that guide and mediate our intellectual activity. There couldn't be a serious discussion of the "immune self" without taking into account the cultural evolutionary baggage through which the concept of "self" has acquired its different senses.

2. The immune self: What and How

As the concept of the "immune self" has been the subject of intensive theoretical analysis, I have no intentions whatsoever to review this literature but only to present a modest perspective on the immune self. Following my previous work on the subject (Neuman, 2008), I will in large try to avoid the "what" question (What is the immune self?) as this question almost inevitably leads to the essentialist pitfall. Instead, I will try to propose to conceptualize the immune self in a way that may be theoretically intelligible and at the same time relevant for producing new research questions. As suggested by Efroni and Cohen (2003), a scientific theory should not

be judged only by one limited criterion, which is its ability to answer scientific questions, but also by its ability to produce new research questions. Adopting a non-conventional organismic metaphor I may say that similarly to an organism, an idea should not be studied only by the solutions it represents in face of evolutionary forces, but also through the potential promise it presents as a source of renovation and resilience for the generations to come.

Let me start by returning to the old original sense of "self" as an activity of producing a difference that makes a difference. If we adopt this sense then we do not make "a categorical error in assigning human description to lymphocytes and antibodies" (Tauber, 1996, p. 8). Tauber's criticism against the anthropomorphism of the "immune self" may be relevant if we apply the modern protestant sense of the self to the immune system. However, if we adopt the old idea of the self as a boundary constituting activity, then there is no categorical error in using the concept of "self" for describing the activity of lymphocytes and antibodies, as these are components that clearly play a role in constituting and maintaining certain boundaries essential for the survival of the organism as a differentiated unit of activity. One should notice that this idea does not involve a circular argument as it involves a conceptual shift between several realms or logical types. The self is the "organism's systemic closure that defines it for all practical reasons as a differentiated unit of activity/analysis" (Neuman, 2008, p. 96). Without our pre-theoretical observation that certain objects exist, and therefore are differentiated from the rest of the world, we can have no theoretical discussion whatsoever. Given the existence of certain objects we can ask how they come to be differentiated in our mind, which is an epistemological/psychological question, and how do they come to be differentiated in the world regardless of our contemplation. In other words, the second question is a kind of ontological question. While nonliving entities exist "in and for themselves" as described by Husserl, organisms continuously struggle to actively maintain their differentiated existence. Each and every organism struggles on a daily basis and from one moment to another to constitute and maintain its differentiated existence.

As we can see from the above discussion, a minor shift in semantics has clear pragmatic consequences. If the self signifies the activity of boundary constitution, then the question is not "What is the immune self?" but "How does it work?" Here again we meet a version of the essentialist concept suggesting that there is an built-in genetic barcode that allows the immune system to maintain the boundaries of the organism and to constitute its systemic closure. Like a can of beans in the supermarket, each and every organism, according to this genetic reductionist explanation, has a well-defined barcode, a fingerprint that signifies its unique identity and is used for differentiating the organism from other organisms. Such a genetic barcode (the MHC for instance) may play a certain role in constituting systemic closure the same as a person's name signifies a certain aspect of his identity. However, the genetic barcode cannot fully explain the systemic closure of the organism and its identity the same as a person's name may designate him but cannot be mi-

sinterpreted as his identity. The sign is never the signified. In fact, the genetic reductionist perspective of the immune self echoes some naive, even primitive one may argue, mythical concepts identifying the sign with the signified. The horror of mentioning the devil's name, in some cultures, results precisely from this concept and the idea that pronouncing the devil's name might bring the ripper to the scene.

The genetic reductionist concept is wrong even for the simple fact that our body, for instance, hosts a wealth of microbial life that cannot pass the barcode criterion. Moreover, even some parts of our self cannot simply pass the barcode test. A trivial example that I use in my book concerns the tolerance of the male body to sperm cells. Sperm cells are produced in the male's body long after his immunological identity, whatever it is, has been established in childhood. These "newcomers" are not simply tolerated by the immune system because they have the genetic barcode of the self. A testicular trauma such as kicking someone in his balls may lead the immune system to identify the sperm cells as associated with infection and to attack them regardless of any identity card they may hold. In the dynamic and symbiotic context of the living organism, the barcode model is too rigid for explaining systemic closure, the same as the identity of a city cannot be explained by the fact that only those holding a certificate identifying them as citizens of the city are allowed to enter and live there. Such a policy would have prevented us from hosting *E. coli* in our colon despite the valuable symbiotic relations that we maintain with this bacteria. In other words, and as Darwin teaches us, the organism is a dynamic thing. A rigid essentialist form of identity would have banned any change, symbiotic relations, or contextual flexibility, which is of prime importance. Well argued! declares the reductionist, so let's throw the immune self and just leave the ... non-self. This is precisely the suggestion underlying Burnet's Clonal Selection Theory (CST). Burnet suggests a very appealing idea according to which lymphocytes with reactivity against host components are destroyed and therefore the immune system identifies and attacks only the non-self. The idea is appealing in a very basic sense: An immune system that recognizes the "self" is in danger of attacking its self and therefore evolution has naturally produced an immune system blind to its self but sensitive only to the non-self. As we know, there is no army without an enemy but for Burnet the immune system is an army without a homeland to defend. The only minor problem with Burnet's appealing thesis is that it is wrong. As argued by Cohen (1994), the immune system knows to recognize itself. Cohen convincingly presents this thesis and as an alternative introduces a dialogical approach according to which self and non-self are complementarily represented in the immune system. There is no self without non-self and vice versa. The theoretical challenge to be addressed is how this delicate balance between the self and non-self is dynamically and contextually created and maintained. Here we get to the idea that the immune system is a meaning-making system (Neuman, 2004).

3. The immune system is a meaning-making system

The challenge facing the immune system is not a mechanical challenge of matching a key to a lock, a receptor to an antigen. This powerful lock-and-key metaphor cannot explain the complex behavior of the immune system (Cohen, 2000; Neuman, 2008). The challenge as I see it is a challenge of interpretation, of meaning making. To explain this point I will use natural language. However, by describing the immune system as a meaning making system I do not simply adhere to a linguistic metaphor. I don't use the conceptual metaphor: The immune system is like natural language. In contrast, I argue that meaning making in its different forms underlies both the activity of the immune system and of natural language. To explain this idea let me start with the polysemy of the sign. Signs in natural language can be polysemous, meaning that they can have different senses in different contexts. For instance, Bass can be used to describe a kind of Fish but also Guitar Bass. There is no meaning encapsulated in the sign itself. It is not a barcode, it does not correspond to a cherished sense living far away in the realm of Platonic ideas, and the form of the sign is arbitrary as insightfully realized by Saussure. Polysemy is a defining characteristic of natural sign systems from human language to the immune system, and it inevitably calls for interpretative activity. If the same sign can mean different things in different contexts how do we know to assign the proper meaning to the sign? The heart of interpretative activity lies in our need to resolve this problem of sense disambiguation. However, let us take a step backward in order to try and explain why polysemy exists. To explain this phenomenon let us recall the seminal work of Zipf (1949). Zipf identified the inherent conflict in every act of communication. If I use signs to communicate some meaning then my economic and energetic interest is to minimize my effort. This interest does not result from ideological laziness. For generations of organisms the world has been (and still is) a tough place, a place where resources are not given for free. In this context, a first principle evident in different forms of biological behavior is the optimal expenditure of energy. In this context, the "sender" would have preferred to communicate all possible intentions, ideas, emotions, or whatever communicable in a single word lexicon! Why should the brain be occupied by building, maintaining, and using a large mental lexicon when one can use a single magic word for everything? The same is true for sign processes in the biological realm. If an antigen, a virus, for instance, can be described in mechanical terms as a "key" and if it has the free choice to design itself, then it would have probably been like the thieves' famous key that can potentially open every lock. A key that can open every possible lock is the same as a single word lexicon that can gain the appropriate response with a minimal expenditure of energy. The problem is the conflicting interest of the "receiver" who would like to invest the minimal amount of energy in interpreting the sign. Trying to understand the meaning of a single word lexicon would have consumed enormous effort of mapping the sign into all possible entities and actions in the world. For the receiver, the interest is clear: a sign for every possible signified entity and action. This demand is unrealistic due to the effort required from the sender to hold an enormous, even astronomical, lexicon con-

taining, for instance, different signs for the "I"; the "I" that denotes the person I am now but also the person I was yesterday when my mood was different, and so on. The same is true for the immune system. If the receptor site could have been analogically described as a lock, then this lock should have been a rigid pattern that can easily identify any vicious intruder. In fact, the antibody does have a more rigid part, a fixed "lock", but this is only a part of the story as the flexible part of the antibody is necessary in order to follow the rapid pace in which the various potential antigens change their "lock" in order to survive. In this evolutionary game between the conflicting energetic demands of the "sender" and "receiver", the polysemy of the sign is a kind of resolution between the two extreme positions. I don't argue that this is an agreed, rational, and conscious result of a social contract between 'receivers' and 'senders' in the biological realm and emphasize the fact that the same biological agent may function both as sender and as receiver. However, we can definitely consider the polysemy of the sign, in both the realm of natural language and the realm of immunology, as an optimal solution emerging under the constraints of the interlocutors' conflicting interests. The price of this optimal and emerging solution is the need to interpret the sign-in-context. Think about this evolutionary game in the context of host and parasite relationships. The host and the parasite mutually recognize each other. The interest of each of the interacting parties is to recognize the other with minimal effort while making sure their social contract of mutual support is still valid. For instance, the parasite may present to the host a single biological signature identifying him as one of the good guys. However, such a position would have demanded from the host enormous effort in interpreting this sign under changing contextual circumstances. The idea is that a single, one-sense signal identifying the parasite as a legitimate guest might not be flexible enough to identify it as an unwanted guest in a changing context. The solution is that the host and the parasite are woven in a contextual and ongoing web of signs constituting mutual recognition on a moment-to-moment basis. In the case of death, for instance, the decomposition of the corpse is mediated by the proliferation of microorganisms living in the gastrointestinal tract. Their violent transformation is a result of a changing context in the most concrete, albeit semiotic, sense of the term. When the host stops functioning as the comfortable guest house that it has been, signs of decay turn the peaceful guests into violent agents. In sum, the polysemy of the sign is an optimal solution to the emergence of complex non-mechanical interactions in and between organisms at different scales of analysis. In this context, meaning making may be defined as "a process that yields the system's differentiated response to an indeterminate signal" (Neuman, 2008, p. 138). Whenever a biological signal is interpreted in at least two different ways under different contexts then we see meaning making in action. From this definition of meaning making, we learn that the immune self, or the contextual and dynamic process through which the immune system contributes to the organism's differentiated existence, involves a continuous distributed process of interpretation. The contextual aspect of this activity is elaborated in the following section.

4. Context: Weaving cues

Natural language processing has made some impressive achievements in building algorithms for Word Sense Disambiguation (WSD). What can we learn from this field for better understanding meaning making in the immune system? First, the challenge facing the immune system may be basically in differentiating between two senses of a sign: Self or Non-Self. In this context, the problem should be simpler than the one of disambiguating the meaning of a sign with more than two potential senses. The situation, however, is far more difficult for the immune system as it does not have a predefined dictionary of terms and senses neither an annotated corpus of sentences in which the different senses of a word are identified. The immune system therefore has to rely on natural intelligence and reasoning from contextual cues. The contextual cues are patterns of co-occurring biological signals resembling those that appear in natural language. For instance, if I have to disambiguate the sense of Bass in the following sentence: "I ate a bass in the restaurant", then the words "ate" and "restaurant" present a minimal context for disambiguating "Bass" as a kind of fish. In contrast, in the sentence: "The musician played wonderfully on the bass during a concert given at the jazz club", the words "musician", "concert", and "jazz club" indicate that bass is probably used in the sense of a musical instrument. Again, we cannot totally dismiss even in this context the other meaning of bass. It is possible, theoretically, that the musician was using a bass fish in order to produce sounds of music that amused the audience during a fringe jazz concert. However, reasoning to the best explanation would lead us to believe that this is not the case. The macrophages are precisely such contextual cues. They cannot sense the antigen directly but report the state of body tissues, the presence and effect of infectious agents, and the state of activation of nearby immune agents. The immunological context is therefore the minimal configuration of signaling agents/pathways through which an ambiguous biological agent is identified as either enemy or friend. This is a dynamic network in which signaling/communication "votes" for a decision through the converging perspective of the immune agents: The T cells respond to the antigen through the MHC but cannot respond to the protein's conformation as the B cells do. The macrophages sense the context but cannot respond to the conformation and so on. The disambiguation of the sign is a complex task in which multiple perspectives converge toward a possible solution. This idea calls for a contextual analysis of immune system activity through tools similar to those developed in Machine Learning and Natural Language Processing. What we need is just a way of mapping the different agents involved in an immune response, recording their behavior through the appropriate sensors, and analyzing these numerous interactions in order to identify patterns of behavior. The development of future sensors for recording the activity of the immune agents would turn this science fiction into science in action. Like the advances made in Brain Machine Interface, it seems that the challenges facing immunology are more "technical", surprising as it may seem, rather than theoretical or metaphysical.

5. Back to the immune self

What have we learned from this rather short journey? The first important lesson is the way our cultural schemes frame and direct our understanding. Imagining the immune self in terms of some Protestant agency has no benefits for understanding the immune system. By presenting this critique, I have no religious critique, á la Dawkins, whatsoever. However, imagining the immune self as a Christian self seems to me a wrong conceptualization even for the devoted believer. As with any other living system that is deeply involved in self regulation, the immune system must have a representation of the "self". As we have learned from cybernetics, there is no regulation without a model. This model must involve a representation both of the requested values the system strives to maintain and those values the system should definitely avoid. However, the immune system, as a complex natural system, is different from the man-made thermostat. Its model of the self is complex, fuzzy, and dynamic, the same as the complementary notion of the "non-self". The immune self is our reified way to describe the processes through which the immune system maintains the differentiated identity of the organism and itself. This is an interpretative process, and to study it in a scientifically productive way we should merge a long hermeneutical tradition asking questions about the nature of interpretation, together with modern understanding of the immune system, future technologies for sensing the system, advanced computational tools for analyzing the sensors' data. These together with good common sense may keep us targeted on the real nature of the immune system rather than going astray after our reified fantasies of the nature of our own selfhood.

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An Author Worth Defending. Introduction

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Issues connected with constructing and sanctioning various categories of embodiment have fascinated Ed Cohen since the beginnings of his academic career. He wrote his first book on the genealogy of discourses connected with masculinity[7] in which he attempted to describe various processes of collective naturalising and assimilating the category of sex. His research interests have centred around the social and scientific foundations of human uniqueness. In the book *A Body Worth Defending: Immunity, Biopolitics and the Apotheosis of the Modern Body* (Duke University Press, 2009), Cohen traces the genealogy of immunity back to the dual legal and biological origin of the concept of immunization. Immunity in the Roman law signified an exception from applying legal norms that are binding for all other citizens, and it still evokes the privilege of personal inviolability and exemption from legal proceedings. As Cohen indicates, the right to defend oneself, to declare the state of emergency, to suspend previous duties was incorporated into the medical discourse in the middle of the 19th century. Gradually, the paradigm of *vis vitalis*, an immaterial life power, was abandoned in favour of the need to defend the human body against external intruders and enemies. The successes of modern medicine implicitly confirmed this research model based on the separation of individuals from their environment. Immunology, as it is seen by Cohen, focuses on protecting the monadic, singular self. In other words, the purpose of his book is to examine how the essentialist assumptions of immunology are of direct concern to other life sciences that conceptualise the human body as one that is not only worth having, but also worth defending. While looking for the sources of monadic identity, Cohen attempts to recreate a biopolitics of immunity, inspired by the works of Foucault, starting with the legal notion of immunity as exception and the militaristic idea of immunity as defence.

[7] *Talk on the Wilde Side: Towards a Genealogy of a Discourse on Male Sexualities* (Routledge, 1993).

It is often said that attack is commonly regarded as the best form of defence, and this is presumably one of the reasons why making such an aggressive distinction between the self and the outside world of non-self should be counted among one of the most fiercely defended medical dogmas. Such a homeostatic truce between humans and the world became a useful category after the WWII when medicine triumphed over infectious diseases and the research on the workings of the immune system accelerated as a result of social, economic, cultural changes that may in part be attributed to the subsequent epidemic of AIDS. Another key word in Cohen's book is apotheosis, the idealization or deification of the human body separated in an artificial manner from other living organisms. The author elegantly combines medicine, biology, economy, politics, philosophy and above all history in order to describe the scientifically naturalised "innate defensiveness" of the human body against the external world, full of vicious viruses, bacteria and parasites. To Cohen, contemporary immunology is a consequence of regarding the need for defence against any internal enemies as an inalienable right and constitutes a basis for developing relations in the contemporary world. Cohen believes that the metaphor of the immunological system concerns not only the internal structure of living organisms, but above all the methods of shaping the social and political reality of the present. The assumption behind the innate defensiveness of organisms has resulted in a paradoxical situation where the efforts of health service do not target the population as a whole, but continue to separate individuals from the collective, since their illness is regarded as a consequence of a malfunctioning ontogenic immune system. The metaphorical struggle for subjectivity intensifies at the border of the skin and reduces the experience of an ill individual to a biochemical problem, while failing to see the social and material context of a given disease entity.

Cohen, using compelling historical arguments, points to the key role of metaphorised "immunity" in life sciences and shows how accepting the metaphorical dogma of defensiveness as rational and normative has influenced the theoretical concepts and experimental research in immunology. The author is presently working on an autobiography depicting his life-long struggle with Crohn's disease and a book on healing and the vitality of life. It may be of interest to add that Roberto Esposito[8] has made an attempt to philosophically reconfigure the notions of immunisation and communisation by putting forward a project of affirmative biopolitics based on the idea of communal, non-singular immunity.

Ed Cohen's website: *http://tinyurl.com/edcohen*

[8] Esposito, Roberto. *Bíos: Biopolitics and Philosophy*. Trans. Timothy Campbell. Posthumanities, vol. 4. Minneapolis: University of Minnesota Press, 2008.

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A Body Worth Defending. Opening Up a Few Concepts:
Introductory Ruminations[9]

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Editorial Abstract

The following text is an introduction to Ed Cohen's book *A Body Worth Defending: Immunity, Biopolitics and the Apotheosis of the Modern Body*. Author investigates the way in which immunology influences the perception of both the human body, and political entities, demonstrating that contemporary conceptualizations of these phenomena exist in a double bind. The historical framework Cohen applies allows for tracing the history of the metaphor of immunity in politics and medicine.

Keywords: biopolitics; body; immunity; medicine; modernity.

In this culture, medical thought is fully engaged in the philosophical status of man.
[Michel Foucault: *The Birth of the Clinic*]

Science projects are civics projects; they remake citizens.
[Donna Haraway: *Modest_Witness@Second_Millennium. FemaleMan©_ Meets_OncoMouseTM*]

The choice of explanations in medicine is always a choice of values.
[Lawrence Kirmayer: "Mind and Body as Metaphors"]

[9] The article was originally published as the introduction to Ed Cohen's book: *A Body Worth Defending*. 2009. Duke University Press. All rights reserved. Reprinted by kind permission of the Publisher.

The Vital Matter of Defense

In his memoirs, Élie Metchnikoff fondly recalls the mundane events which precipitated his discovery in 1881 of immunity as a form of biological self-defense:

> *One day when the whole family had gone to a circus to see some extraordinary performing apes, I remained alone with my microscope, observing the life in the mobile cells of a transparent starfish larva, when a new thought suddenly flashed across my brain. It struck me that similar cells might serve 'in the defense of the organism against intruders'. . . . I said to myself that if my supposition was true, a splinter introduced into the body of a star fish larva, devoid of blood vessels or a nervous system, should soon be surrounded by mobile cells as is to be observed in a man who runs a splinter into his finger. This was no sooner said than done.*
>
> *There was a small garden to our dwelling . . . [and] I fetched from it a few rose thorns and introduced them at once under the skin of the beautiful starfish larvae as transparent as water.*
>
> *I was too excited to sleep that night in the expectation of the results of my experiment, and very early the next morning I ascertained that it had fully succeeded.*
>
> (Metchnikoff, *Souvenirs*, 97 [marked by Ed Cohen])

From this humble conjunction of a starfish larva, a thorn, and a micro scope, Élie Metchnikoff deduces an entirely new way to perceive how organisms coexist and thereby ushers biological "immunity" into the world as an organismic form of "defense"[10].

With his family off seeing "some extraordinary performing apes," the scientist alone with his instrument has an epiphany: "How does the organism *defend* itself from intruders?" he wonders, for obviously, in a case of "intrusion," any response must be a "defense." Aha, he thinks, perhaps the mobile cells that I am observing can *mobilize* themselves against such an incursion. Metchnikoff decides to test his hypothesis by enacting this scenario. Identifying with and as an intruder, he pierces the "skin of the beautiful starfish larvae as transparent as water." In doing

[10] The work of Alfred Tauber and his colleagues provides the starting point for my reflections on immunity. See Tauber and Chernyak, *Metchnikoff and the Origins; Tauber, The Immune Self*; and Podolsky and Tauber, *The Generation of Diversity*. Also formative for my thinking is Moulin, *La dernier langage*. The best general history of immunology is Silverstein, *A History of Immunology*. See also Napier, *The Age of Immunology*. For a treatment that focuses on German bacteriology as the crucible from which Paul Ehrlich's thinking about immunity emerges (but which slights Metchnikoff), see Mazumdar, *Species and Specificity*.

so, he imagines that he models a form of aggression which he assumes to be entirely natural (as if he himself constitutes a force of nature), thereby providing a classic example of what the philosopher G. E. M. Anscombe calls action under the form of description (Anscombe, *Intention*: 84–85). In other words, by construing his experimental protocol as an intrusion, Metchnikoff enacts it as such and then reasons that, however the larva reacts, this reaction represents the intrusive catalyst's logical antithesis. Observing the experimental subject the next morning, he witnesses the fragment of the rose thorn engulfed by large amoeboid cells, apparently attempting to decompose it. He then recognizes—or in fact *re*cognizes—this cellular decomposition as a characteristically protective process. With this flash of insight, Metchnikoff conceives a definitive *and defensive* way to understand how organisms coexist in environments replete with others of different sizes and scales.

Certainly, many of us believe that Metchnikoff 's understanding transparently describes the way living things are, or at least the way they should be. Over the last one hundred years or so, the idea of immunity has passed from Metchnikoff 's lab into our self-understanding, so that today we take for granted many assumptions on which this understanding leans. For ex ample, most of us who rely on biomedical treatments such as vaccinations or antibiotics accept the idea that our immune systems ought to defend us against illnesses (even as we are also increasingly aware that they do not always live up to this promise). And while few of us have any deep understanding of its complexities, we generally presume that the immune system represents the front line in our incessant battle with the hostile forces of disease. Despite our ready acceptance, however, immunity is not a *natural choice of images* for our ability to live as organisms among other organisms of various sizes and scales—nor is defense, for that matter. Instead, both terms derive from the ways that Western legal and political thinking accounts for the complex, difficult, and at times violent manner that *humans* live among other *humans*. Only later, much later, are they applied the animate world more generally—including that part of the animate world we call "human." Modern presumptions about personhood and collectivity saturate both immunity and defense. Each offers a different strategy for accommodating the frictions and tensions (if not outright contradictions) between the singular and the multiple, the one and the many, that characterize modern political formations. Indeed, both immunity and defense play central roles in framing what we now understand as liberal or democratic governance, and hence they deeply inform our economic and political horizons.

So how do these complex and critical concepts end up in biomedicine anyway? And what biopolitical effects do they induce when they migrate from politics and law into the cellular matter that we call "the body"? Even as we go for vaccinations, take antibiotics, try to avoid the things to which we are allergic, have our white blood cell counts checked, or listen to news reports about AIDS, SARS, or avian flu, most of us remain ignorant of a basic historical fact: biological immunity as we know it does not exist until the late nineteenth century. Nor, for that matter, does the idea that organisms defend themselves at the cellular and molecular le-

vels. For nearly two thousand years, immunity, a legal concept first conjured in ancient Rome, has functioned almost exclusively as a political and juridical term—and a profoundly important and historically overdetermined one at that. "Self-defense" also originates as a political concept, albeit a much newer one, emerging only 350 years ago in the course of the English Civil War, when Thomas Hobbes defines it as the first "natural right." One hundred and twenty five years ago, biomedicine fuses these two incredibly difficult, powerful, and yet very different (if not incongruous) political ideas into one, creating "immunity-*as*-defense." It then transplants this new biopolitical hybrid into the living human body. We have not been the same since.

When science transfigures immunity in the 1880s and 1890s by equating it with defense, defense is acknowledged for the first time as a capacity of the living organism. This acknowledgment radically changes not just how we imagine our bodies as living organisms but also how we imagine what it means to be an organism living among other organisms and what it means to be a human living among other humans. Moreover, immunity's new incarnation emerges as the avatar of a scientific practice that profoundly transforms how we conceive and address both illness and healing. Indeed, immunity's acceptance as a robust biological concept fundamentally changes the embodiment of these essential human experiences. To day we fight diseases both individually and collectively. We declare war on cancer and AIDS. We visualize white blood cells destroying tumors. We imagine that we are fighting off a cold. We kill the germs that cause bad breath. What we no longer do (lest we incur the stigma of being terribly "New Age") is consider that we might harbor a capacity to heal. Following Metchnikoff 's declaration that the "battle" between white blood cells and microbes "represents the healing power of nature," defense quickly replaces healing as medicine's scientifically approved ethos (Metchnikoff, *Daphnia*: 193).

Before this replacement, for people all over the globe and throughout most of recorded history, "healing" bodies forth the organism's natural propensity, albeit a propensity that also needs human support and encouragement. From antiquity until the mid-nineteenth century, almost all cultures recognize that nature exercises a curative power in the organism, a power which medicine at best emulates or enhances. The Galenic and Hippocratic traditions (the prevailing philosophies of healing in the West) know this force as *vis medicatrix naturae*, the healing power of nature (Neuburger, *The Doctrine*). According to this worldview, healing manifests the organism's natural elasticity: it incorporates the organism's most expansive relations to the world, embracing the forces that animate the cosmos as a whole. Those seeking to facilitate the healing process attempt (at best) to encourage nature's course by redressing the micro and macrocosmic imbalances that keep symptomatic crises from resolving favorably. Within such healing frameworks, organisms incorporate and inexorably rely on the elements that constitute the world in which they live. Illnesses result from imbalances among these constitutive elements, whereas health emerges from restoring inner and outer harmony.

Therefore natural healing ex presses the immersion of living beings in the universe and affirms their fundamental connection to the matrix from which they arise and to which they will one day return.

By the end of the nineteenth century, however, the vis medicatrix naturae falls out of favor among Western bioscientists. Deemed unduly vitalistic by scientific medicine's increasingly reductionist paradigms (which pursue biochemical explanations for biological processes), "healing" be comes a more and more anachronistic notion. Instead, bracketing healing as an improperly fuzzy premise, scientific medicine embraces a highly complex, if not paradoxical, legal rubric—or even, perhaps, legal ruse. Though we do not always fully appreciate it, immunity is somewhat of a trickster. Within the juridico-political domain, immunity operates by defining lawful exceptions to the law precisely in order to maintain that the law applies universally and *therefore without exception*. In other words, since the law declares that its exceptions always already derive from it, such exceptions do not trouble its jurisdiction (Esposito, in *Bios*)[11]. Historically this declaration proves useful, since realpolitik often frustrates desires for juridical purity. Immunity (in its nonbiological valence) thus lubricates the ineluctable friction between law and politics. It allows the exigencies of politics to rub up against the formalities of the law without causing them to warp and turn back on themselves. Biomedicine embraces this lawful conundrum (i.e., that exceptions prove the rule) to incorporate "defense" as properly "natural" and thereby anoint it as a natural property.

This metaphoric substitution supports scientific medicine, since it restricts the complex, contradictory, and yet entirely necessary intimacy of organism and environment to a single salient type of engagement: aggression/response. With the advent of biological immunity, medicine localizes the ability to recover from or to avoid disease in the specific actions of our cells and molecules (specificity constituting another of biomedicine's hallmarks).[12] This specific activity quickly supersedes the less specific notion of healing as a more appropriately scientific concept. Furthermore, it imagines the individual organism as the space within which a cellular struggle for survival (a.k.a. disease) takes place, and conversely defines a specific microbial agent as the hostile cause against which the organ ism must wage its relentless war with death. While the germ emerges as both a biological and a political agent in the decade or so before immunity realizes its defensive capacity, immunity-as-defense retrospectively lends germ theory some of its legal force, helping it achieve the status of natural law.

Before Metchnikoff 's realization, the germ's vicissitudes remain obscure. If germs actually cause disease, then why do they cause disease in some people and animals and not in others? Moreover, if these disease-causing germs are omnipresent, then

[11] Gestures toward a similar understanding, though his engagement with immunity—both legal and biological—remains largely philosophical rather than historical.

[12] Kay demonstrates in *Who Wrote* how immunology's privileging of specificity provided the template for the first models of genetic inheritance.

how do we stay alive in such a relentlessly hostile environment? Immunity helps us reconcile ourselves to the fateful microbes. It provides us with the wherewithal to keep these ubiquitous, invisible, life-threatening others at bay. Medicine then allies itself with this self-protective force, seeing its own actions as a mirror image. Instead of evoking the organism's essential connection to the world in which it lives, immunity refigures medicine as a powerful weapon in the body's necessary struggle to defend itself *from* its life-threatening context.

Yet if this struggle represents such a natural condition, why do medicine and biology rely so explicitly on political and juridical concepts to make sense of it? If the ways that organisms coexist evince our political and juridical precepts so immediately, does this mean that medicine after immunity constitutes politics by other means? In the first half of the nineteenth century, the military theorist Karl von Clausewitz offered his famous formulation: "War is nothing but a continuation of political intercourse with a mixture of other means." In the second half of the twentieth century, Michel Foucault reverses the syntax to ask: "Should we . . . say that politics is war pursued by other means?" to which he responds: "It is one of the essential traits of Western societies that the force relationships which for a long time had found expression in war, in every form of warfare, gradually became invested in the order of political power (Foucault, *La volonté de savoir)*.[13] Immunity strangely grafts or inoculates both military and political potentials into human bi ology as an entangled mode of explanation. In fact, immunity offers a peculiar hybrid of military, political, and biological thinking that "naturally" negates the distinctions among these realms. Rendering biological immunity as an organism's active process of defense, scientific medicine deftly fuses a bellicose ideology (which sees environmental challenge as a hostile attack) with a political notion of legal exception (which nevertheless affirms the law's universal applicability).

Through this potent conceptual alchemy, biological immunity insinuates itself *at and as* the intersection of two disparate, if not opposed, ways of organizing human interactions: war and law. To the extent that the law seeks to preempt war's violence (albeit by mobilizing its own violence) and to the extent that declarations of war seek to define violence's legal ex tent (albeit within their own jurisdiction), the two seem counterpoised (Deleuze, *Foucault*: 30).[14] Hence not only do immunity as legal exemption and immunity as defense not necessarily correspond; they do not even necessarily coexist. Strictly speaking, where immunity exists there is no need of defense and where defending occurs there is no immunity. Nevertheless, the bioscientific appropriation of immunity collapses both these possibilities to describe how a complex organism maintains its vitality while living in a world where

[13] Unless otherwise noted, quotations are taken unmodified from the English translation, *The History of Sexuality, vol. 1: An Introduction*.

[14] Deleuze argues that "Foucault shows that the law is now no more a state of peace than the result of a successful war: it is war itself, the strategy of this war in action".

some of its fellow organisms (viral, bacterial, parasitic, and human) potentially threaten its wellbeing and aliveness. As a consequence of this incongruous and yet largely unnoticed fusion, the "immune" organism becomes a biopolitical life form through and through.

The "Nature" of the "Modern Body"

As its subtitle suggests, using the lens of immunity, this book focuses on how medicine makes "the body" "modern" and reflects on the biopolitics this modern turn in medicine engenders. In other words, it ruminates on how medicine modernizes us by incarnating a theoretical practice that simultaneously—if unconsciously—defines humans as organisms and as political actors and in so doing incorporates biopolitics as one of our consummately modern dimensions. At the center of this rumination appears a virtual node that we might call the "modern body." While we often take the body to represent what is most natural about us, or indeed suppose that our bodies manifest our "nature" itself, this presumption assumes far more and far less than is the case (R. Williams, *Problems:* 67–85). Instead both our bodies and our selves have undergone profound historical changes—changes both giving rise to, and ensuing directly from, immunity's biomedical apotheosis.

As more and less than a natural phenomenon, the modernized body arises as an artifact of intense human interest and investment. Informed by a confluence of finance capital, philosophical reflection, and scientific theory, not to mention military formations, colonial relations, religious reformations, technological developments, kinship dynamics, industrial processes, educational regimes, health care protocols, among many other factors, the modern body aspires to localize human beings within an epidermal frontier that distinguishes the person from the world for the du ration which we call a life. If we think of Mikhail Bakhtin's "grotesque body"—a body radically open to the world both temporally and spatially, simultaneously eating, shitting, fucking, dancing, laughing, groaning, giving birth, falling ill, and dying (Bakhtin, *Rabelais and His World*)[15] —as an icon for a nonmodern or premodern body, then by contrast the modern body proffers a proper body, a proprietary body, a body whose well-bounded property grounds the legal and political rights of what C. B. Macpherson famously named "possessive individualism" (Macpherson, *Political Theory*).

For all its salience as a political, economic, philosophical, and even psychological phenomenon, however, until the end of the nineteenth century the modern body does not exist, strictly speaking, as a biological body. Or to put it more accurately, until the end of the nineteenth century, the modern individual's atomized body does not accord with prevailing scientific theories that apprehend living organisms as contiguous with, rather than fundamentally distinct from, their lifeworlds. Indeed, this book holds that only with the advent of biological immunity does a mo-

[15] See also Stallybrass, *Politics and Poetics.*

nadic modern body fully achieve its scientific and defensive apotheosis. To appreciate this individualizing transubstantiation, *A Body Worth Defending* traces the body's modern vicissitudes as they unfold from the middle of the seventeenth century to the end of the nineteenth century to consider how they end up in our cells and tissues, as well as in our imaginations and institutions.

After the advent of immunity-as-defense, bioscience affirms that living entails a ceaseless problem of boundary maintenance. Less modern ideas about living beings ensconce organisms in a material world whose vital elements form—and whose fluxes and flows inform—their aliveness.[16] With immunity as its avatar, modern biomedical dogma holds to the contrary that as organisms we vitally depend on a perpetual engagement *against* the world to maintain our integrity or indeed our selves. However, this agonistic presumption does not entirely accord with biological thinking about how organisms coexist in shared ecologies, sometimes with great mutual benefit, sometimes pacifically, sometimes indifferently, and sometimes deleteriously. Instead, modern bioscience's investment in the self-interiorizing and defensive organism betrays its unacknowledged debt to modern philosophies of personhood.[17] Immunity incarnates ideas about human being culled from modern politics, economics, law, philosophy, and science, which then belatedly achieve scientific status when immunity inoculates them into the living organism and thereby validates them as essentially "natural."

Although it takes immunity-as-self-defense as its nominal subject, this book only partially traces the specific developments in biology and medicine that precede and condition immunity's biomedical coming of age. It does not exhaustively analyze immunity's complex invocations from the eighteenth century through the late nineteenth, when the term appears with accelerating frequency to describe a general empirical observation that disease affects different people differently.[18] Nor does it seek to address or contest the historiographies of biology, medicine, and technology on which my argument extensively draws. Instead, *A Body Worth De fending* engages immunity's migration from politics and law into the domains of

[16] Contemporary (or dare I say "postmodern") theories centering on biotech, often following Deleuze, also embrace such fluid potentials. However, they seem to think this embrace represents an ontological shift precipitated by new biotechnologies (e.g.,Massumi, Parables; Thacker, *Biomedia and Global Genome*; Clough, *Affective Turn*). This book suggests instead that the modern body coalesces as a biological possibility only in the late nineteenth century by historically incarnating a modern ontology from which these newer political ontologies then differ (and defer).

[17] Tauber's *Immune Self* elucidates how immune discourse engages philosophy's positing of selfhood over the last several centuries

[18]Chapter 4 addresses this usage and considers key moments in its development. My comments about immunity's descriptive valence derive from considering more than four hundred examples in English and French, between 1750 and 1890, thanks to the genius of Google books. Obviously not an exhaustive or systematic archive, this word searchable database nonetheless provides access to more documents than anyone has used to consider immunity's significance before. While counterexamples may exist (though I have not found any), the vast preponderance of instances confirm my claim. Try it yourself and see.

medicine and science as a complex of thinking about modern bodies which percolates through political, legal, philosophical, economic, administrative, governmental, scientific, and medical discourses. As this complex unfolds, beginning in Europe around 1650, its manifestations mutually inform and modify each other. Together they turn over—and indeed overturn—the pre or nonmodern ground in which theocentric feudal hierarchies planted their ensouled human forms, thereby clearing and fertilizing the terrain where the hybridized seeds of modern individualism come to flourish. Indeed, within modernity (or however else we might conceive it) the attachment of the person to the body supersedes its attachment to the soul. Concomitantly, the distinct personal statuses of body and soul denominate distinct *political* ontologies (Hacking, *Historical Ontology*).[19] Modernity births the modern body, and the modern body makes modernity matter.

Obviously, the meanings that accrue to the terms "modern" and "modernity" are myriad and complex. Tomes devoted to defining and describing modernity and the modern fill not inconsiderable shelf space in libraries around the world. Some treatments define these concepts historically, some philosophically, some technologically, some religiously, some economically, some politically, some geographically, some sexually, some racially, some globally, and many all of the above. Yet all these diverse readings share an underlying sense that modernity refers to living relations in and of time. As its etymology suggests, "modernity" (from the classical Latin adverb *modo* meaning "just now") connotes a punctual immersion in the present which syncopates the eschatological time frame espoused by premodern Christianity. Insofar as modernity designates a historical period (whatever the exact chronological parameters ascribed to it), it does so precisely by reimagining time as historical, that is, as a human index of change. Michael Hardt and Antonio Negri have recently characterized this shift, at once conceptual and material, as "revolutionary immanence."(Hardt and Negri, *Empire*: 70–74). Among its many other effects, such radical immanence opens the possibility for rooting human being—and human beings—both spatially and temporally in the localized domain that we call the body. In fact, we might characterize the transformations that European modernity incorporates by saying that they enable the essential metonym for the person to morph from immortal soul to mortal body. Altering the criteria for, and claims to, personhood, this metonymic shift contributes to destabilizing the religiously ordained (soul-based) hierarchies that characterized premodern European social formations. The immanent human body provides a temporal and spatial locus for biopolitical agency and therefore helps inaugurate a new political economy of modern personhood: one in which differences among and between

[19]This book seeks to understand the vicissitudes of human "being" in light of Foucault's genealogical undertakings. It differs in my focus on the historical grounding of modern political ontology in the body.

people (e.g., race, sex, gender, class, age, etc.) appear as attributes of bodies rather than the gradations of souls.[20]

In this reading, modernity's ordinance becomes secular not because it abjures the spirit but rather because it orients human experience around a living temporality that resides in the world. From the Latin *saeculum*, meaning the ordinary lifetime of the human species, a lifetime, a generation, or an age, modern secularity (like modernity itself) originally designates a situatedness in time in a specifically embodied way. The opposite of secular, then, is not religious but eschatological. As the lived dynamics of human embodiment begin to define human agency, they underwrite both political contestation (e.g., theories of natural rights) and economic transformation (e.g., wage labor). Mary Poovey identifies arguments from and about secular "human nature" as mediating epistemologically be tween premodern investments in a providential order and modern social institutions (Poovey, *Liberal Civil Subject*). This book adopts a similar mapping to Poovey's but analyzes the modern nature of human nature in the changing biological and medical perceptions about the human organism itself. In other words, it traces modernity's genealogy through changing ideas about the nature of the human, especially as the human organism increasingly imagines and lives itself as a biological phenomenon separate and distinct from an environment that only subsequently seems to surround or even oppose it.

In this regard, modernity marks a passage from the encompassing "passibility" that Timothy Reiss attributes to premodern and nonmodern subjectivities, where personhood accrues from "a sense of being embedded in and acted on by . . . the material world and [by] immediate biological, familial and social ambiances, as well as the soul's (or 'animate') and cosmic, spiritual and divine life." (Riess, *Mirages of Selfe*: 2). Modernity might thus appear as an ensemble of practices that literally incorporates—or incarnates—a historical paradox: modernity produces and reproduces humans as both natural and cultural, biological and social, empirical and transcendental, finite and infinite, insofar as it conjures the body as a hybrid biopolitical formation which we *must* have in order *to be* a person. Given the vast array of possible meanings, the next section adumbrates how modernity and the modern circulate in this book by considering two distinct and compelling interpretations, the first provided by Bruno Latour, the second by Michel Foucault. Hopefully this will help to clarify what it means to say that biological immunity makes the body *modern*.

[20] With regard to sexual difference, Laqueur describes this shift by noting that at the end of the eighteenth century, "a biology of hierarchy grounded in a metaphysically prior 'great chain of being' gave way to a biology of incommensurability"("Orgasm," 24). In *Society Must Be Defended*, Foucault describes the coeval emergence of biological racism (254–58).

A Short History of Biopolitics

In a concise and polemical text provocatively titled *We Have Never Been Modern*, Bruno Latour offers a surprising and compelling analysis of the putatively modern. He does so by disclosing a set of epistemological assumptions that underwrite the modern's material successes even as they contradict its ostensible premises. Extrapolating from Steven Shapin and Simon Schaffer's exploration of how modernity's advent in England transforms science and politics into overlapping and co-constituting do mains, (Shapin and Schaffer, *Leviathan and the Air-Pump)* Latour initially posits what he calls the "Modern Constitution" as supposing two distinct and yet inextricable beliefs: "It is not men who make Nature; Nature has always existed and has always been there; we are only discovering its secrets" and "Human beings, and only human beings, are the ones who construct society and freely determine their own destiny." (Latour, *We Have Never Been Modern*: 30).

Disarticulating nature from humans, and humans from nature, frees political and scientific thinking from the impacted dynamics that feudal and early modern relations between nature and man suppose (as well as those of premodern cultures more generally) (Latour, *We Have Never Been Modern*: 98–100).[21] Each now be comes available for critical reflection and rearticulation. Yet, as Latour demonstrates, these conditions remain insufficient in and of themselves, since they actually contradict each other, and so "the moderns" offer additional constraints: "But these two guarantees are contradictory, not only mutually but internally, since each plays simultaneously on transcendence and immanence. . . . Are they lying? Deceiving themselves? No, for they add a third constitutional guarantee: there shall exist a complete separation between the natural world (constructed, nevertheless, by man) and the social world (sustained, nevertheless, by things)."(Latour, *We Have Never Been Modern*: 31). This condition, constituting what Latour calls "purification," informs the modern by disaggregating the very elements from which modernity creates itself. It binds—and blinds—modernity to its unstable epistemological and ontological foundations by secreting them below the thresholds of visibility and intelligibility.

Taken together, these constitutional "guarantees" enable the moderns to mobilize resources, ideas, objects, and relations in ways heretofore un imaginable, via what Latour calls "networks." These new mobile possibilities not only infect modernity's famous self-conceit that it radically breaks with the past (i.e., that it completely severs its ties both with tradition and with traditional cultures) but also enable modernity to propel itself for ward through time. In so doing, it appears to relen-

[21] Latour argues that the disjunction modernity supposes between nature, society, and God gives rise to a series of corollaries including the temporal bifurcation between "traditional" and "modern," and the geopolitical mapping of this temporal schema onto other cultures taking the form "premodern" versus "modern," or succinctly "Them" versus "Us." In this sense, his argument accords with Chakrabarty, *Provincializing Europe*, about the Eurocentrism of modern historiography).

tlessly reanimate these very temporal and geopolitical ruptures within its unceasingly "productive" capacities.

> *[The moderns] are going to be able to make Nature intervene at every point in the fabrication of their societies while they go right on attributing to Nature its radical transcendence; they are going to be able to become the only actors in their political destiny, while they go right on making their society hold together by mobilizing nature. On the one hand, the transcendence of nature will not prevent its social immanence; on the other, the immanence of the social will not prevent the Leviathan from remaining transcendent. We must admit that this is a rather neat construction that makes it possible to do everything without being limited by anything. It is not surprising then that this Constitution should have made it possible, as people used to say, to "liberate productive forces."*
>
> (Latour, *We Have Never Been Modern*: 31)

By productively liberating itself from the past, modernity liberates the present *for* the future. Yet the neatness of this temporal bifurcation rests on the messiness of the conceptual matter that underwrites this progressive narrative. If nature transcends and intervenes, society self-creates and naturalizes. Causality appears everywhere and nowhere at once. The fungible categories which underwrite the Modern Constitution and make it so productive concomitantly give rise to a plethora of justifications, many of which manifestly contradict each other. For such justifications to appear noncontradictory, or "rational," and therefore politically and philosophically valid, some form of mediation must materially but tress the foundational divisions supporting the modern (nature-society, transcendent-immanent, subject-object, nonhuman-human, secular religious, traditional-modern, etc).

The Modern Constitution achieves this support, according to Latour, by outsourcing such contradictions to what he calls "hybrids." Hybrids form material networks that bind up "nonhuman nature" and "human culture" while disappearing below, beneath, or beyond modernity's epistemological and ontological threshold, almost as if they exist in and as the world itself. Explaining how this immanent hybridity ubiquitously prevails and yet remains largely undetected, Latour offers another modern guarantee, the guarantee of guarantees: "There shall exist a total separation between the work of hybrids and the work of purification" (Latour, *We Have Never Been Modern*: 31). In other words, hybrids "work" precisely insofar as their work remains immune from the radical, or indeed ontological, bifurcation that modernity presumes. To return to our main example, by borrowing on its explicitly juridico-political legacy and then claiming to describe nature itself, biological immunity succinctly illustrates how hybrids conjoin society and nature while occluding the fact that they do so (also explaining why immunity performs such im-

portant work for modern medicine, or even why it makes medicine thoroughly modern). By playing the opposition between nature and politics against the excluded middle, modern ways of explaining the world propose distinctions that biopolitical hybrids (such as biological immunity) should obviously undermine, since their manifest social nature should confound the society-nature divide. However, because hybrids appear constitutionally innocent of any such intention, and because they must be constitutionally exempt from consideration for the Modern Constitution to remain effective, they perform their imaginary work unremarked and unchallenged. In so doing, these hybrids secret(e) their values in everyday forms, shaping how we imaginatively and materially make sense of our lives, without revealing either the stakes involved or the possibility that other options might exist.

Hybrids underwrite our conceptual mapping of the world while them selves remaining "invisible, unthinkable, unrepresentable" (Latour, *We Have Never Been Modern*: 34). In so doing, they make the (contradictory) logic of such mappings almost impossible to discern. We think we are doing one thing while we are also doing otherwise at the same time. This double-thinking permits modernity to breech the limits that it declares inviolate: "The critical power of the moderns lies in this double language: they can mobilize Nature at the heart of social relationships, even as they leave Nature infinitely remote from human beings; they are free to make and unmake their society, even as they render its laws ineluctable, necessary and absolute" (Latour, *We Have Never Been Modern*: 37). Hybrids under write the modern double bind even as they belie it. Materializing concrete instances of nondifferentiation, their nonappearance or nonintelligibility enables modernity to exist as such. Or to put it slightly differently, high lighting their appearance and their intelligibility makes us realize that "we have never been modern"—or, at least, realize that modernity is not all that it is cracked up to be, or perhaps, simply, that modernity is always already cracked: "Here on the left, are the things themselves; there, on the right, is there free society of speaking, thinking subjects values and signs. Everything happens in the middle, everything passes between the two, everything happens by way of mediation, translation and networks, but this space does not exist, it has no place. It is the unthinkable, the unconscious of the moderns" (Latour, *We Have Never Been Modern*: 37).

Littered with hybrids, the modern unconscious reveals the traces of the contending forces which inform the social nature that we are. Yet because they lurk beneath the level of our conscious reflection—at least insofar as we "are modern"—these hybrids also conceal these very forces from us. This book interrogates one such hybrid, "immunity-as-defense," to meditate on the thoroughly political dimensions of the putatively biological substrate that we call "the body" (itself another hybrid, if not a hybrid of hybrids, as we will see in chapters 2 and 3). Biological immunity and the body mirror each other, each reflecting the other as both natural ground and raison d'être. Immunity takes on the responsibility for maintaining the integrity of the body, while the body's putative singularity creates a constitutive vulnera-

bility against which immunity must relentlessly de fend it. Silently invoking its juridico-political legacy to supplement this natural insufficiency (while conversely naturalizing its unappreciated juridico-political valence), immunity throws itself into the breach be tween nature and society as a good hybrid should.

The longer I work on this project, the less I understand why it seems obvious to us to use a complex legal and political concept to describe how we coexist as organisms. Taken at face value, immunity has little to recommend it as an organismic possibility; indeed, once called to our attention, it seems hard not to notice that the trope only works as catachresis[22]. But what troubles me more than this patently improper character is the fact that despite how transparently immunity functions as a biopolitical hybrid and how obviously its "political nature" hides in plain sight, no one gives this hybrid strangeness the slightest regard. Every day immunity is invoked countless times as an unproblematic facet of reality, that is, as "fact": labs are run on this fact, inoculations and antibiotics are prescribed according to this fact, pharmaceutical corporations invest in this fact, governments plan and implement policies predicated on this fact, NGOs and international and supranational organizations organize and distribute resources based on this fact. Immunity's utility is indisputable. Yet as a consummate hybrid, it contradicts itself on many levels and then enfolds its contradictions within itself.

A Body Worth Defending considers immunity as an apotheosis of both modern medicine and the modern body because immunity defensively renders the organism distinct from the vital contexts in which it necessarily exists, locating both nature and culture inside it. This diremption hollows out the lifeworld, defining the organism as a defensible interior which needs to protect itself ceaselessly from a hostile exterior. In so doing, immunity-as-defense naturalizes premises avowed by an earlier political modernization, one that anoints the individual—along with its now essential metonym, the body—*as the* natural social atom. If these entangled hybrids form the basis for modern political theory and modern biomedicine respectively, they do so as instances of what Foucault famously named "biopolitics." Indeed, rubbing Latour up against Foucault (and thereby offering what I hope could provide a useful if not pleasurable frisson for both), we might say biopolitics names a "hybrid domain," or a domain of hybridization. It makes visible and intelligible relations of force which, on the one hand, seek to distinguish biology and politics epistemologically and ontologically and, on the other, endeavor to mobilize "life" as a vital resource for, and target of, power.

[22] *Catachresis*, according to the OED, means the "improper use of words; application of a term to a thing which it does not properly denote; abuse or perversion of a trope or metaphor."

Biopolitics (along with its fraternal twin, "biopower") has proved one of the most infectious as well as most elliptical elements of Foucault's conceptual legacy.[23] Despite their renowned elusiveness, biopolitics and biopower have engaged and continue to engage the interests of many con temporary thinkers, who recognize that the concepts evoke something which seems distinctly characteristic about the modern world (at least in its Euro-American incarnations).[24] Alluding to a pervasive engagement with, or entanglement in, "life itself," biopolitics bespeaks a palpable sense that power has operated for the last two hundred or so years in part by creating, manipulating, managing, promoting, enhancing, and investing in a "zone of indistinction" (to appropriate Agamben's idiom) between nature and culture which we all too unproblematically call "the body." If both the life of the body and the quantum of life realized within bodily aggregations known as "populations" emerge as political concerns in Europe during the late seventeenth century and the eighteenth, we might say that they do so as hybrids which entrain the nature that humans incorporate within the politics that we enact. In other words, following Foucault, bio politics seems to gesture toward an unremarked elision between nature and culture both in what we name as "human" and in ensembles of living human beings. Moreover, biopolitics reveals this hybrid formation as a highly potent domain, or as a domain whose potency derives from the biopolitical indistinction it motivates. Within the ambit of the modern, then, "the life" of human beings and of human collectivities emerges more and more as a paramount subject-object of political concern.

Foucault situates this emergence within a historical shift occurring from roughly the middle of the seventeenth century onward—in other words, within the ambit of modernity construed as a historical horizon. Though he does not precisely characterize it this way, Foucault's biopolitical thinking emplots "the body" as a life-form that takes place within the historical transformations that modernize us (if we ever become so). This problematic clearly appears in the lectures he gives at the Collège de France in 1976–77, titled Society Must Be Defended, where he considers the problem of political sovereignty in part by situating Hobbes's political philosophy in the context of the English Civil War and its Cromwellian aftermath (1649–

[23] Foucault frequently, if somewhat vaguely, uses the terms "biopolitics" and "biopower" during the mid 1970s, most famously in the concluding section to *Lavolonté de savoir* (1976) and in the title to the his lectures of 1978–79 at the Collège de France, *Naissance de la biopolitique*. The less well remarked "bio-history" also shows up in the last part of *La volonté de savoir* as a counterpart to biopower, but much less commonly elsewhere. One important exception that is significant for our purposes occurs in a lecture given in Brazil in 1974: "There appears then a new dimension of medical possibilities that I will call the question of bio-history. The doctor and the biologist henceforth no longer work at the level of the individual and its descent, but begin to work at the level of life itself and its fundamental events. We find ourselves in bio-history and it behaves as a very important element" ("Crise de la médicine," in *Dits et écrits*, 48).

[24] Some might dispute Foucault's periodization as Agamben's *Homo Sacer* does (for my critique of Agamben's critique of Foucault, see E. Cohen, "A Body Worth Having") or his Eurocentrism, as Mbembe does in "Necropolitics." However, few if any deny that biopolitics and biopower poignantly describe a potent characteristic of the world as we know it

60). The next year's lectures, *Securité, territoire, popula tion* (1977–78), expand this historical project, situating biopolitics in the aftermath of the Thirty Years' War as a "governmental" supplement to sovereignty per se. If (as we will consider in chapters 1 and 2) internecine violence and bloodshed in England leads modern political thinkers like Hobbes and Locke to invest in sovereignty and the rule of law as a means of civil pacification, Continental thinkers and rulers at the same time rely more and more on extralegal strategies to keep the peace both within and between nations. To apprehend this difference, we should recall that unlike the domestic and fraternal unrest which seized England, across the Channel, on the Continent, the most fearful violence ensues from conflicts that are not just civil but also regional, not just internecine but also international.

Preceding and overlapping the English Civil War, the Thirty Years' War (1618–48) brings unrelenting death and devastation to many parts of Europe. This enduring period of military, political, and religious conflict not only results in widespread human mortality and morbidity but also visits ecological destruction, agricultural ruin, and economic collapse upon vast swaths of the region. While the war's lengthy and convoluted dynamics cannot be summarized succinctly here, the complex alliances and enmities that underlie these three decades of violent discord can roughly be parsed into the opposition between the Habsburg dynasty, which ruled the Holy Roman Empire (now much of Germany, Austria, Switzerland, the Czech Republic, Slovakia, Hungary, and northern and central Italy), as well as Spain, against the combined opposition of the rulers of France, Sweden, Denmark, and Holland. Furthermore, this international backdrop also provides the setting for more internal struggles within and between the many Germanic principalities, bishoprics, electorates, dukedoms, cities, and estates which variously and alternately ally themselves with the larger powers. Overlaying, or underlying (depending on your interpretation), these military maneuvers are religious divergences between Calvinism, Lutheranism, and Catholicism which orchestrate the byzantine play of forces and counterforces that characterize this extended and extensive era of bellicosity. Needless to say, given the widespread involvement and deeply felt justifications, the conclusion of these animosities, culminating in 1648 with the Peace of Westphalia, radically recasts the future of European states. Yet, even more importantly for our purposes, the Thirty Years' War also leaves in its wake a radically new mode of valuing human life. For in contrast to the English situation, where (as we will find in chap ter 2) the political worth of human bodies bespeaks a *legal and economic valuation* predicated on the individual's abstraction from the lifeworld and its generalized vulnerability to death, the conclusion of these widespread and deadly hostilities on the Continent sees the value of the living human body *politically affirmed* as a vital defense against an imminent potential for generalized war in Europe. In the aftermath of the Thirty Years' War, living itself becomes politically invested as a vital state of war preparedness.

The biopolitics that crystallizes during the eighteenth and nineteenth centuries (and ultimately congeals within immunity-as-defense) is catalyzed by the Thirty Years' War and the Peace of Westphalia. In particular, Foucault intimates that resolving the violent conflicts among the warring European states gives rise to an extralegal political order which, in contradistinction to the English case, does not invoke natural law or natural rights to pacify the region. This new order creates modern Eu rope, establishing a "geographic region of multiple States, without unity and with unevenness between the small and the large, having a relation of utilization, colonization and domination to the rest of the world. . . . Voila, that's what Europe is." (Foucault, *Securité, territoire, population*: 306).[25] Within this uneven geographic domain, organized violence and death are used and deployed as political resources both within and between states. According to the new equilibrating calculus of Europe, wars which had previously been thought—and fought—as rivalries among princes and been justified through competing claims to jurisdiction (war as litigation by other means) now come to function as a means of ensuring peace: "The first instrument of this precarious, fragile and provisional universal peace, which took the appearance of a balance and an equilibrium among a plurality of States . . . is war. That is to say, henceforth, one is going to be able to wage war, or better, one must wage war precisely in order to maintain this equilibrium (Foucault, *Securité, territoire, population*: 308). Enlisting war as the primary resource for a general economy of peace implies two corollaries: the need for permanent diplomatic missions (and spies) serving to gauge and regulate the use of war, which Foucault de scribes as "a permanent apparatus [*dispositif*] of relations between States, an apparatus of relations which are neither an imperial unity nor an ecclesiastical universality. . . . a veritable society of nations" (Foucault, *Securité, territoire, population*: 310); and the need for a permanent military apparatus comprising professional military personnel, a structured and permanent army, a military infrastructure (for tresses, equipment, roads, communications, etc.), and specific military knowledges (tactics, strategies, intelligence, etc.). After the devastating era of the Thirty Years' War and the ambitious peace it provokes, Foucault suggests that war enters modern politics as both a deadly and a vital instrument: "War is no longer another face of the activities of humans. War is going to be, from this moment on, the implementation of a certain number of means that politics has defined and of which the military is one of its fundamental and constitutive dimensions" (Foucault, *Securité, territoire, population*: 313). Two hundred years later, considering humans as living organisms, immunity-as-defense finally brings this war home.

Amid Europe's paradoxical domain of permanently bellicose peaceful ness, biopolitics emerges as a resource both for war and for its prevention. To avert excessive violent death, biopolitics augments the forces of life; in the name of a pacific life, it invokes the belligerent specters of war. This Janus-faced regime incorporates with-

[25] On Europe's self-conceit as a universal historical process with respect to the rest of the globe, see Chakrabarty, *Provincializing Europe.*

in itself the very violence against which it contends, establishing war as the political ground for affirming the lives on which, and in whose name, it acts. In the final part of *La volonté de savoir*, titled "Right of Death and Power over Life," Foucault maps this new domain across two axes: the "disciplines: an anatamo-politics of the human body" and "regulatory controls: a biopolitics of the population." (Foucault, *La volonté de savoir*: 183 [139]).[26] The first of these he explicates at length in Discipline and Punish, where not coincidentally the tactical organization of military forces provides one of the paramount examples of how disciplines inform "docile bodies." Remarking on the efficacy of the Prussian army's new training regimes under Frederick I (who invests heavily in militarily "balancing" European relations), Foucault comments:

> *Through this technique of subjection [assujettissement] a new object was being formed; slowly, it superseded the mechanical body—the body composed of sol ids and assigned movements, the image of which had for so long haunted those who dreamt of disciplinary perfection. This new object is the natural body, the bearer of forces and the locus of a life [siège d'une durée]; it is the body capable of specified operations, which have their order, their stages, their internal conditions, their constituting elements. The body, in becoming the target for new mechanisms of power, offers itself up to new forms of knowledge. Body of exercise, rather than of speculative physics; body manipulated by authority, rather than imbued with animal spirits; body of useful training [dressage] and not of rational mechanics, but in which, by which even, a number of natural requirements and functional constraints will reveal themselves.*
>
> (Foucault, *Discipline and Punish*: 155 [157])[27]

Formed through a "technique of subjectification" and target for "new mechanisms of power," the "natural body" clearly does not manifest "nature" in an unmediated or ontological sense. Rather, constituted by and for strategic exigencies, the natural body serves as the political locus within which *vital forces endure*. Indeed, as Foucault notes elsewhere, given the massive new investments in permanent armies which require extensive training of troops to carry out military operations (e.g., efficiently using equipment, moving in synchronous patterns, obeying chains of command, etc.), the endurance of the life force trained in this manner becomes an object of great political and economic interest. (Foucault, *Dits et écrits*: 188). The political and military concern with and for the natural body, then, imbues this body with its nature. Or, retracing Foucault's precise thinking, "natural requirements and functional constraints will reveal themselves" in, or even through, the natural body by way of the "new forms of knowledge" to which it, as the "target for new mechanisms of power," must "offer itself up." In light of this contrapuntal

[26] Page numbers in brackets refer to the English translation, *The History of Sexuality*, vol. 1: *An Introduction.*

[27] Translation modified

formulation, we discern in Foucault's natural body one of Latour's network of social-natural hybrids that shore up the Modern Constitution, since its nature is thoroughly political.

The military investment in the natural body bespeaks the potent effects that the new political economies of war manifest for the living human being. In modern Europe, war provides a forceful terrain where the value of human life is realized—both individually and collectively. If Hobbes characterizes the "state of nature" as one of "Warre of every one against every one," Foucault suggests that on the modern political battlefield, individuals do not so much contend against one another individually as much as they are conscripted within national formations which channel their vital potentials toward strategic ends. In other words, as Julian Reid argues, Foucault suggests that the ends of war transform the living human organism into a resource for national *defense*:

> *The strategic stakes of the military endeavors of modern states reside not simply in the clash of forces that distinguishes combat but in preparing for conflict, in disciplining the life of bodies that constitute organized military forces. War is fought for political order not among states, or on territorial battlefields where military forces clash, but on the terrain of the human body. It is the order that life assumes within the human body that is at stake, Foucault argues, in the struggles to discipline the human body*.
>
> (Reid, *Life Struggles*: 129–30)

Within this disciplinary formulation, we discern the first premonitions of modern biomedicine's avatar, immunity-as-defense. For the disciplines, "life" appears "ordered" within "the body" as a resource for, and a condition of, war preparedness. This is the case not only within the military per se but also within the domains where (as we will discern in chapter 2) disciplinary techniques applied to living bodies seek to augment the vital forces of the nation itself (e.g., the factory, the school, the hospital, etc.). By the end of the nineteenth century, when immunity emerges as a robust medical and scientific concept, it thoroughly naturalizes the military model as the basis for organismic function. As if materializing the disciplinary investment in the natural body, the immunological framework establishes war—at the level of cells and molecules—as the condition of life itself (the topic of chapter 4). Indeed, we might even say that the disciplinary formation of the natural body bespeaks the escalating incorporation of war in the mundane ways that we live.[28] Moreover, this political investment constitutes human life, both individually and collectively, as a valuable asset and increasingly construes living processes themselves as resources for the state in its ongoing struggle to balance its forces against those of the other states with which it coincides (chapters 1, 2, and 3 consider this dynamic for England, Germany, and France respectively).

[28] The continuation of this dynamic in the nineteenth and twentieth centuries gives rise to what Paul Virilio calls "pure war," as a totalizing social mobilization through and for war. Virilio, *Pure War)*.

Appearing after the disciplines, biopolitics emerges in the eighteenth century as a regulatory ensemble that both constitutes and conditions a new aggregate form of life: population. One of a series of modern abstractions that hypostatize the regularities of collective living and discern quasi-natural laws within them (e.g., the economy, society, human nature), (Poovey, *The Liberal Civil Subject*) population conceives the individual lives of national subjects as units belonging to a more encompassing vital domain which the state now recognizes as a valuable resource for its own ends. This overinvestment in life at the levels of the natural body (discipline) and of the population (biopolitics) constitutes the new regime that Foucault names "biopower."

> *The old power over death that symbolized sovereign power is now carefully overlaid [recouvert] by the administration of bodies and the calculated management of life. During the classical age, there is a rapid development of diverse disciplines—universities, secondary schools, barracks, workshops; in the field of political practices and economic observations, there also appear the problems of birth, longevity, public health, housing, and migration. Hence there is an explosion of numerous and diverse techniques for achieving the subjectification [assujettissement] of bodies and the control of population. Thus, an era of "biopower" commences.*
>
> (Foucault, *La volonté de savoir*: 183–84 [139–40])[29]

The era of biopower might serve as another name for modernity, since, as Foucault puts it, it marks the "threshold of biological modernity." (Foucault, *La volonté de savoir*: 188 [143]).[30] Here human life appears *at and* as the intersection of two different but inter locking apparatuses that simultaneously individualize and bind people together: "The setting up, in the course of the classical age, of this great duplex technology [*technologie à double face*]—anatomical and biological, individualizing and specifying, turned toward the performances of bodies and regarding the processes of life—characterizes a power whose highest function henceforth is perhaps no longer to kill but to invest life through and through." (Foucault, *La volonté de savoir*: 183 [139]).[31] "Life" augments death as the primary instrument of power because it can be hailed both singularly and collectively, at the level of the organism and the species, as performance and as process, as biology and economics.

Life does not then specify the unmediated immanence of a distinctly and properly natural domain that precedes or exceeds social determination, only subsequently entering human relations by way of "cultivation" or "culture."[32] Rather, life specifies an object of administration and subjectification that constitutes the processes

[29] Translation modified

[30] Translation modified

[31] Translation modified

[32] The history of these concepts indicates that they derive by analogy from agriculture, where human manipulation of the earth transforms an immanent potential into a resource. See R. Williams, *Keywords*: 48–50, 76–82.

of human living as a thoroughly hybrid domain. Targeting the world transforming potential manifest by living human being (including, of course, its capacity to labor)[33], bio power *appreciates* life by recognizing in it an exploitable natural resource rather than simply wielding death or diminishment as sovereign power does. Yet it is precisely this appreciation (in both its economic and aesthetic senses) that isolates living potential in the body and in collections of bodies in the first place. Moreover, as Foucault emphasizes, the two principal techniques of biopower converge not just conceptually but materially and effectively on and in these bodies (and bodies of bodies) through their administration and subjectification: "In fact, their articulation will not happen at the level of speculative discourse but in the form of concrete arrangements [*agencements concretes*] which will constitute the great technology of power in the nineteenth century."(Foucault, *La volonté de savoir*: 185 [140]).[34] Biopower en compasses a domain of hybrid networks that knit together biological processes, disciplinary technologies, individualized organisms, biopolitical apparatuses, and populations, among others, and in so doing affirms the value of human life.

Among its many palpable consequences, this life-affirming power re casts the role of the state, changing its raison d'être from that of a saver of souls to a governor of bodies. If in premodern Europe the rationale that political theology provides for divinely anointed monarchs affirms their salvific responsibility for their subjects' souls—that is to say, their primary concern for their subjects' eternal life, rather than their temporal existence—then the rationale provided by political philosophy for modern sovereignty shifts this locus of concern from the afterlife to this life, if not to "life" itself. As Foucault describes it, this shift from soul to body has, since the eighteenth century, swallowed us whole. Deflecting its concern from soul to body, the modern state's "somatocracy" organizes new forms of governance that envelop the lives of its subjects in their all encompassing embrace. (Foucault, Crise de la médicine, *Dits et écrits*: 43). Watching over us from cradle to grave, medicine serves as one of the most consummate somatocratic forces and concomitantly garners great power and authority (not to mention income) for its efforts. When it conceives immunity as its physiological doppelgänger in the last decades of the nineteenth century, medicine naturalizes this governmental project by proxy. According to the new bioscientific doxa, the organism's own cells now seem to engage in the very warlike actions that the modern state itself enlists to protect its subjects' lives as its most vital asset. Thus, *A Body Worth Defending* argues, by relegating defense to the organism's interior, modern medicine transforms the body into the apotheosis of the modern.

[33] See Virno's discussion of "laborpower" as embodied potential in *A Grammar of the Multitude*: 81–84.

[34] Translation modified

Genealogical Rumination, or Foucault in Slow Motion

By now I'm sure you realize that the work of Michel Foucault lives at the heart of this project. From the beginning of his career, Foucault addresses medicine as a knowledge formation that tangibly informs human experience.[35] While Foucault's early writings have had a widespread (if not always enthusiastic) reception in the history of medicine, medical sociology, and medical anthropology, thus far his later interests and methodologies have had less impact on studies of biomedicine.[36] Moreover, how reflecting on biomedicine might reciprocally illuminate biopower and biopolitics remains largely unexplored. *A Body Worth Defending* seeks to redress these gaps in our appreciation both of Foucault's own writings and of how they might link modern medicine more closely to bio political effects and contexts. In so doing, it foregrounds how one avatar of modern biomedicine, immunity-as-defense, metaphorically crosses from politics to nature and back and forth again, and offers a meditation on what, following Emily Martin, we might call "immunophilosophy."[37]

Each of the book's four chapters elucidates the knowledge, imagination, ethics, politics, and values that precipitate immunity's modern biological incarnation to illuminate how modern medicine defensively anoints the "modern body" as its most sacred icon. This project is at once historical and philosophical; or, to be more precise, it is genealogical.

Genealogy refers to an interpretative process inaugurated by Friedrich Nietzsche and adapted by Foucault, which Foucault famously described as a "history of the present." (Foucault, *Discipline and Punish*: 31). For Foucault, genealogy considers the past as an immediacy whose immanence in the present derives neither from its inevitability nor from its determinacy.[38] Rather, genealogy understands that the

[35] In his first two books, *Folie et déraison*, and *La naissance de la clinic*, Foucault directly considers the formative role that medical knowledge and institutions play in the constitution of "modern man." Over the next twenty years, medicine continues to occupy Foucault's interest both directly (for example, in *Les machines ŕ guérir*, the work on hospitals which he coedits in 1979, or in the lectures on health care he gives in Brazil) and indirectly (as in the way medicine functions in *La volonté de savior* to inform the apparatus of sexuality), though these later studies have received much less attention among scholars of medicine. See Foucault, "La politique," 7–18; Foucault, "Crise de la médicine," in *Dits et écrits*; Foucault, *La naissance de la biopolitique*; and Foucault, "L'incorporation de l'hôpital dans la technologie moderne," in *Dits et écrits)*.

[36] Somewhat redressing this aporia are Petersen and Bunton, *Foucault, Health, and Medicine*; and Jones and Porter, *Reassessing Foucault*. Also, numerous recent works extend Foucault's inquiry, such as Rabinow, *Making PCR* and *A Machine to Make the Future*; Rose, *Politics of Life Itself*; Hacking, *Rewriting the Soul*; Franklin, *Embodied Progress* and *Dolly Mixtures*; Fassin, *When Bodies Remember*; and Sunder Rajan, *Biocapital*, among others.

[37] The term "immunophilosophy" was coined by the anthropologist Emily Martin in her groundbreaking book *Flexible Bodies* (91–112).

[38] Foucault discusses genealogy in numerous texts. One succinct formulationappears in "What Is Critique?" (Lotringer and Hochroth, *The Politics of Truth*), where he states: "Genealogy, that is, something

presentation of the past, that is, the realization of "pastness" in and as "presentness," emerges from fragmentary and often random convergences whose accreted effects nonetheless confront us as "real." Such genealogical endeavors seek to uncover the chance combinations and conjunctions, intersections and collisions, productive coalescings and violent rendings, that give rise to the ways we realize our lives now. Genealogy's basic premise holds that the world is much more virtual and much more mutable than the manner in which it presents itself. In genealogy we disclose contingencies secreted within phenomena which present themselves to us as the essential dimensions of our world. Through this disclosure, genealogy hopes to glimpse instabilities where we often see inevitabilities, to imagine possibilities where we resign ourselves to necessities, and thus to learn to think and live otherwise than we supposed imaginable heretofore.

Disturbing the foundational certainties ascribed to the body, genealogy opens life to history by considering contingencies which the body hides. Though Foucault still retains his own attachment to the body (for this nominal formulation persists despite its problematization), he locates genealogy's concern at and as "the articulation of body and history." (Foucault, *Nietzsche, Genealogy, History*: 147–48). Genealogy, according to Foucault, decomposes the body's "nature"—and thus any pretense to its "being" (as) an immutable, inevitable, transhistorical, or immanent truth—revealing what, following Latour, we might call the body's "hybridity." Insofar as genealogy discloses the body as hybrid, it enables us to consider how the historical unfoldings that we take (and mistake) as its contours, or even its "defenses," appear self-evident as its and our most vital matter. In Foucault's terms, such "eventualization" is "a matter of shaking this false self evidence, of demonstrating its precarious ness, of making visible, not its arbitrariness but its complex interconnections with a vast multiplicity of historical processes, many of them of a very recent date." (Foucault, *The Impossible Prison*: 277).

Genealogy therefore offers a fruitful framework through which to con sider immunity's transubstantiation into a biological function at the end of the nineteenth century. When science adopts the juridico-political metaphor as a robust concept, it radically redefines the truth of the body as both substantially distinct from, and opposed to, the world in which it exists. However, this scientific affirmation necessarily obscures not only the conditions of its own coming into being but also occludes all competing frameworks, which it concomitantly disqualifies as un or prescientific. For this reason, a genealogy of immunity necessarily partakes of Foucault's more general genealogical goal to destabilize and decenter scientific discourse's self-authorizing and self-validating truth claims. As Foucault re marks: "Genealogies are quite specifically anti-sciences. . . . They are about the insurrec-

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that attempts to restore the conditions for the appearance of a singularity born out multiple determining elements of which it is not the product, but rather the effect. A process of making it intelligible but with the clear understanding that this does not function according to any principle of closure. . . . Therefore schematically speaking, we have perpetual mobility, essential fragility or rather the complex interplay between what replicates the same process and what transforms it" (57–58).

tion of knowledges. . . . Genealogy has to fight the power effects characteristic of any discourse that is regarded as scientific." (Foucault, *Society Must Be Defended*: 9).

An antiscientific or genealogical approach to immunity does not, how ever, seek to contest its truth or effectiveness but seeks to discern how the concept congeals within itself the interests and assumptions of a wider, nonscientific ambit *as science* to disqualify *as nonscience* what Foucault calls "subjugated" knowledges. The contemporary idiom that regards healing modalities that do not unquestioningly affirm the immunological paradigm as "alternative," "complementary," or "supplemental" (e.g., acupuncture, osteopathy, homeopathy, etc.) illustrates precisely how such disqualification works. Placing immunity at the center of truth, as the most truthfull concept, bioscience displaces other possible under standings from the domain of "the true." While they may offer empirical verification (and hence be eligible for insurance reimbursement), these "supplements" remain nonetheless excluded from proper bioscientific legitimacy. They might work, but they are not "true." A genealogy of immunity highlights how motivated and yet nondetermined combinations of political, economic, sociological, philosophical, diplomatic, and bio logical events precipitate immunity as a robust bioscientific explanation while simultaneously rendering other healing possibilities less than, or not yet, scientific.

If the goals of genealogy are antiscientific, its process is rumination. In *On the Genealogy of Morals*, where Nietzsche both describes and deploys genealogy simultaneously as a historical method and as a form of interpretation, he plays on the bovine resonance of this image quite explicitly: "To be sure, one thing is necessary above all if one is to practice reading as an *art* in this way, something that has been unlearned most thoroughly nowadays . . . something for which one almost has to be a cow and in any case not a 'modern man': *rumination*." (Nietzsche, *On the Genealogy of Morals*: 23). Counterpoised to the habits of "modern man," genealogical rumination not only approaches matters as if from a nonhuman, cowlike perspective but advances by way of slow, careful digestion. In this book, it proceeds by lingering over numerous distinct events and disjoint concepts with no necessary or predictable correspondence that "a body worth defending" accretes. Moreover, this immunological rumination ruminates in turn on Foucault's biopolitical idiom itself, lingering over numerous texts and insights that Foucault invokes in his writings to break down their often gnomic significance into more digestible bits.

The body of this book repeatedly limns the terrain of Foucault's writings (especially the less well-known, more recently published lectures he gave at the Collège de France between 1975 and 1978) and asks how they illuminate our investments in biomedicine and human bodies more generally. As a result, the argument continually circles around and returns to topics often familiar to Foucault's readers; however, in doing so, it expands on and extends the Foucauldian reference by dwelling on and with texts and issues that Foucault himself often passes over quickly while making his points. Addressing Foucault in slow motion, then, not

only elucidates the significance of Foucault's work but also interrogates the biopolitical dimensions of modern medicine as an instrument of biopower itself. These entwined undertakings form the conceptual armature of *A Body Worth Defending*, binding its diverse genealogical considerations together within a contrapuntal play of theoretical and historical inquiry.

In considering immunity as the biomedical apotheosis of the modern body, *A Body Worth Defending* evokes three recurrent motifs: one addresses the history of a concept (how does immunity migrate from politics and law into medicine?); one reflects on the emergence of a political ontology (how does the body come to ground modern notions of political, legal, economic, and biological personhood?); one interrogates the theoretical hope that Foucault's writings continue to inspire today (how do biopolitics and biopower inform contemporary thinking about living human being both in its singularity and its collectivity?). Braided together, these three lines of inquiry ruminate on a basic question about how modern personhood comes to conceive itself as fundamentally, if not biologically, defensive. To put it crudely, my main goal is to understand how and why those of us who live within the ambit of modern medicine (defined in this case by the acceptance of biological immunity as a foundational precept) so readily accept the notion that to endure as living organisms, we must actively and relentlessly fend off the predations of the very world that sustains us. Or, even more crudely put, I am trying to comprehend how and why we unreflectively believe that as embodied beings we are essentially and necessarily—i.e., "naturally"—distinct from the lifeworlds within which we materially arise and on which we materially depend for our existence. In other words: how did we come to believe that as living beings, "the body" separates us from each other and from the world rather than connects us?

To Defend or Not to Defend? That Is the Question

Of course, biomedicine no longer holds that immunity simply defends the organism—even if defense remains one of immunity's most rudimentary and most radical valences. In the middle of the twentieth century, immunology transforms itself into the "science of self/nonself discrimination," as Macfarlane Burnet proposes. (Burnet, *Self and Not-Self*: vii; Tauber, *The Elusive Immune Self*).[39] "Self-nonself discrimination" arises within immunology to account for evidence that immune activity can paradoxically defend against the host organism's own tissues—or at least destroy them. This auto-reactivity, or autoimmunity, confounds an immune paradigm predicated on host-invader relations, which imagines the immune target as foreign. To make sense of autoimmunity while still retaining its basic defensive orientation, immunology evokes a more nuanced explanation, which Burnet provides: "When Macfarlane Burnet initiated the modern preoccupation with the self/nonself dichotomy, it was to explain the apparent paradox of why we all do

[39] For a detailed reflection on Burnet's legacy, see Podolsky and Tauber, *The Generation of Diversity*.

not succumb to autoimmune disease." (Silverstein, *There Is Only*: 177).Or, as the editors of an issue of *Seminars in Immunology* (2000) devoted to contemporary immune theories polemically affirm: "Everyone agrees that a biodestructive defense mechanism must make some kind of self-nonself discrimination." (Langman and Cohn, *Editorial Introduction*: 159). While not everyone actually agrees (as we will see in a moment), nonetheless immunity's defensive implication does pass over into the organism's self-constitution. For most immunologists, "self" implies "as opposed to nonself," and "dis criminate" supplements "defend."

However, this lexical transition does not render defense immunologically obsolete. Rather, it recasts immunity as a productive rather than a negative activity, affirming the self as both self-constituting and self defending (self-constituting because self-defending, self-defending because self-constituting). As Scott Podolsky and Alfred Tauber observe: "The organismic view of immune function focused on the processes of self-nonself discrimination and the general regulatory basis by which to model them; the main question is how the body distinguishes between friend (self) and foe (nonself)."(Langman and Cohn, *Editorial Introduction*: 159).[40] The analogy "self is to nonself as friend is to foe" reveals the immunological self-relation as decisively political. Indeed, the opposition of friend to foe has defined the poles of Western politics ever since there first was a polis.[41] Moreover, despite Burnet's ecological interests in how biological organisms coexist, his self-nonself model recapitulates immunity's underlying defensiveness as intrinsic to the individual organism, projecting its politics into the living being as a vital condition (Burnet, *Biological Aspects*: 23–24). Thus, while self-nonself seems to displace defense as immunity's raison d'être, it actually pushes it even deeper into the organ ism, to the level of ontogeny if not ontology.

Throughout the twentieth century, immunology nuances its sense of defense. In the late 1950s, Burnet adapts his self-nonself theory to Niels Jerne's "selection theory," precipitating "clonal selection theory." (Jerne, *Natural Selection*; Burnet, *Modification of Jerne's Theory*). With many adjustments and complexifications, this theory still largely obtains—albeit in a more postmodern vein. Hence, while some immune theorists do propose alternate possibilities, at the beginning of the third millennium venerable scientists like R. E. Langman and M. Cohn still categorically claim:

> *We assume without further justification that the immune system is a biodestructive defense mechanism that normally functions to destroy and rid both intracellular and extracellular pathogens without destroying or seriously impairing the host. . . . In fact, we would go so far as to make this the definition*

[40] Critiquing "self/nonself " as the basis for immunological function, Pradeu and Carosella, in "The Self Model, "propose "continuity" and "(strong) discontinuity" as a more adequate to explain the empirical data about immune response).

[41] In *The Politics of Friendship*, Derrida offers an extended meditation on Aristotle's formulation of this problem.

> *of an immune system: Any biodestructive defense mechanism that makes somatically selected self-nonself discrimination is an immune system.*
>
> (Langman and Cohn, *Minimal Model*: 190)

For Langman and Cohn, defense still constitutes the sine qua non of immunity, and self-nonself maps the terrain across which (or within which) this defensive encounter transpires. Immunity may necessitate more complex reconnaissance to accomplish its essential mission, but the defensive imperative remains much the same. Even when a renegade theorist like Irun Cohen attempts to move beyond clonal selection and self-nonself to introduce a "dialogic" or "cognitive" paradigm, he proffers similarly defensive tropes:

> *The immune system is the guardian of our chemical individuality; it is a system that eliminates parasitic bacteria and viruses, a system that rejects foreign cells and tissues, a system that can destroy tumor cells arising from our own bodies.*
>
> *By deciding what macro molecules and cells are allowed residence within us, the immune system establishes the molecular borders of each person. In de fending the individual, the immune system defines cellular individuality.*
>
> *The immune system has earned a reputation, justly, for its role as protector of the body against foreign invaders. However, the immune system is not only a department of defense, it also functions as a department of internal welfare. The immune system is an unsung hero of maintenance and reconstruction.*
>
> (Irun Cohen, *Tending Adam's*: 5)

Here Cohen highlights defense's inability to account for all the processes encompassed by immunity (as opposed to Langman and Cohn). To re dress this limitation, his cognitive model seeks to appreciate ways that immune function enhances "body maintenance." (Irun Cohen, *Discrimination*: 215). Yet, in figuring what this entails, Cohen evokes the specter of "internal welfare," the exact image that governing discourses at the end of the eighteenth century and the beginning of the nineteenth employed to explain medicine's value for the state as a supplement to its defense (mentioned earlier and discussed at length in chapters 2 and 3). Thus, in rectifying the politico-historical limits of one metaphor, Cohen unwittingly conjures the limits of its historical confrere. Moreover, when he does so, he imagines the immune system as a form of "homeland security" *avant la lettre*, even foreseeing its policing of residence and border crossings.

One of the few immunologists who explicitly abjure defense is Polly Matzinger. In fact, her "danger" model provokes quite defensive defenses of defense.[42] Matzinger's theory addresses a range of phenomena for which defense oriented immu-

[42] See Anderson and Matzinger, *Danger*, for the three rounds of defense and response in *Seminars in Immunology* (2000). Also see the following works by Matzinger: *Danger Model in Its Historical Context*; *Danger Model: A Renewed Sense*; *Innate Sense of Danger*; *Innate Sense of Difference*; *Tolerance, Danger*.

nology cannot account, including, among others, autoimmunity; transplant rejection; why tumors are not rejected; why mothers do not reject fetuses; why we can go through puberty, maternity, and aging without rejecting ourselves; why we do not defend against com mensal bacteria and viruses (e.g., the bacteria in our guts without which we are dead meat); and graft versus host disease. Positing a "two signal" paradigm (immune responses require two separate effector signals, one of which indicates proximate tissue damage or death), Matzinger under scores the embedded metaphors that inform immune theories:

> *For half a century we have studied immunity from the point of view of various forms of SNSD [self-nonself discrimination] models in which immunity is controlled by the adaptive immune system, an army of lymphocytes patrolling the body for any kind of foreign invader. Recently there has been a shift to include the cells and molecules of the innate immune system, an army of cells and molecules patrolling the body for a subset of foreign invaders that are ancient enemies. . . .*
>
> *Perhaps it is time to stop running a cold war with our environment? The Danger model does not allow an army to control immunity. It expands the definition of the innate immune system to include the extended, highly interactive family of bodily tissues. It allows for a flexible system that adapts to a changing self while launching immune responses to dangerous pathogens. It also allows us to live without maintaining a rigid sterility that segregates us from the environment. We become a habitat, welcoming the presence of useful commensal organisms and allowing the passage of harmless opportunistic ones. With such an immune system we live in harmony with our external and internal environment.*
>
> (Matzinger, *Danger Model in Its Historical Context*: 8)

In distinguishing her ideas from immunology's earlier defensive paradigms, Matzinger not only highlights their militaristic implications but also stresses that they represent the body as a defensible and defended boundary. Far from an ideological critique, Matzinger's concerns about immunology's inability to negotiate a number of empirical impasses lead her to question its implied vision of the human organism. However, the terms of her questioning also reveal the values that immune theories incarnate.

Apart from its ability to encompass heretofore contradictory data (certainly not conclusively established), Matzinger's danger model discloses the modern body that immune discourse incarnates. Her sense that immune paradigms conduct "a cold war with our environment," which does not represent the natural and *hence inevitable* order, allows her to posit a more pacific, and dare I say "communal," world. (Community is the etymological opposite of immunity, as chapter 1 reveals.) In so doing, she invokes a concept, harmony, that fell out of Western biomedicine in the late nineteenth century when immunity replaced "natural healing" (the vis medicatrix naturae) as a scientifically endorsed concept. By predicating this har-

monious possibility on danger as an alternative to defense, Matzinger suggests that defending incorporates unwarranted scientific assumptions about how organisms (human and not) coexist in shared environments. Moreover, as her rhetoric intimates, these unwarranted scientific assumptions both depend on and realize unwarranted political consequences which deleteriously affect organisms (human and not). Matzinger's danger model then proposes that the body might actually, empirically, scientifically, and medically *be* a nonmodern body, a welcoming habitat, and conversely that the defended, self-defining modern body might itself constitute a source of danger.

A Body Worth Defending provides some of the back story for how modern medicine constitutes the modern body and asks how immunity (which *no one* in immunology ever questions as an appropriate metaphor, unlike defense) makes this constitution make sense. It tracks how the human organism loses its natural harmony with the environment to achieve its new modern apotheosis. Long before this possibility exists biologically—unthinkable until the middle of the nineteenth century—it lives politically, legally, and economically in the wake of seventeenth and eighteenth century Europe's violent turn from feudal hierarchies and absolute monarchies. Chapter 1, "Living Before and Beyond the Law, or A Reasonable Organism Defends Itself," introduces the historical provenance of immunity and defense and situates them in relation to ideas about natural law that shape modern politics and modern science. Chapter 2, "A Body Worth Having, or A System of Natural Governance," con siders how the two axes of biopower, the anatamo-politics of bodies and the biopolitics of population, inform modern ideas about the body and personhood, not only giving rise to new legal, political, philosophical, and economic subjects but also enabling medicine to incorporate these new subjectivities as its political rationale. Chapter 3, "A Policy Called 'Milieu,' or The Human Organism's Vital Space," focuses on the coincident revolutions in French politics and medicine and explores how nineteenth century medico-politics, or public hygiene, envisions humans as vitally situated beings. It then examines how bioscientific epistemology inverts this vision when Claude Bernard introduces the concept of *milieu intérieur* and thereby legitimates laboratory experiment as the privileged locus for biological truth. Chapter 4, "Incorporating Immunity, or The Defensive Poetics of Modern Medicine," brings together the political and medical valences preceding immunity's defensive incarnation, especially evident in humoral medicine's interpretations of infectious diseases and in the international military, economic, and political strategies to disrupt them. Against this background, it reveals how bacteriology's equation of microbes with invaders—a metonymy derived from the metaphoric representation of epidemics (especially cholera) as invasions—leads to Metchnikoff 's countercoup of imagining phagocytes as defending the organism against these invaders. From this biopolitical conjunction, immunity-as-defense arises as the apotheosis of the modern body.

Modern medicine appears at the end of the eighteenth century and the beginning of the nineteenth as an explicitly hybrid domain, as a biopolitical domain, which publicly declares its indifference to the modern distinctions between nature and society insofar as they equally impinge on living human being. Across the next two centuries, this ongoing incarnation of politics in nature and nature in politics marks medicine as one of our most powerful governing institutions. Indeed, we might entertain the possibility that the power of modern medicine lies not only—or even especially—in its curative capacities but also in its ability to finesse the terms of the Modern Constitution. Proliferating an amazing array of biopolitical hybrids, modern medicine deflects our ability to consider how the care and governance of our bodies import political values into our putatively "natural" processes. In so doing, medicine secret(e)s its political import within the tissues, cells, and molecules of our flesh, where we would not usually think to look for it. It turns us into modern bodies. By interrogating the ways that immunity comes to matter as an intimate and necessary element of our living, *A Body Worth Defending* considers the biopolitics of modern medicine as a matter worth rethinking. Indeed, it tries to suggest that such a rethinking might actually lead us to imagine new ways of living, both singularly and together, which might be more healing than those that modern medicine currently offers us.

Today immunity informs us deeply: as organisms, as individuals, as citizens, as peoples, and as a species. In the wake of immunology, we no longer just live our politics, but our politics literally live in us. Conversely, the world in which we live has been recast according to this new "natural" order such that overtly political acts of violence and aggression can be interpreted immunologically, as George W. Bush did when he described the events of September 11, 2001, to a joint session of the U.S. Congress by declaring: "Our nation has been put on notice: we are not immune from attack."[43] Yet despite how immersed we are in immunological understandings and how deeply immunological effects reside in us, we remain largely

[43] See the full text of Bush's address "A Nation Challenged," *New York Times*, September 21, 2001. William Safire introduced this trope in his *New York Times* oped piece on September 12, 2001, when he asked: "What are we doing to protect our skies, to develop innate immunity and multivalent vaccines, and to carry the war to the enemy?" There is more than a slight bit of irony in this usage, since in the months preceding the events of September 11, 2001, the U.S. government had been seeking to abrogate the treaty founding the World Criminal Court and was threatening not to participate in any United Nations peacekeeping missions unless U.S. soldiers received "immunity" from UN jurisdiction. See Crossette, "War Crimes"; Schmemann, "U.S. Links Peacekeeping"; Richardson, "America's Interest"; and Alvarez, "Bush Faces." Almost as if ghosting this political mobilization of immune discourse by the Bush administration, Jacques Derrida uses the metaphor "autoimmunity" to meditate on 9/11 as the return, or turning back, of a political violence that the United States thought to defend itself against with its violent interventions elsewhere—especially in the name of "democracy." See Derrida, *Rogues*. Also see the long interview "Autoimmunity." On Derrida's use of the trope of autoimmunity, see Haddad, "Derrida and Democracy"; and Esposito, *Bios*. From the perspective developed here, Derrida's use of autoimmunity proves somewhat problematic. It neither takes into account the internal tensions between politics and law realized within the juridical trope "immunity" itself nor notices that medical discourse then unwittingly adopts and grafts them onto liberalism's endorsement of self-defense as the first natural right. Thus the reprisal of immunity's genealogy in autoimmunity remains unrecognized by Derrida.

ignorant of the processes through which this infectious concept has come to have such a purchase on our lives. In recovering a bit of this history, then, *A Body Worth Defending* recalls some of the decisions about how we construe the world that this concept accretes—and hence implicitly invokes—whenever biological immunity serves as a transparent representation of our vital nature.

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Alfred I. Tauber: Transgressing

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Immunology, as a branch of biology, deals with two fundamental issues. First, what features make one particular group of organisms unique and distinct from other organisms of similar kind? Second, how are the mechanisms that protect organisms from their predators built and maintained? Until after World War II immunology lacked formal theoretical approach to these issues, but it was delivered with an introduction of "the self" notion. Alfred I. Tauber is one of the most important and qualified scientist involved in studies of this concept in the field of immunology. For this reason, I will begin this introduction with a short biography of Alfred Tauber. In second part, I will briefly describe the notion of the immune self.

Picture source: Alfred I. Tauber's archives.

Alfred I. Tauber – life and areas of interest

Asked by us about his favorite free time activities, he answers that he *like[s] to think*. He is a Professor of Philosophy at the Boston University Department of Philosophy and Zoltan Kohn Professor of Medicine at the Boston University School of Medicine. He also teaches philosophy of science at Tel Aviv University as a visiting professor. In the years 2003–2010 he served as the Director of the Center for Philosophy and History of Science and in 2008 he was awarded the Medal for Science, which is the highest honor awarded by the Institute of Advanced Studies at the University of Bologna. However, Alfred Tauber is a hematologist and biochemist by training. Before joining the Boston University School of Medicine in 1982 he was associated with the University of Washington Affiliated Hospitals, Tufts-New England Medical Center, Brigham and Women's Hospital (Boston) Harvard Medical School and MIT. His bibliography includes 9 books (monographs); 13 edited works; 70 history and philosophy of science/medicine papers; 27 ethics papers; 6 Ameri-

can philosophy papers; 46 book reviews, short introductions, and book forewords; 85 original scientific reports; 23 scientific reviews, letters, and book chapters; 47 scientific abstracts. He is the author of *The Immune Self, Theory or Metaphor?* (Cambridge 1994), *Confessions of a Medicine Man, An Essay in Popular Philosophy* (MIT 1999), *Henry David Thoreau and the Moral Agency of Knowing* (California 2001), *Patient Autonomy and the Ethics of Responsibility* (MIT 2005), *Science and its Quest for Meaning* (Baylor University Press 2009), *Freud, the Reluctant Philosopher* (Princeton 2010) and (submitted) *Requiem for the Ego. Heidegger, Adorno, and Wittgenstein on Freud*. In his own words, the clash between his two careers (that of a philosopher and that of a biomedical researcher) and the necessity to build a bridge between them were his main sources of inspiration. In *David Thoreau and the Moral Agency of Knowing* (2001) Tauber explores the problem of bridging scientific knowledge and personal meaning. The philosophy of Thoreau serves him as an example of such translation, in which moral, aesthetic, and spiritual dimensions of experience might cohere within the reality offered by science. *Science and the Quest for Meaning* (2009) can be seen as continuation of this issue. In this book Tauber states that there must be a kind of a correspondence between science and the notions both of social reality and of the existential placement of humans in their natural cosmos, although he admits that there cannot be a complete union between the metaphysics of science and the metaphysics of personal experience. Similar tension, arising from a necessity of reconciling scientific objectivity with patient–centered healing process and compassion, resulted in the largely autobiographical *Confessions of a Medicine Man* (1999). Set in the same area was *Patient Autonomy and the Ethics of Responsibility* (2005), where Tauber offered detailed examination of the doctor–patient relation. He stated that the notion of identity, constructed on economical and judicial grounds, where individual is an almost utterly autonomous consumer, is misleading, and that physician responsibility must be based on identity construed in mutual, doctor–patient relation. The topic of responsibility is also present in *Freud, the Reluctant Philosopher* (2010), where Tauber, passing over the scientific status of psychoanalysis, concentrates on humane observations made by Freud, namely, that we should discover the subconscious motives of our behavior and take responsibility for who we are. Tauber calls his guiding philosophy a “moral epistemology” and describes it as the inextricable weaving of our personal values into our knowledge and into our ways of knowing. In his view, awareness of this correlations can give us, at least potentially, the freedom of exercising moral responsibility.

Immunology and immune self

According to the classic account of immunology, immune system of an organism destroys external and dangerous elements – pathogens, foreign substances, altered host elements, etc. – and ignores elements belonging to the host. Thus, the central distinction of immunology is between what is host and what is other, which was called the “self/non–self discrimination” due to the importance of the underlying

notion of self. The very notions of self and non–self were introduced into immunology by Sir Frank Macfarlane Burnet. According to his statements, immune system can be regarded as silent (when ignoring certain elements) or active (when doing the opposite), and thus we talk about the immune's system tolerance. Foreign elements are destroyed by immune cells and their products, whereas the normal constituents of the individual are ignored (tolerated). In other words, the boundaries of the host organism are defined by immune reactivity. What is attacked is other and what is regarded by immune silence is the selfhood. This model was approved by immunologists due to the so-called mechanism of acquired immunity. In brief, there are two stages of this mechanism. Firstly, as soon as the organism is informed about the appearance and activity of pathogens, it unleashes its immune cells in a strong immune reaction. During this process the immune system learns about the hostile pathogens and destroys them. Thus, each subsequent invasion of identical or similar pathogens will be repulsed in a quicker and more effective way. Because of this, the self/non-self discrimination passed from the status of a theory to that of a paradigm, and became regarded no longer as a theory, but as a fact. However, such approach had to deal with a vast body of experimental data that was incompatible with theories build upon Burnet's view. Namely, on the one hand, the immune system can not only tolerate host elements, but also ignore the presence of external, foreign components; on the other hand, the immune system can also destroy cells regarded typically as belonging to the host – this situation happens not only due to, for example, cancer, but is also a normal, desired activity resulting from the physiological economy. These discoveries led to a recognition that the classical theory, in which the host can be described as a fortress, from which the forces of lymphocytes can sally forth to destroy attackers, is a naïve and inaccurate description. In fact, the immune system turned out to be based on a dynamic equilibrium, in which the attacked and the tolerated are not easily predicated, rather than on simple warlike vision. Although the supporters of the self/non-self distinction tried to enforce their statements by incorporating the surveillance of the body for malignant, effete, damaged, or dead host constituents (altered "normal" cells), as well as the autoimmune processes directed against properly working elements, Alfred I. Tauber in *The Immune Self, Theory or Metaphor?* (1994) argues that the self/not-self distinction cannot remain unchallenged after sequential blows caused by modern discoveries. Since the immune system is constructed not on the basis of a simple foreign/host distinction, but rather on the basis of the balance of foreign and host elements, the biological notion of self becomes fluid and dependent from its environment. In short, there can be no circumscribed, self-defined entity that is designated as the self. According to Tauber, instead of reformulating the classic self/non-self distinction, we should replace it by a spectrum of divisions based on a gradation of immune responses.

Conclusion

Alfred I. Tauber is undoubtedly an authority on the philosophy of immunology. However, we should look at his work within the big picture, where the philosophy of science meets his moral epistemology. There is always a discreet interplay between the values of society and its science. On the one hand, values affect the way we construe and understand metaphors in science and the way we create facts. On the other hand, science (especially modern, non-intuitive) forces us to reframe our experience and to try to reconcile different world models. Although the philosophy of immunology seems to be far away from everyday experience, it deals with one of the most basic notions, and thus can contribute to our understanding of ourselves, even if mainly on the ground of biology.

Alfred I. Tauber's website: *http://blogs.bu.edu/ait/*

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From the immune self to moral agency

Comments[44]

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Editorial abstract

Author comments on the changes in the philosophy of immunology that have occurred since the publication of his book *The Immune Self: Theory or Metaphor?*, as well as on the dangers, misunderstandings and expectations in this area. Finally, he presents his account of moral agency in the context of his own works discussing this question.

Keywords: Alfred Tauber; philosophy of immunology; metaphor; morals; self.

From *The Immune Self* to...?

What has changed in the Author's approach and in the contemporary philosophy of immunology since *The Immune Self: Theory or Metaphor*?

The views I expressed almost 20 years ago have not significantly changed. I still believe that the self-metaphor governs the practice and theoretical orientation of most practicing immunologists, but the neat boundaries of "self" and "other" continue to be broken and replaced by a spectrum of functions based on a gradation of immune responses that do not neatly fit the self-other division. When the centrality of self/non-self discrimination is contested, much controversy ensues. In a special issue of *Seminars in Immunology* in 2000 the issues were well-aired. While some detractors generously called for a pluralistic approach, and others regarded the crisis over the "self" as overblown, most would agree that immune selfhood is increasingly a polymorphous and ill-defined construct. Contemporary transplantation biology and autoimmunity studies have demonstrated phenomena that fail to allow faithful adherence to a strict dichotomy of self/non-self discrimination, and as new models are emerging, the immune self's grounding appears unsteady and thus increasingly elusive as the putative nexus of immunology's doctrines.

[44] Editor of the Comments: Witold Wachowski.

My thinking in terms of the organism per se has developed to a growing appreciation of how the host's internal ecology confers an ever-evolving identity. In a fascinating inversion of our body mythology, we find that an individual's immune system itself is in part created by the resident microbiome. (For example, in vertebrates, the gut-associated lymphoid tissue becomes specified and organized by bacterial symbionts, and the immune system does not function properly and its repertoire is significantly reduced if the symbiotic microbes are not residing within the gut.) Simply, the immune system is constructed in concert with "foreign" elements. So while the defensive role of immunity is clearly prominent in the medical and agricultural contexts, that point of view must be balanced with how the individual organism participates in a community of others that contribute to its welfare. From this ecological vantage, there can be no circumscribed, self-defined entity that is designated – the self.

So when one refers to the greater ecology of the immune system – the larger context that includes both internal and external universes sensed and acted upon – the borders must remain open to allow free exchange between the host and its environment. On this understanding, the immune system is endowed with a high degree of communicative abilities for sensing both the environment (in the form of pathogens, allergens, toxins, etc.), but also, and just as importantly, allowing the free exchange of even a larger universe of substances and organisms to be engaged for the organism's benefit. In short, the immune system possesses cognitive functions for the on-going negotiation of various interactions between the host and its environment. To remain restricted within an analysis that already assumes only a defensive posture limits understanding how animals live in exchange with others. Accordingly, by describing that interactive economy, immunology becomes an important member of the ecological sciences. That ecological sensibility has been the focus of my more recent writings, which are summarized in the *Stanford Encyclopedia of Philosophy*[45].

The dangers and the misunderstandings

Are there any dangers threatening the philosophy of immunology and, generally, the philosophy of science? Are the questions concerning immunity still underestimated? Are there still some misunderstandings in this area?

If we look at the "big picture," immunology is adjusting to the twin demands of increasing molecular elucidation, on the one hand, and an ecological sensibility, on the other. In both contexts, the "self" has slipped into an archaic formulation. I have already discussed the ecological dimension above, and, from the molecularists' perspective, atomic delineations have outstripped explanations of immune regulation so that no molecular signature of selfhood suffices to explain the complex interactions of immunocytes, their regulatory products, and the targets of

[45] *http://plato.stanford.edu/entries/biology-self/*

their actions. Reactivity has become the functional definition of immune identity. Accordingly, self/non-self discrimination recedes as a governing principle when immunity is appreciated as both outer-directed against the deleterious, and inner-directed in an on-going communicative system of internal homeostasis. From this dual perspective, immune function falls on a continuum of reactivity, where the character of the immune object is determined by the *context* in which it appears, not by its character as "foreign" per se. More simplistic models have too often obscured this cardinal lesson.

Two misunderstandings have caught my attention.

1) The first is specific to the way immunity has been co-opted by culture critics. Indeed, I am intrigued that the immunization idea has been applied to characterizing society. This approach was first used, at least in America, by Donna Haraway and Emily Martin, but the parallels they described between ways immunity was conceived by scientists and the seepage of those ideas into Western societies has more recently been radically extended by Sloterdijk, Esposito, Beck, Derrida and Baudrillard. In their writings, the self metaphor (appearing as immunization) *returns* into the socio-political lexicon to model social theory, namely by their assertion that immunisation has become the core dynamics of contemporary biosocieties. I find this circularity very interesting, albeit these commentators see no irony. They have bought the immunization paradigm wholesale and applied that construction to analyzing culture and to building a political theory, of sorts, one itself made up of analogues and metaphors from the very science that has carried those metaphors originally *from* that culture (in everyday psychology and philosophy) for its own purposes! In other words, both the immunologists and the social theorists are eating from the same trough, but, apparently, each is unaware that they share the same metaphor, albeit from two different perspectives. So, while I suggest we watch the metaphor play in different domains, these critics are playing the game with no perspective of how their own use of the digested metaphor of selfhood has returned.

Indeed, one must ask to what degree does the immunization idea describe some underlying, heretofore hidden understanding of the social, as opposed to simply applying a fecund metaphor to culture, where resonance or correspondence appeals to the reader? What differentiates this work from literature (as opposed to a more rigorous, empirically-based social theory)? In other words, is theoretical *insight* provided by the immunization idea applied to society? I think not, for I consider the effort in many ways intellectually facile and superficial when the metaphor is extended to everything – from religion and metaphysics to housing and cities – and thus becomes a universal solvent to dissolve all of human culture into one vat. This exercise is simplistic, radically reductionist, and ultimately pointless.

2) The other misunderstanding is much more general: When I ponder the entrenched notion of selfhood in immunology, I am reminded of an exchange I had with Stephen Weinberg, the Nobel laureate physicist, who asked me, "What has the philosophy of science ever done for science?!" to which I replied, "Not much. Philosophy of science is about philosophy. Science fends for itself." That was not quite a complete answer, but it sufficed for him.

The self, the embodiment and the morals

What is the connection between the immune self (or, generally, the bodily self) and the moral self?

I have argued, in line with Charles Taylor (*Sources of the Self* 1989) that the self is a moral category, serving as the nexus of how we conceive the moral agent exercising values and ethical choices. That agent, of course, cannot be construed as an *entity*, aka, *the self*, but rather a focus upon which moral philosophers, politicians, jurists, and artists each might refract the person qua person. This modernist construction has suffered grievous blows over the past century to the point that we may wonder what, indeed, is such a self who has been effectively deconstructed by postmodern criticism.

Yet "self-ness" serves as the operative *function* of that which is mine, or identified as "me." This adjectival approach then meets the imbroglio of the discarded certainty of the indubitable Cartesian *cogito* with an alternate, more "open" notion of personal identity. No longer a noun, selfhood has shifted its grammatical alliances to the verbs and adverbs, which may, under duress, serve as adjectives as well. Leaving the parameters of selfhood to a possessive identity function embraces the postmodern view of the self as having been decentered, and/or disenfranchised, from its modernist conceit, while at the same time allowing for a functional definition of *me* or *I*, i.e., that for which I take *responsibility*. This orientation does not gainsay the critique of individuality as a product of both manipulative social power (Foucault), unconscious opportunism (Freud) or distorted subject-object relations (Heidegger). It makes only a modest claim: The 'me' (or 'I') serves as the variable linguistic label of a *function* of possessive identity, which in the translation of Freud's *das Ich* has been forever called (inaccurately) "the ego."

And that which assumes responsibility also commits "itself" to personal freedom. Here we witness the slide of the epistemological knowing agent into its moral context. The Western precept of individuality and the freedom adjoining this self-image is not readily mortgaged, much less forsaken. Indeed, despite efforts to displace the modernist metaphysics of the Western mind, the basic precept of human autonomy is not easily dislodged. So the collective "error" of adhering to "the self" concept is in service to a larger agenda, namely to fortify a subjective commitment to individualized self-fulfillment, on the one hand, and personal responsibility, on the other hand. Rights and obligations held hand-in-hand. Assuming a moral posture in the face of contradictions is hardly a unique case in which putative objective

knowledge is employed to support an ideological, religious, or social belief. Simply, strict conceptual coherence has been forfeited for a mosaic of commitments, and perhaps both acknowledging and accepting that fragmentation is the key characteristic of our age.

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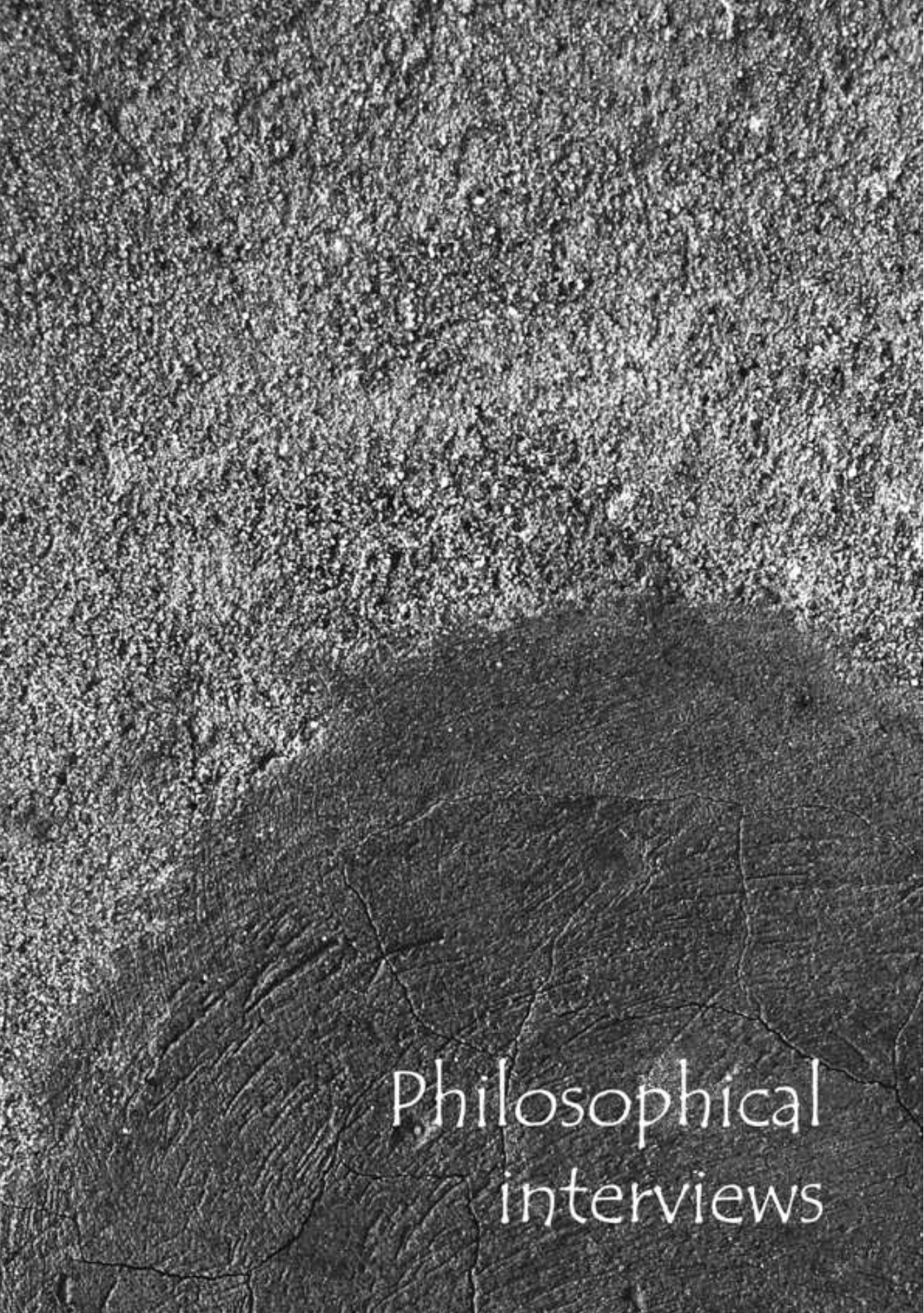
prepared by Jacek S. Podgórski


Philosophical
interviews

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Investigating subjectivity
Introduction to the interview with Dan Zahavi

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Cogito ergo... sum?

The problem of subjectivity constitutes one of the most crucial issues in contemporary philosophy, especially the philosophy of mind. An attempt to describe the structure and the role of conscious experience may help us to lay theoretical grounds for further research on this particular matter. When it comes to understanding the subject, which for a long time was based on Cartesian philosophy, . the area of subjective experiences was regarded as an objective base for systematic enquires into the human mind (Bremer 2008: 43). According to Descartes, during the process of introspection we obtain the so-called privileged access to our (mental) states and, thus, we cannot be wrong about them. This infallibility was supposedly supported by the fact that we always experience our states as our own and from the first-person perspective. The role of personal reports as reliable indicators for a theory of human consciousness was also founded on 19th-century psychology, which continued to use the method of introspection. Therefore, the first-person perspective in the research on consciousness was for a long time an accepted approach in the traditional philosophy of subject . However, at present there is a tendency to renounce this kind of an approach to subjectivity. Introspection has been recognized as an unreliable, and above all, insufficient way of describing the human mind. Together with the progress in neuroscience and the widespread cooperation between philosophers and empirical researchers, in recent years the so-called reductive approach to subjectivity has gained popularity According to this approach, subject's mental life and the subject itself can be reduced to a particular experience generated by neural activity (Metzinger 2004), or the very existence of the experience of self can be questioned (Prinz 2012). We are going to look at two philosophical propositions that annihilate the subject in some sense, and consider whether the issue of subjectivity has been resolved or not.

I – that is, no-one

Recent years have brough a lot of attention to Thomas Metzinger's thesis that "there is no such thing as a self" (Metzinger 2009: 1) . Metzinger denies the existence of a metaphysical self, arguing that the notion of self does not refer to any observable things in the world. Therefore, the self cannot be real, where Metzinger recognizes a thing as being real only if it can be explained according to the rules and methodology of science (Zahavi 2008: 101). On the other hand, Metzinger points out the fact that the concept of self is, for some reason, quite common – which is why it is worth taking a closer look at how it could be affected by the structure of our experience. While investigating the sphere of human subjectivity, Metzinger discovers that it is characterized by certain stable patterns, i.e. first-person perspective, the sense of ownership in reference to our thoughts or feelings, and something even more basic – the sense of "being oneself." This sense of being oneself is understood as pre-reflexive and refers to the sense of oneself being identical through time. In spite of the fact that this experience is hard to grasp, Metzinger tries to analyze it carefully and to determine its minimal conditions. He does so by referring to experimental situations which manipulate the other properties of experience, especially first-person perspective (Blanke & Metzinger 2009). As a result, he argues that the crucial matter for developing a sense of self is the experience of one's own body.

Still, if the self – as Metzinger claims – does not exist, our experience of ourselves must be an illusion. And so it is - Metzinger calls it "the ego tragedy." We live in a constant illusion generated by our own brains. A human brain, being nothing but an information processing cognitive system, processes information in a way that creates a simulation of the surrounding reality as well as ourselves. However, this process is inaccessible to a subject, which results in our impression of being in direct contact with the world and ourselves. It has its evolutionary explanation, as it enables us to orientate in the environment and – what is important for this paper – to feel that we are ourselves.

Metzinger writes that his goal is to convince readers that the experience of being oneself can be in a satisfying way explained in subpersonal terms (Metzinger 2004: 2). In his attempt to characterize the sense of self, he engages also other levels of description: functional, informational/ computational, representational and at last, phenomenological (303). By showing how subjective states, including the sense of self, are correlated with brain functioning, he wishes to build a bridge between philosophy and science (4). This claim is of great importance here, as it unites all of the concepts presented in this paper.

The awaited self

As it has already been mentioned, while criticizing the metaphysical self, Metzinger acknowledges the existence of a phenomenal self, which his theory of subjectivity tries to describe. However, we can also hear voices that deny the existence of the metaphysical self as well as the phenomenal self. The American philosopher Jesse Prinz in his paper "Waiting for the self" (2012) refers to Hume's so-called "bundle theory" (Bremer 2008: 178). According to this theory, the self is identified with a bundle of flowing impressions, replacing one another through the time. There is no reason to believe that we can distinguish a self as an enduring thing that would be something else apart from impressions. Still, Prinz is not interested in a metaphysical reading of Hume's thesis, but he calls attention to the fact that among many different phenomenal qualities that constitute our experience, we cannot find any that could be described as „I-qualia" (Prinz 2012: 124). While experiencing a particular thing, we deal only with the qualities that make up the experience of this thing. At the same time Prinz stresses two possible ways in which we can read the claim that there is no such thing as I-qualia apart from the qualities that are given in perception. We can say that there are I-qualia, but they are reduced to other qualia (reductive claim) or we can say that there is no such thing as I-qualia (eliminativist claim). Prinz supports the latter claim, showing the weaknesses of both reductive and non-reductive views of the phenomenal self. By referring to different ideas of how the self can be grasped – for example the studies of brain activity or psychological experiments – he argues that we cannot point to the experience of oneself as a subject, neither at the phenomenal level, nor by looking for neuronal correlates of this kind of experience.

Prinz suggests that waiting for the self to come is similar to waiting for Godot (Prinz 2012: 148). However, he says that although we do not experience the self directly, somehow it becomes present through its own absence. How is that possible? We can refer to certain characteristics of our experience, such as stable first-person perspective, the fact that the experienced qualia depend on our sensory apparatus and that we cannot experience things that are not within the reach of our senses. As Prinz puts it: "the self is absent if we look for it, but is always already there in each act of looking" (Prinz 2012: 149).

The self under a magnifying glass

Both Metzinger and Prinz begin their philosophical observations with rather radical theses: "nobody was or had a self" (Metzinger 2004: 1), "there is no [..] phenomenal I" (Prinz 2012: 123). But when we analyze their views further, we can see that, firstly, they are not as radical as they might seem at first sight, and secondly, that they have something in common. Both philosophers admit that the self is present to some degree - in the way it structures our experience (Prinz) or additionally in the elusive but distinguishable feature of "feeling like oneself" (Metzinger). What is more, both philosophers believe that the phenomenal self can be - and should be - a subject of empirical studies. Metzinger in his works refers to the

results from neurobiology, neurology, psychiatry and other disciplines belonging to cognitive science. In his analyses there can be found examples of psychological disorders caused by neurological dysfunctions, or altered states of consciousness. All of them are to become the basis for comprehensive research on the subjective experience with the application of scientific methodology. Similarly, Prinz mentions philosophical attempts at capturing the self by using methods of brain imaging. By pointing out their shortcomings, at the same time he becomes a voice making the case for careful research planning and even more careful analyses of their outcomes.

Some of the aspects of presented conceptions, such as their interdisciplinary character and inquisitiveness in discovering even the most vague facets of the self, can likewise be found in the views of Dan Zahavi, whose story about subjectivity we present in this issue of AVANT (see: his interview in this issue). Other aspects of these theories, such as their intended revolutionary and controversial character, have become the object of Zahavi's criticism.

Self as someone

Dan Zahavi has already been our guest in T/2011 AVANT, when we presented translations of his works concerning naturalization of phenomenology and studies on the self. In the paper dedicated to the latter subject ("The complex self: Empirical and Theoretical Perspectives," Polish translation – "Złożona jaźń: Perspektywy empiryczne i teoretyczne", 2011), Zahavi presents his opinion on the matter of investigating the self, addressing above all the issue of validity of this kind of research, seemingly undermined by the aforementioned philosophical approaches. The Danish philosopher brings attention to the problem raised also by Prinz, that is, the issue of necessity of philosophical reflection on different understandings of "self" and of implementing the results of philosophical analyses into empirical research (for example, of developmental psychologists, psychiatrists). As Zahavi observes, many empirical researchers use different concepts of the self (Zahavi 2011), which causes nothing but confusion in a matter which is already complicated enough. Zahavi dedicates a passage of his text to mentioning the variety of philosophical definitions of self, including Neisser's and James's typologies. At the same time he refers to Metzinger's theory of subjectivity, which is based on – as it was said before – the critique of the notion of self as not referring to any real thing in the world. But as Zahavi argues, this kind of „reified" understanding of self is not the only one that is offered by philosophy. Hundreds of years of investigating what the self is have brought a wider range of theoretical opportunities than merely the self in the Cartesian sense, seen as unchangeable and enduring substance (Zahavi 2011). The mutual work of philosophers and scientists has made it possible to explore the topic not only from the theoretical, but also the practical standpoint.

In effect, Zahavi pays attention to the phenomenon of interdisciplinary research which has increase its popularity over the last few years and which – also according to Metzinger and Prinz - has made an important contribution to the research

on the self. As Zahavi writes: "the self is so multifaceted phenomenon that various complementary accounts must be integrated if we are to do justice to its complexity" (from the paper: „The complex self: Empirical and Theoretical Perspectives" that was originally presented during the symposium "Phenomenology, cognition and neuroscience" on 19.02.2010 in Duquesne University, Pittsburgh, USA). Integrating different options – also in the field of philosophy itself – is regarded by Zahavi as a part of the role of philosophy. As we can read in the interview in this issue of AVANT: "Reality is complex, and in order to do this complexity justice we need a diversity of complementary perspectives. This applies not only to the relationship between theoretical (philosophical) and empirical perspectives, it is also relevant to philosophy per se." As we can see by reading the interview, Zahavi actively promotes interdisciplinary research by managing the Center for Subjectivity Research in Copenhagen. The Center is a place where many specialists from different disciplines meet, people who believe that the self is a topic worth exploring. As we can find out on the website of the Center, the main idea of the Center is that "the notion of self is crucial for a proper understanding of cognition, action, sociality, and experience" (*http://cfs.ku.dk/about/*). That is why Zahavi – in opposition to Metzinger and other supporters of the thesis that self doesn't exist – persistently claims that instead of „being no-one" we should be talking about „being someone" (Zahavi 2005). Discussion concerning this problem is still open though, as Zahavi admits in our interview: "I do not believe that we at some point will be able to close the debate, so that we from then on no longer have to deal with and wonder about what it for instance means that something is real, what it means to be a self, etc. For the same reason, I also think that most of the systematic problems I work with are and will remain open."

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Husserl, self and others:
an interview with Dan Zahavi[46]

Picture source: Dan Zahavi's archives.

How did you originally get interested in philosophy?

I met philosophy early. I read much as a child, and occasionally came across references to philosophy. I didn't understand what it meant, but I was curious, and when I was 12 years old, I asked my mother to buy me a copy of Will Durant's *The Story of Philosophy: the Lives and Opinions of the Greater Philosophers*. I can't claim to have understood much at that age, but Durant's account of Plato was still so inspiring that I there and then decided that I wanted to study philosophy. And that was basically a decision I stuck to, and which I have never regretted. It made me opt for modern languages in the gymnasium, since I wanted to learn German so that I could read Kant and study in Germany. Right after the gymnasium, I enrolled as a philosophy student at the University of Copenhagen. Initially I was mostly interested in the history of philosophy (Aristotle, Thomas Aquinas and Kant), but

[46] An earlier version of the present interview appeared in Danish in F.K. Thomsen & J.v.H. Holtermann, eds. 2010. *Filosofi: 5 spørgsmål*. Automatic Press.

eventually I got interested in Husserl, which I back then took to be an interesting synthesis of Aristotle and Kant. So I decided to write my MA thesis on him, and it was on this occasion that I finally realized my plans about studying abroad. I went to Wuppertal in Germany to study with the renowned Husserl-scholar Klaus Held. Held had been the assistant of Landgrebe, who himself had been one of Husserl's assistants. In the spring of 1991, I handed in my MA thesis which was entitled *Intentionalität und Konstitution*. It also became my first book (Zahavi 1992).

By then I had decided that I wanted to write a PhD. I was lucky enough to obtain scholarship and went to the Husserl Archives at the *Katholieke Universiteit Leuven* in order to work with Rudolf Bernet as my doctoral supervisor. In 1994, I successfully defended my thesis *Husserl und die transzendentale Intersubjektivität*, which later was also published as a book (Zahavi 1996). By then, if not sooner, I was already set on an academic path with phenomenology as main area of focus. After some years as post.doc and assistant professor in Paris and Copenhagen, and after having written and defended my habilitation *Self-awareness and alterity* (Zahavi 1999), I submitted an application to the *Danish National Research Foundation* together with two colleagues, Arne Grøn and Josef Parnas. The application was successful and in 2002 allowed me to establish the *Center for Subjectivity Research*, which I have directed ever since. In 2006, I obtained a permanent position as professor of philosophy at the University of Copenhagen. Whereas my own background is strictly in philosophy, and whereas I initially worked alone, and only with philosophy, after the establishment of the *Center for Subjectivity Research* I increasingly started to collaborate with other people, including empirical researchers such as the psychiatrist Josef Parnas, the clinical psychologist Louis Sass, the developmental psychologist Philippe Rochat and the neuroscientist Andreas Roepstorff. Philosophers I have collaborated with include Shaun Gallagher and Evan Thompson. Together with the two latter, I have now for a number of years been involved in an attempt to build bridges between phenomenology, philosophy of mind and cognitive science.

What do you regard as your most important contribution to philosophy?

Since my master thesis I have worked on phenomenology; a philosophical tradition established by Husserl (1859-1938) which in many ways can be said to constitute the cornerstone of what today frequently, and somewhat misleadingly, is called Continental philosophy. Briefly put, phenomenology might be characterized as a philosophical analysis of different modes of appearance and related hereto as a reflective investigation of those forms of understanding and structures of experience that allow the objects to show themselves as what they are. From the outset, I took it to be important to bring phenomenology into dialogue with other philosophical traditions. In my PhD I drew on critical theory (Habermas), in my habilitation it was the Heidelberg school (Henrich and Frank) and analytical philosophy of language and philosophy of mind (in particular Rosenthal, Anscombe, Perry, Cas-

tañeda and Armstrong). After the *Center for Subjectivity Research* was established, my methodological and theoretical pluralism has only become even more pronounced.

In my PhD, I presented a new interpretation of Husserl's theory of intersubjectivity. I argued that Husserl's main reason for dwelling so much on the topic of intersubjectivity was transcendentally motivated, and that his phenomenology would ultimately have to be appreciated as an intersubjective transformation of transcendental philosophy. In other words, rather than being interested in the basic building blocks of reality, Husserl was concerned with the transcendental philosophical question about what it means for something to be real, and how we can experience it as such. He defended the view that these questions couldn't be answered on the basis of an isolated subject, but only by considering the contribution of the intersubjective community. I also discussed Sartre's, Merleau-Ponty's and Heidegger's contribution to a phenomenological theory of intersubjectivity, and stressed the common features and virtues of such analyses when compared to the language-oriented approach to intersubjectivity found in Habermas and Apel. My PhD was published in the spring of 1996, a few months after Anthony Steinbock and Natalie Depraz had published their respective analyzes of Husserl's theory of intersubjectivity. The three books are all different, and deal with different aspects of Husserl's theory. But they are all characterized by drawing on a quite comprehensive amount of sources and by their rejection of the traditional reading of Husserl as a quasi-solipsist. Since then, all three of us have often been classified as representing a new generation of (revisionist) Husserl scholars. A more overarching presentation of my reinterpretation of Husserl – which responds to the widespread portray (caricature) of Husserl as a subjective idealist, intellectualist, immanentist etc. – can be found in the book *Husserl's Phenomenology*, which in the meantime has been translated into a wide range of languages (Zahavi 2003a).

In my habilitation, I defended the concept of pre-reflective self-consciousness, i.e., the idea that our experiential life is characterized by a form of self-consciousness which is more primitive and more fundamental than the reflective form of self-consciousness that one for instance finds in various kinds of introspection. I presented a detailed reading of Husserl's analysis of self-consciousness and inner time-consciousness (which criticized Sokolowski's and Brough's internal object model), and demonstrated more generally, by also drawing on Merleau-Ponty, Sartre, Henry and Derrida, how central and fundamental a role the concept of self-consciousness plays in phenomenological philosophy. Phenomenology hasn't merely been interested in the question of how consciousness is involved in the appearance of objects, but has also inquired into the self-appearance of consciousness. The book is probably the most exhaustive discussion of phenomenological accounts of self-consciousness, and was in 2000 awarded with the Edward Goodwin Ballard Prize in Phenomenology.

My research in the years that followed has continued to address the same basic issues. On the one hand, I have been preoccupied with the relationship between experience, self and self-consciousness. I have argued that all three concepts are interdependent and that a theory of consciousness which wish to take the subjective dimension of our experiential life seriously also needs to operate with a (minimal) concept of self. Opponents have included those who either deny the reality of the self or who claim that the self is a social construct whose formation requires language and concept use, normativity and narratives. As part of this work I have investigated the strengths and weaknesses of the narrative account of self, discussed and criticized various forms of self-skepticism, and examined some of the forms of self-disorders that we find in schizophrenia (cf. Zahavi 2003b, 2005, 2007a, Sass, Parnas, Zahavi 2011). During the last few years, this interest has also gone in a more intercultural direction. I have started to work with experts in Buddhist philosophy from USA, Australia and South Korea. Our ongoing work is aimed at better understanding the similarities and differences between the concepts of self that the different traditions are operating with (see Siderits, Thompson, Zahavi 2011).

On the other hand, I have continued to write on intersubjectivity, empathy and social cognition. I have defended a phenomenological account of empathy, argued in favor of the bodily and contextual character of interpersonal understanding and criticized dominant positions within the so-called 'theory of mind' debate, including simulations theory and theory-theory. As part of this work, I have also spent time discussing and criticizing some of the standard accounts of autism, including the claim that the reason why people with autism have difficulties understanding and interacting with others is due to deficiencies in their theoretical capacities (Zahavi 2001, 2008b, Zahavi & Parnas 2003).

Most recently, I have started to study social emotions like shame (Zahavi 2010a). My interest is mainly due to the fact that such emotions do not merely express a concise form of self-experience, but that they at the same time involve relations to others. In the next few years I intend to continue working on various forms of socially mediated self-experience.

In parallel with my systematic work in these areas, I have on the one hand continued my Husserl research, where I, for instance, have discussed the metaphysical implications of transcendental phenomenology: Can the phenomenological clarification of the lifeworld and of the structure of experience tell us something about the nature of reality itself (see Zahavi 2008c), and on the other, I have sought to establish and promote increasing cooperation between phenomenology, analytical philosophy of mind, and cognitive science (in particular development psychology and psychopathology). The latter effort brought me in 2006 the *Elite Research Prize* of the Danish Ministry of Science, Technology and Innovation. Two representative publications are the books *Subjectivity and Selfhood* from 2005 and *The*

Phenomenological Mind from 2008. The latter book is co-authored with Shaun Gallagher with whom I am also co-editing the journal *Phenomenology and the Cognitive Sciences*.

Although I initially to a large extent identified myself with Husserlian phenomenology, I eventually found the disagreements which have marked the relations between the different traditions in phenomenology more and more counterproductive. I will certainly not deny that it can be useful to focus on the difference between, for example, Husserl's, Heidegger's, Sartre's and Merleau-Ponty's understanding of phenomenology, but too much emphasis on the difference does not only run the risk of degenerating into a kind of trench war which is anything but philosophical fruitful, it also weakens the effort to make phenomenology a powerful and systematically convincing voice in contemporary philosophical discussion. For the same reason, I have in the last year been increasingly more eclectic in my use of the resources that can be found in phenomenology (cf. Zahavi 2003c, 2007b, 2008d). The same attitude has also characterized my work in the *Nordic Society for Phenomenology* which I, together with Hans Ruin and Sara Heinämaa took the initiative to establish in 2001, and which I was then president for in 6 years.

What are the main open problems within your area of philosophy?

I will not deny that one might talk of progress, development and results in the field of philosophy, but I doubt that a number of the fundamental philosophical problems will ever be resolved in a way which will satisfy all future generations. In other words, I do not believe that we at some point will be able to close the debate, so that we from then on no longer have to deal with and wonder about what it for instance means that something is real, what it means to be a self, etc. For the same reason, I also think that most of the systematic problems I work with are and will remain open.

Some problems are however more urgent than others, and among the latter, one might for instance mention some of the methodological challenges which the ever more dominant naturalism has occasioned.

How, for example, should one for instance view the relationship between the first-person perspective, the second-person perspective and third-person perspective on consciousness? We know what it feels like to feel disgust at the sight and smell of spoiled food. We are able to recognize the disgust in the facial expressions of others. Neuroscience is increasingly able to locate and identify the areas of the brain that are active when we have these types of experiences. What is still missing is a real theoretical integration of these different perspectives. Such integration is essential, if we are to do justice to the complexity of consciousness, but it is in no way obvious how natural science all by itself will be able to do so.

A related problem concerns the relationship between philosophy and empirical research. I do not believe that philosophical considerations as such can be made superfluous or be replaced by empirical research – therefore, I also oppose the idea that philosophy ought to be naturalised, if that is meant to entail the suggestion that it should be made part of or an extension of natural science – but I do not think it is healthy for those branches of philosophy that I work in to operate in a vacuum without any contact to empirical research. The challenge is to find the right balance – where the unique contribution of philosophy is respected while strengthening the interdisciplinary collaboration (Zahavi 2010b, Zahavi & Roepstorff 2011, Rochat & Zahavi 2011).

How do you view the relationship between philosophy, other sciences and the world outside on science?

It is fairly straightforward to show that the questions I am primarily dealing with – the nature of the self and its relation to others – are questions with immediate existential relevance to most people. Who has not considered the question of what makes up one's self-identity? Are you the same from birth to death? Can radical changes in one's values and convictions change one so much that one becomes another? Can one be a self alone, or only together with others as members of a community? How do we understand others in the first place? Can we at all experience others, or are we always strangers to one another? But as already indicated above, such questions are also central to a large number of empirical disciplines, including developmental psychology, cognitive psychology, anthropology, sociology, psychiatry and neuroscience. We find references to self and other in various explorations of perception, action, embodiment, emotions, memory, etc. It is in particular this fact which makes the questions so fascinating, and while one as a philosopher can learn quite a lot about the issues in question by a study of the empirical findings, there is also something deeply satisfying about seeing how a philosophical analysis of, for example, self-consciousness or empathy can be of relevance and inspiration to empirical researchers, such as psychiatrists and developmental psychologists.

What role want you to the philosophy must play in the future?

Fundamentally speaking, I see three tasks for philosophy:

First of all, it has the role of being a transmitter of traditions. The theories we today make use of didn't arise out of the blue. They have a historical origin, and by better understanding their background and the alternatives which have been developed over time, we are also in a better position to assess their strengths and limitations. Take as an example consciousness research. The field has undergone something of a renaissance during the last 20 years. But the topic itself is hardly new. Just think of the exploration and analysis of consciousness that one finds in

philosopher such as Descartes, Locke, Leibniz, Hume, Kant, Hegel, Kierkegaard, Nietzsche, James, Dilthey and Bergson. By ignoring the resources found in the tradition, one risks missing out on important insights that at best might be rediscovered decades or centuries later.

Although contemporary neuroscience on several occasions has criticized philosophy for not having made any progress or produced anything of lasting value during the last 2,500 years, familiarity with the history of philosophy will reveal the extent to which 17th Century epistemology and metaphysics, including its understanding of the structure of perception and nature of reality, of what is subjective and objective, continues to influence, in a not entirely harmless way, cognitive neuroscience. I consequently see history of philosophy as absolutely central to the work of philosophy.

Secondly, I think that philosophy has a critical task. It should raise and pose critical questions to contemporary dogmas, including the scientific ones. It should be a safeguard against a too facile reductionism, for example, one that would claim that everything must be explained by the theoretical resources we currently have available, and that that which cannot be so explained must be rejected as fiction. Here, philosophical training can remind us of how little we know. It will be able to insist on the complexity of the problems we are facing while nurturing an intellectual openness to new, original ideas.

Finally, I also think that philosophy has a constructive role to play. Not only can it contribute positively to the clarification of a number of problems that it shares with various empirical disciplines, but I also think that there are issues and problems belonging to the domain of, say, metaethics, transcendental philosophy, metaphysics and part of epistemology, which are specific to philosophy, and where it can make a unique contribution.

I hope that philosophy in the future will continue to flourish in all three areas. Reality is complex, and in order to do this complexity justice we need a diversity of complementary perspectives. This applies not only to the relationship between theoretical (philosophical) and empirical perspectives, it is also relevant to philosophy per se. Rather than to see it as a weakness, I regard the diversity of philosophical traditions as a strength. This obviously doesn't mean that everything is equally valid. But it is possible to do excellent philosophy in more than one way.

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Dan Zahavi's website: *http://tinyurl.com/dzahavi*

Guest of the issue

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Mark Rowlands

AVANT editors and co-workers had a chance to meet Mark Rowlands in Toruń, Poland a year ago in 2011. He gave two talks at *Philosophers' Rally*, the first one on "Intentionality and the Extended Mind" (involving the discussion of his latest book *The New Science of The Mind: From Extended Mind to Embodied Phenomenology,* 2010) and the second – less formal, on his *The Philosopher and the Wolf* (2008) memoirs.

Professor Rowlands is certainly a man of many (philosophical) interests. His works may be divided into three categories: the philosophy of the mind and cognitive science (starting from *Supervenience and Materialism* (1995) and *The Nature Of Consciousness* (2001), followed by the 2006 and 2010 books already mentioned), ethics, the moral status of non-human animals and problems of natural environment (*Animal Rights* (1998), *The Environmental Crisis* (2000) and *Animals Like Us* (2002)), and broadly construed cultural criticism and philosophy 101-style books (*The Philosopher at the End of the Universe* (2003), *Everything I Know I Learned from TV* (2005) and *Fame* (2008)). Rowland's article *Representing without Representations* published in this issue is related to his earlier book, *Body Language* (2006).

Mark Rowlands is currently the Professor of Philosophy at the University of Miami. He began his academic career with an undergraduate degree in engineering at the University of Manchester and then switched to philosophy. He was awarded his PhD in philosophy at the University of Oxford. Apart from his official publications, he runs his own blog, found at rowlands.philospot.com and remains active on academia.edu, where his recent papers can be found (see: *miami.academia.edu/Mark Rowlands*). Mark Rowlands's website: *www.markrowlandsauthor.com/* and blog: *http://rowlands.philospot.com/*

Jakub R. Matyja

Picture source: Mark Rowlands's archives.

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Of wolves and Philosophers

Interview with Mark Rowlands

Tadeusz Ciecierski

If wolves were capable of philosophizing what would be their favorite philosophical method and/or theory?

I'm afraid I have no idea. I think the question has moved so far from the actual world that I have no idea of what an answer would even look like.

Relatively recently your book The Philosopher and the Wolf was translated into Polish. It has received very good reviews. However, when reading the book, one cannot get rid of the impression that the picture of human nature sketched in it is – euphemistically speaking – not very positive. Do you really think that there are so few truly admirable things about human nature?

It's nice to hear the reviews were good.

Yes, I think it's fair to say that I didn't dwell for very long on the human virtues. But, of course, there is no shortage of humans who are wiling to extol the virtues of human beings. Much of the history of human thought has concerned itself with these things. There are comparatively few who have been willing to question these virtues, or point out our fairly obvious flaws, in any sustained or systematic way. So, the book was, in part, an attempt to redress the balance.

But, if you read between the lines of the book, it actually presupposes, rather than denies, that humans have many admirable qualities. In fact, I argued that some of our most impressive qualities – in particular, our intelligence and our moral sense – can evolve out of some of our worst qualities. I think Nietzsche once claimed that what is best about us comes from what is worst. *The Philosopher and the Wolf* carries on this theme. That is, the project was not so much to deny the admirable qualities of humans, but to dig down into the roots of those qualities and see what we find.

Various considerations included in the book are described by you as attempts of calling into question parts of „the mythology of the ape" - consisting of, among other things, a certain idea of happiness. Do you have any positive ethical or anthropological proposal hidden behind the revaluation of the myth in question?

The philosophical focus of the book was provided by the stories we tell to distinguish ourselves from, and elevate ourselves above, other animals. I wasn't really concerned with the truth or falsity of these stories, but with what our acceptance of them revealed about us. There is, as far as I am aware, no hidden positive ethical or anthropological proposal.

If you were asked to advertise your book to a possible reader – how would you do that?

When I was twenty-seven, I did something really rather stupid. Actually, I almost certainly did many stupid things that year – I was, after all, twenty-seven – but this is the only one I remember because it went on to indelibly shape the future course of my life. When I first met Brenin, I was a young assistant professor of philosophy at the University of Alabama, and he was six-week old, a cuddly little teddy bear of a cub. He was sold to me as a wolf, but I all likelihood he was a wolf-dog mix. Whatever he was, he grew up, and with this came various, let us call them, *idiosyncrasies*. If I left him unattended for more than a few minutes, he would destroy anything he could lay his jaws on – which, given that he grew to be thirty-five inches at the withers, included pretty much everything that wasn't screwed to the ceiling. I don't know if he was easily bored, had separation anxiety, or claustrophobia, or some combination of all of these things. But the result was that Brenin had to go everywhere I did. Any socializing I did – bars, parties, and so on – Brenin had to come too. If I went on a date, he would play the lupine gooseberry. I took him to lectures with me at the University. He would lie down and sleep in the corner of the lecture room: most of the time anyway – when he didn't things would get interesting. I mean, you can probably imagine the circumstances that caused me to append this little cautionary note to my syllabus:

NOTE**:** Please do not pay any attention to the wolf. He will not hurt you. However, if you do have any food in your bags, please ensure that those bags are securely fastened shut.

As a result of having to share a life with a rootless and restless philosopher, Brenin became not only a highly educated wolf – the recipient of more free university education than any wolf that ever lived – but also, I suppose, a rather cosmopolitan wolf, moving with me from Alabama to Ireland, on to Wales, England, and finally to France.

The Philosopher and the Wolf is the story of those years we spent together. But it is also a philosophical examination of the ways in which we differentiate ourselves from other animals – the stories we tell to convince ourselves of our superiority. Each story, I argued, has a dark side – each story casts a shadow. And in each case, what is most revealing is not the story itself, but the fact that we believe it and think it important.

I focused on three common stories. The first is that we are better other animals because we are more intelligent. The second is that we are better because we have morality – we can understand right and wrong – and they do not. The third is that we are superior because we, and we alone, understand that we are going to die. Intelligence, morality and our sense of our own mortality were the three major themes of the book. I am far from convinced that any of these stories can establish or underwrite a critical gulf between us and other animals. But, in *The Philosopher and the Wolf*, I was more interested in what each story reveals about us. That is, I was interested in what our valuing of these things says about us. I argued that when we dig down far enough into the roots of each of these things, we find features of ourselves that are deeply unflattering. At the roots of our intelligence we find manipulation and machination. In the roots of our morality we find power and lies. And our sense of our mortality renders us fractured creatures, unable to understand ourselves in any satisfactory way.

What can a philosopher learn from a wolf?

Well, it is not as if a wolf can teach a philosopher anything directly. But, indirectly, as a result of living with Brenin, my life took on a certain shape, and as a result of this shape, my thought traveled down certain paths that, I suspect, it otherwise would not have traveled. That is the only sense in which I "learned" anything from Brenin.

Do you believe that the ethics of respect for all sentient creatures can gain universal (or at least common) acceptance in the world we live in?

My heart says yes, but my head tells me this is unlikely – certainly not in my lifetime.

Quite recently we had here in Poland a visit of Peter Singer who, like you, is perceived as an advocate of animal rights (or, more adequately: the rights of sentient creatures). Do you share his ethical views as well as their utilitarian foundations?

Singer and I converge on many of our views on animals. I agree that the way humans currently treat animals (in the form of factory farming, and so on) is unconscionable. More generally, we both agree that animals are morally considerable: they have interests that should, morally speaking, be taken into account when decisions are made that impact on them. However, Singer is a utilitarian. I am not. So, we disagree with respect to theory.

Others often think that I am a contractarian (of a neo-Rawlsian sort). This is because I have developed a contractarian case for the moral status of animals). But I am, in reality, more eclectic. I find much that is good not only in contractarianism, but also virtue ethics and the capabilities approach. I think all these theories have true things to say about different aspects of morality.

In *The Philosopher and the Wolf* you sketch the contrast between the ape's and the wolf's world perspectives – and what about Mark Rowlands' world perspective?

I'm not sure my beliefs fall together in a sufficiently unified way for them to coalesce into a world perspective. Let's see if I can put it all together …

With regard to the mind, I believe, and have defended, the Sartrean thesis that consciousness has no content. There is no such thing as mental content. Therefore, given one or two more plausible premises, I am committed to the Wittgensteinian claim that the word is a totality of content (i.e. facts) not things (if we don't think mental content, we must think worldly content).

For this reason, I am committed to thinking of intentional directedness towards the world as a form of revealing activity, broadly understood. I am the subject of intentional states to the extent that I entertain worldly content in a certain way (credulously, desirously, emotively, and so on). And my endorsement of embodied and extended cognition follows directly from this – revealing activity often straddles neural, body and environmental processes. (All this is discussed at much greater length in my recent book, *The New Science of the Mind: From Extended Mind to Embodied Phenomenology* (MIT Press, 2010).

My view that consciousness is, in the above sense, empty leads me to at least look favorably on no-self views of the sort associated with Buddhism and Derek Parfit – and therefore, also the ethical consequences of these views (no absolute distinction between one's own suffering and that of others, etc). Although this is the topic of future work - I haven't thought enough about it to have the right to an opinion yet!

So, who knows? Perhaps it is all starting to hang together? Perhaps I am in the process of developing a world perspective. Perhaps I'm not. If I am, I haven't got there yet.

Today, as in the past, it is still expected that philosophers be persons capable of addressing the most fundamental questions. On the other hand most professional philosophers stand aloof from such questions while paying a lot of attention to small philosophical puzzles. What do you think about this situation?

I suppose I find it in some ways regrettable. Part of the reason I have, in recent years, woven together philosophy with autobiography is as an attempt to reconnect philosophy with life and the art of living. So, *The Philosopher and the Wolf* is a book about life – in particular, it's about growing up. I have a book coming out next year called *Running with the Pack* – and that's about growing old. (I suppose there's a natural trilogy to be written here, but I hope I don't have to write the third part for a while yet).

For a while, philosophers abandoned these sorts of themes. Maybe they still have – I don't know. Perhaps it was part of a perceived process of professionalization. As Julian Barnes once remarked, we are all amateurs when it comes to our own lives, and this sort of personal examination was excised in the (poorly conceived) aim of becoming a professional discipline (which basically amounted to dealing with issues and questions that only someone with an extended formal training in philosophy could understand). I think (I may be wrong) that things are changing, and this can only be a good thing. Philosophy, in the final analysis, is the art of thinking clearly. And even if we are all amateurs when it comes to our own lives, this does not preclude thinking clearly about those lives and what is important in them.

Your book „Philosopher at the End of The Universe" is the introduction, based on science fiction films, to philosophical theories, problems and ideas. Is that your favourite cinema genre?

I'm not sure I have a favorite cinema genre any more – although when I wrote *The Philosopher at the End of the Universe* sci-fi was probably what I liked most. Science fiction is an ideal medium for talking about philosophy. What unites the two is the thought experiment. It is characteristic of philosophy to use thought experiments, and many science fiction stories/films are simply large scale, and exceptionally vivid, thought experiments.

Do you consider yourself more of a philosopher who occasionally practices literature or a novelist who occasionally practices philosophy?

It depends on what earns me the most money in any give year. I'm joking. Of course. Most of my writing has been solidly in philosophy. That is, of the 15 books I have written (two are in press and will be out late this year/early next), 10 have been straightforward philosophy research monographs. Two have been autobio-

graphies/memoirs with strong philosophical content. The other three were popular books in philosophy. Based on this evidence, I have to conclude that I am a philosopher.

It is expected that a philosopher ought to be an acute and keen observer of the surrounding reality. What is your opinion on all the recent stir and commotion caused by the slogan of "crisis"? Do you think that it indicates the truly alarming nature of certain truly alarming events, or rather that it indicates the "spiritual" condition of the typical representatives of Western civilization?

The term "crisis" is raised in so many different contexts these days – economic, environmental, spiritual, moral, and so on – that it has become a devalued currency. If we switch from talk of crisis to talk of the major problems that are going to face humans and their planet in the next century, then I am pretty sure it is the environmental problems that are going to drive the others. At the root of it all, of course, is the unsustainable size of the human population.

What is the status of philosophy in the age of galloping empirical sciences? Are philosophers still needed today?

Is there any major philosophical problem that has been solved by the empirical sciences? What is the nature of right and wrong? What is justice? What is knowledge? What are objects? What are events? What is intentionality? What is meaning? Even problems that seem amenable to empirical solution – the nature of consciousness provides an obvious example – seem to resist this sort of solution. Thus, while fMRI studies can show us the correlates of conscious states, they fall short of explaining, exactly, how these states are produced by the brain activity. And even if this is disputed, this dispute will rest on further philosophical questions such as, what is an explanation? What constitutes an adequate explanation of an event?

Of course, it goes without saying that familiarity with empirical studies is helpful. But philosophical problems can't in general be solved by these alone because they involve, in part, the question of how these results are to be interpreted. And that means, in effect, working out how these results are to be conceptually organized or structured.

What is your opinion concerning the condition of contemporary philosophy?

There is interesting stuff being done. However, the older I get, the more insular, needlessly technical, and uninteresting much of it seems. This is worrying, because this happens to a lot of philosophers as they get older, and it may be a symptom of my decline rather than the decline of philosophy. Either much of philosophy is getting worse, or I am (or, logically, both!).

Contemporary philosophy – as divided into the camps of so-called analytic and so-called continental philosophy – strongly polarizes the opinions of persons with philosophical background or philosophical interests. The reader of your books may have an impression that you are intentionally attempting to break out of this division: your work contains many elements characteristic of the analytic tradition as well as many continental inspirations (you mention, among others, Heidegger, Camus and Nietzsche in this context). How would you place your philosophical investigations on the contemporary philosophical map?

Yes, I am trying to break out of – or, perhaps, simply take no notice of – this division. I think the idea that one half of the philosophical world can afford to ignore what the other half is doing is very silly. My philosophical training was solidly within the so-called analytical tradition. And I suppose there is a clear sense in which I write in an analytic way (at least in my works of professional philosophy). However, some of the biggest influences on me have been from within the so-called continental tradition – in particular, the phenomenological tradition has played a big role in shaping my thought. Some of the truly great ideas of twentieth century philosophy came from this tradition. I work within that tradition, and with those ideas, but do so in, I suppose, an analytic way.

Of course, these terms 'continental', 'analytic' don't really make much sense. The idea that Husserl, for example, is not an analytic thinker is absurd. And in *Being and Time*, to take just one more example, we find some pretty spectacular feats of analysis.

It is time for some trade questions. As you frankly admit, in the philosophy of the mind you are one of the proponents of the idea of embodied and environmental cognition (*The Body in Mind* ,1999) . Do you still think that the idea in questions gives us the best tools to account for phenomena such as intentionality, consciousness, learning and – generally speaking – cognition?

Yes. This is a good example of the sort of combination of analytic and continental I mentioned in my answer to the previous question. My version of embodied/extended cognition follows directly from my analysis of intentionality. But this is an analysis that fits far more comfortably with certain themes in the phenomenological tradition, in particular, the noetic/noematic framework developed by Husserl. Roughly, I argue that cognition is embodied and extended because intentionality is a form of revealing activity – activity whereby the world is revealed to a subject as falling under a given mode of presentation – and revealing activity often straddles processes occurring in the brain, in the world, and in the wider environment.

Your adventure with philosophy was preceded – just like in the case of Wittgenstein – by polytechnic studies. Did this fact leave a mark on your philosophical investigations?

Yes, I also read engineering and like Wittgenstein, it was at Manchester University. Perhaps I should have gone to Cambridge afterwards, instead of Oxford. What effect this had on my subsequent philosophical choices, I suppose I can never really know because I have no point of comparison. That is, I have no idea what my investigations would have been like if my past had been different. On the face of it, however, it strikes me as implausible that an unsuccessful foray into engineering should have left that much of a mark on my philosophical thinking.

As many contemporary philosophers you are considered a „naturalist". How do you understand „naturalism"? What are your reasons for favouring the naturalistic approach?

I'm not a naturalist. This is not because I am opposed to naturalism, but because I don't think it is useful to conceptualize things in this way. First, naturalism has so many different meanings as to effectively render it an ill-defined concept. Second, it is not clear what it is being opposed to. How many would like to describe themselves as "supernaturalist"? There may be a few, but not many.

Intentionality (capability to represent) or consciousness? Which phenomenon is, in your opinion, more complex and fascinating?

I do not think you can separate the two. At its core, I think intentionality should be understood as disclosing or revealing activity. Consciousness is a type of disclosure. So, there is no question of one being the more complex or fascinating.

Two types of disclosing or revealing activity: causal and constitutive. Sub-personal cognitive processes disclose the world *causally* in the sense that they provide a physically sufficient condition for the world to be revealed in a given way to a subject. For example, if Marr's theory of vision were true, then certain processes that begin with the retinal image and conclude with a 3D object representation would be physically sufficient for the world appear a certain way to a subject. These processes would not be logically sufficient. The subject might be a zombie, and so on. But the processes do form a physically sufficient condition. Conscious experiences, on the other hand, disclose the world *constitutively* in the sense that they provide a logically sufficient condition for the world to be revealed in a given way. Thus, if an experience with a certain phenomenal character – a certain what it is likeness – occurs, then that is logically sufficient for a certain portion of the world to be revealed in a given way (even if the experience is illusory or hallucinatory). Consciousness is, fundamentally, constitutive disclosure of the world, and as such is a species of intentionality.

In your book *The Nature of Consciousness* (2001) you advocate the view that the essence of consciousness lies in the fact that it can be both the act and the object of experience. How would you explain this idea to persons unfamiliar with the modern philosophical jargon?

I can think. I can also think about my thinking. That is, I might think that my thought is troubling, or perplexing, or liberating. So, my thought can be an object of my consciousness – in this case, an act of thinking. But at the same time, I am thinking about my thought. So, as well as being an object I am aware of, my consciousness is also an act of awareness – an act of being aware of my thought.

As I mentioned in my answer to the previous question, I actually think the essence of consciousness is intentionality. And we will not understand intentionality by looking at objects of awareness. Intentionality is the directing of consciousness towards objects. It is not that upon which consciousness is directed – even when these items are mental ones. To understand intentionality, we need to understand consciousness as act. As act, consciousness is the constitutive disclosure of the world. It is a type of revealing activity.

Will machines think?

Yes.

And the last question: how do you recall your recent short visit to Poland?

I had a lovely time. Torun is a beautiful city. I appreciate the hospitality of the organizers of the Philosopher's Rally, and also the great job they did in whisking me up to Kadyny in time for my wife's brother's wedding. I hope to return before too long.

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Representing Without Representations

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Abstract

There is a problem of representation and an apparatus of representations that was devised to solve this problem. This paper has two purposes. First, it will show why the problem of representation outstrips the apparatus of representations in the sense that the problem survives the demise of the apparatus. Secondly, it will argue that the question of whether cognition does or not involve representations is a poorly defined question, and far too crude to be helpful in understanding the nature of cognitive processes.

Keywords: action; cognition; intentionality; normativity; representation.

1. Introduction

The claim that cognition is to be explained in terms of operations performed on mental representations has stumbled upon hard times in recent years; at least in certain circles. The 'circles' in question comprise a loose and, according to some, unholy alliance of researchers in the fields of robotics, embodied approaches to cognition, enactive approaches to perception, dynamicists, and vehicle externalists, to name but a few. To a considerable extent, the tribulations of the apparatus of mental representations were predictable. The idea of a mental representation has come to mean too many different things to too many different people. As an erstwhile, if distinctly revisionist, defender of mental representations, I strongly suspect that the problem is not with the idea of mental representations as such – if only people could be persuaded to use the term in the right way. But that, unfortunately, is the tricky part. And so, even if the theoretical utility of the idea of mental representations remains intact, its practical utility must be questioned.

This paper, therefore, begins with a strategic decision: Let us refuse to quantify over mental representations. Let us eliminate all talk of mental representations from our vocabulary. Let us cease to use the concept of representation as an explanatory concept in the development of our theories of cognitive processes. There: at a stroke it is done! And this is all absolutely fine with me. But even if we

do this, we are still left with a problem of *representation*. The problem of representation is a problem that the apparatus of representations was, in effect, introduced to solve. But the problem of representation is not exhausted by the apparatus of mental representations. It outstrips this apparatus in crucial ways. Therefore, even if we eschew the apparatus, the problem remains. Of course, without the apparatus, we might no longer call it the problem of representation. And, indeed, before we have progressed more than few pages, I shall be calling it something else. But a rose by any other name smells as sweet. And the problem remains irrespective of its appellation.

This paper has two purposes. First, it will show why the problem of representation outstrips the apparatus of representations in the sense that the problem survives the demise of the apparatus. Secondly, it will argue that the question of whether cognition does or not involve representations is a poorly defined question, and far too crude to be helpful in understanding the nature of cognitive processes. My stalking horse in this paper will be provided by Shaun Gallagher's interesting but, as I shall try to show, ultimately ill-advised attempt to take issue with the position I defended in my book, *Body Language*. I examine Gallagher's critique not only because I think it is ineffective as a critique of the position defended in that book but, more importantly for present purposes, as a means of getting to the primary destination of this paper: the ill-defined character of the concept of representation.

2. Representation and Normative Grip

Cognitive states make a *normative* claim on the world. Such a claim is essential to their possessing content. This point is a familiar one, and is strongly associated with McDowell (1994), through Sellars (1956/1997) all the way back to Kant. The point is usually made in connection with belief, the most obvious example of a cognitive state. If I have a belief with the content that *p*, then the world *should* be *p*. If the world is not *p* then something has gone wrong. Let us call this the *normativity condition*. This condition is closely associated with another: the *misrepresentation condition*. The possibility of believing, in general, entails the possibility that at least some of one's beliefs are wrong. The normativity constraint grounds – i.e. makes true – the misrepresentation constraint. The normativity constraint is, therefore, more basic.

To see this, suppose your beliefs were simply about whatever caused them. Then they would be infallible. Their content simply consists in whatever produces them, so there would be a perfect match between content and extrinsic state-of-affairs. The normativity condition forces us to distinguish between what actually causally produces a belief and what should produce it. Not everything that actually *does* produce my belief that there is a horse in front of me *should* produce this belief: the donkey that is in front of me and is, in fact, causally producing my belief should not do so. It does produce the belief, but it shouldn't. And this is why my

belief is false. So beliefs can misrepresent – be false – only because beliefs make a normative claim on the world. The normativity condition is, therefore, basic.

Satisfying the normativity condition is an absolute desideratum on any satisfactory account of cognitive states. The apparatus of mental representations was introduced precisely to do this. In its original seventeenth century guise, mental representations were divided into impressions and ideas, corresponding roughly to the distinction between perceptual representations and subsequent memory representations (and representations involved in various processes of ratiocination). This apparatus was introduced precisely to register the epistemic gap between the contents of the mind and the contents of the world. That is, it was introduced precisely to acknowledge the possibility that, given the contents of the world, the contents of the mind might not be what they should be. This was, obviously, a theme that had come to prominence with Descartes.

Contemporary representationalism, at least in cognitive science, views representations not as items of which we are aware in the having of experiences, but as neural states, typically individuated by their higher-order physical or functional properties. But the same desire to safeguard the normativity of representation, and the resulting possibility of error, can still clearly be discerned. According to this account, cognitive states are relations to representations. Representations are understood as discrete, identifiable, internal states of a subject: typically brain states individuated by way of their higher-order properties. Crucially, they can be instantiated independently of what is going on in the outside world. Thus, to use an example of Fodor's, consider the HORSE representation. If this representation is instantiated when the world does not, in an appropriate way, contain a horse, or is not instantiated when the world does, in the relevant sense, contain a horse, then something has gone wrong. Both the normativity and the misrepresentation conditions are satisfied as a consequence of the independence of mental representation and worldly fact. It is this independence that makes possible the distinction between the worldly fact or item that *should* produce the mental representation and what actually *does* produce it.

3. The Persistence of the Problem of Representation

The problem of representation is, ultimately, a problem of explaining our normative *grip* on the world. That is, it is the problem of explaining how we are able to interact with the world in a way that both reflects and respects the normativity condition. The apparatus of mental representations – items sufficiently independent of the world for us to draw a distinction between what in the world does cause them and what in the world should cause them – is one way of explaining our normative grip on the world. But eschewing this apparatus will not make this requirement go away. Consider, for example, the following passage from Dreyfus (quoted from Gallagher 2008). Here, Dreyfus is arguing that skilful intentional action does not require representations:

> *A phenomenology of skill acquisition confirms that, as one acquires expertise, the acquired know-how is experienced as fine and finer discriminations of situations paired with the appropriate response to each. Maximal grip [Merleau-Ponty] names the body's tendency to refine its responses so as to bring the current situation closer to an optimal gestalt. Thus, successful learning and action do not require propositional mental representations. They do not require semantically interpretable brain representations either* (2002: 367).

It is clear that, in this passage, Dreyfus *presupposes* that we have a normative grip on the world. But he does not (in this passage) say how this is possible. Maximal grip, we are told, names the body's tendency to refine its responses so as to bring the current situation closer to an optimal gestalt. But just how, one might ask, does it do this? This is precisely the problem of normative grip. But the problem of representation essentially is the problem of explaining our normative grip on the world: or, at least, once you've explained normative grip, you have done most of the hard work required for explaining representation. Therefore, one cannot simply *presuppose* that we have a normative grip on the world and then claim to have *obviated* the need for representation. (This, it goes without saying, is not intended as a point against Dreyfus, but against the more general assumption that normative grip on the world is not something that requires explanation).

Our normative grip on the world is, I have argued, precisely what the traditional apparatus of representations was supposed to explain. The type of explanation this apparatus proffers is one that, as we might say, goes from the inside out. The true locus of normativity is to be found in internal states of a subject. These then go on and shape that subject's behaviour, and so account for its ability to interact with the world in ways that respects and reflect the normativity condition. The guiding idea behind my book, *Body Language* was that the way to reject the traditional apparatus of representations, while at the same time respecting the normativity condition, is to reject this direction of explanation. The true locus of normativity does not, or does not necessarily, reside on the inside, in the form of inner representations. Rather, it is also to be found on the outside. Our behaviour is infused with a form of normativity that is *sui generis* and does not derive from the inner states of a subject.

4. *Body Language*: The Thesis

The central thrust of *Body Language* was, in effect, to argue that the possibility of satisfying the normativity condition (and other assorted constraints) can be divorced from the traditional apparatus of mental representations. What is crucial, I argued, is explaining the normative grip that an agent has on the world. Whether we do so by way of an appeal to mental representations is an optional extra – one that may, ultimately, turn out to be misguided. To explain the normative grip an agent has on the world is to explain how it behaves in ways that reflect and respect the normativity condition. Nothing I said in *Body Language* precluded the possibili-

ty of trying to satisfy this condition by appeal to the traditional apparatus of representations. That issue was bracketed. However, I did argue that our normative grip does not consist simply in the production within us of mental representations. It consists also in certain things we do in and to the world around us. These *deeds*, I argued, have a normative – and indeed representational – status that is independent of that possessed by any internal states. Deeds are normative, and they are so independently of mental representations. Their normativity is *sui generis*.

The argument can be divided into two parts. First, there is the identification of a sub-category of things we do that I called *deeds* or *pre-intentional* acts. Second, there is the argument that these deeds satisfy most typical criteria of representation. Here is an example of a deed (or rather several) that I employed quite extensively in *Body Language*:

- You are trying to catch a ball in a high velocity sport such as cricket. You have less than half a second before the ball reaches you. However, to compound difficulties, the ball is moving towards you at a tricky height: lower chest height. To complete the catch you have an awkward decision to make – whether to point your fingers up or down.

Pointing your fingers up or down is, in this case, an example of a deed. So too are:

- All the additional on-line, feedback modulated, adjustments of the fingers you will have to make in order to successfully receive the ball.

In general, deeds are *hierarchically structured*: deeds have other deeds as components, and the order of performance is a function of the task. Deeds, I argued, have three defining features:

1. They are things we *do* rather than things that *happen to us*. In catching the ball it is not as if we discover our hands and fingers moving of their own accord – that would be a very alien and unnerving experience.

2. They fall short of intentional *action* in the strict sense. Like actions, intentional states may play a role in explaining the *status* of a deed as something we do. I move my fingers because, ultimately, I have a general antecedent intention to catch the ball. However, unlike actions, general antecedent intentions are not sufficient to *individuate* deeds. An entire array of feedback-modulated adjustments may go in to satisfying one general antecedent intention.

3. They are distinct from sub-intentional acts in O'Shaughnessy's (1980) sense. They are not at all like random tongue-wagglings or toe-tappings where, as O'Shaughnessy puts it, reason plays neither a positive nor negative role in their genesis. Deeds are things we do precisely because we have general antecedent intentions we wish to satisfy.

Deeds are, in effect, pre-intentional acts: items that fall somewhere in between actions in the traditional philosophical sense and sub-intentional acts of the sort made famous by O'Shaughnessy. The fact that they are not individuated by prior intentional states – intentions, volitions, etc – has, I argued, one crucial consequence: it entails that if the deeds performed by a subject have normative status, this cannot have been inherited from prior intentional states of that subject. This makes deeds crucially dissimilar to actions – for which normative status clearly is inherited from prior intentional, hence normative, states.

The second part of the argument was concerned to show that deeds satisfied most – but not all – of the commonly accepted criteria of representation: the conditions that an item must satisfy in order to qualify as capable of representing an item distinct from it. These criteria are:

> (1) *Informational constraint*: An item *r* qualifies as a representational item only if it carries information about some state-of-affairs *s* that is extrinsic to it.
>
> (2) *Teleological constraint*: An item *r* qualifies as representational only if it has the *proper function* either of tracking the feature or state-of affairs *s* that *produces* it, or of enabling an organism or other representational *consumer* to achieve some (beneficial) task in virtue of tracking *s*.
>
> (3) *Misrepresentation Constraint*:Item *r* qualifies as representing state-of-affairs *s* only if it is capable of misrepresenting *s*.
>
> (4) *Decouplability Constraint*: Item *r* qualifies as representing state-of-affairs *s* only if *r* is, in an appropriate sense, decouplable from *s*.
>
> (5) *Combinatorial constraint*: For any item *r* to qualify as representational, it must occur not in isolation but only as part of a more general representational framework.

Applied to the simple binary example of a deed described above – pointing one's fingers up or down in order to catch a ball moving with high velocity – the story went something like this. The position of the fingers carries information about the trajectory of the ball; at least it does so to no lesser extent than traditional mental representations carry information about things extrinsic to them. It has the function of tracking the ball's trajectory, or of enabling the catcher to do something in virtue of such tracking. The finger position can misrepresent the ball's trajectory. It can form part of a larger combinatorial system. For example, pointing the fingers up then makes possible the more subtle modulation of fingers necessary to receive the ball. It makes no sense to modulate your fingers in this way unless and until the fingers are pointed up.

This list of criteria was formulated, in part, with a view to inclusiveness. Thus, while some views place the idea of information at the heart of our understanding of the idea of representation, others (for example, the teleosemantic view developed in Millikan 1984) do not. In this paper, I shall focus on what I actually think is

the core of representation: the normativity condition. In *Body Language* I called this the *teleological* condition; a label that I now realize is inadequate. We need to explain our normative grip on the world. But to describe this as a 'teleological constraint' is too narrow, and pertains only to one way in which this normative grip might be implemented (a way associated with Millikan and others). The concerns of this paper do not require me to take a stand on whether this is the only way that the normativity condition might be satisfied. Accordingly, I shall take no stand. Henceforth, instead of talking of the teleological condition, I shall talk of the *normativity* condition.

5. Gallagher's Critique

In an interesting and useful critique, Shaun Gallagher (2008) takes me, in *Body Language*, to be defending a form of *minimal representationalism*. According to this interpretation, I want to (a) cling to the claim that representations are implicated in cognition, and (b) offer a reinterpretation of what representations are along broadly minimalist lines. So, according to this interpretation, my purpose in *Body Language* was to argue that certain sorts of actions – pre-intentional acts or *deeds* – were representations. This would necessitate an expansion in our concept of what sort of thing can be a representation, and accordingly, a drift away from the traditional idea of representation as a discrete, identifiable, and above all internal state of the subject. Gallagher, then, argues that there is no real sense in which such items can be regarded as representations.

In fact, my view was almost the exact contraposition of the one Gallagher describes and attacks. There is, I agree, no real sense in which deeds can be regarded as representations. Therefore, what we need to do is understand that representing the world is an activity that does not require representations. While this may sound paradoxical, it is based on a distinction that is quite simple: the distinction between an item being a *representation* and its being *representational*. One reason – perhaps the principal reason – that Gallagher attributes to me the contraposition of my actual view is because of failure to observe this distinction. Thus, he writes:

> *Rowlands argues that such 'deeds' or pre-intentional acts are representational. Although he hesitates to call them representations per se, to call them representational suggests that they involve representations at some level, and in any case do fit his definition of representation* (2008: 356).

However, it is not that I *hesitate* to call pre-intentional acts representations: I *deny* that they are representations. Gallagher claims that to call something representational 'suggests that they involve representations at some level.' But that is precisely what I deny. Thus, for example:

> *The claim to be defended in the rest of this book is that deeds can, in fact, possess representational status. This is not to claim that they are representations as such. As I indicated earlier, the claim that deeds are representations*

> *is not so much false as disingenuous. The content of the concept of a representation is, I think, too closely bound up with the assimilation of representations to the category of the word. And as such, it would be better, for the purposes of stating the principal arguments developed in the following pages, to bracket the apparatus of representations. What are fundamental are not representations but the activity of representing. Deeds, I shall argue, often form a critical part of this activity. And, crucially, the part of the activity of representing constituted by deeds is no less a genuinely representational part than that constituted by internal representations traditionally construed* (2006: 114).

To understand the distinction between an item qualifying as a representation and its qualifying as representational, let us first recall the conditions on representation cited earlier: the informational, normativity (formerly 'teleological'), misrepresentation, decouplability and combinatorial conditions. Collectively, these conditions are an attempt to specify what it is for one item to be *about* another. That is, they are attempts to specify the conditions that must be met if an item is to possess *content*. One may I think, justifiably question whether they do succeed in this task. But that is not pertinent to present purposes. Naturalistic constraints on representation are, precisely, attempts to identify the conditions that must be satisfied if an item is to possess content: that is to count as *representational*. In *Body Language*, I argued that some deeds satisfy these conditions, and do so in the same way and for the same reasons that internal states of an organism might satisfy them.

However, these conditions do not exhaust the generally accepted naturalistic constraints on an item qualifying as *a* representation. There is, it is generally accepted, a further *explanatory* constraint: if an item is to qualify as a representation then it must play a role in explaining (or producing, or guiding) the behaviour of an organism (see, for example, Cummins 1983). Clearly deeds do not satisfy this further constraint. They do not play a role in explaining (producing, guiding) behaviour because they *are* behaviour. It is, however, easy to identify the difference between this constraint and the other constraints introduced earlier. The informational, normativity, misrepresentation, decouplability and combinatorial constraints pertain to the relation between the proposed representation and the worldly items that it is supposed to be about. The explanatory constraint concerns the relation between representation and behaviour. The first five constraints are in the business of explaining the *aboutness* of an item. The explanatory constraint is in the business of specifying the relation between and item and the behaviour it causes. This is, perhaps, some sort of causal relation. But whatever is true of it, it is not a relation of aboutness.

In *Body Language*, I argued that deeds satisfy the naturalistic constraints pertaining to the aboutness of an item. For this reason they qualify as *representational.* They do not satisfy the further explanatory constraint, and for this reason they do not qualify as *representations.* This, then, is the content of the distinction between what is representational and what is a representation. Satisfying the information-

al, normativity, misrepresentation, decouplability and combinatorial conditions qualifies – at least arguably – an item as representational. Satisfying these and, in addition, the explanatory condition, qualifies an item as a representation. Therefore, deeds are representational but not representations.

In this paper, my focus will be on the middle three conditions: normativity, misrepresentation and decouplability, since it is these that are germane to Gallagher's critique. Of these conditions, normativity is basic. As we have seen, if you can satisfy the normativity condition, the misrepresentation condition comes for free. The misrepresentation condition is entailed by the normativity condition. In *Body Language* I also argued that the decouplability condition was derivative upon the misrepresentation condition in the sense that it is simply a misleading way of stating that condition. That is, I argued that all the decouplability we can reasonably require can be found in misrepresentation, if this is properly understood. If this is correct, then satisfying the normativity condition gives you both of the other conditions for free. The argument for this relation between decouplability and misrepresentation is a novel one, may conceivably be mistaken, and it is here, I think, that the argument needs to be attacked.

Instead, however, Gallagher contents himself with attacking the idea that deeds could be decouplable on intuitive grounds. Implicated in this attack is, I think, a mistaken conception of decouplability. He writes:

> *But once we do decouple a pre-intentional act from x (the ball, the piano keys, the painting) I suggest that we are no longer talking about action in the same sense. Indeed, it is difficult to see how pre-intentional acts can be decoupled from x (the ball, the piano keys, the painting) or the context without becoming something entirely different from an element of the action at stake*' (2008: 357).

How 'difficult to see' it is depends on the situation one is trying to imagine. Waving one fingers around in a context where there is no piano is, of course, a very different action – or, as I would prefer to put it, succession of deeds – from that that of playing the piano. But simply hitting the wrong key during the playing of a difficult passage does not make it a different sort of action at all. Similarly, pointing one's fingers up or down in a context where there is no cricket ball hurtling towards you is a very different type of action from that of performing the same movement in the heat of the game. But simply getting it wrong – pointing your fingers up when you should have pointed them down, and so dropping the ball, for example – does not make it a different sort of action. Gallagher seems to be using the first type of scenario for his model of decouplability, whereas I understand decouplability in the second way.

The key to Gallagher's thinking in this regard is perhaps indicated by the sentences that immediately follow the passage quoted above:

> *Off-line cognition, imagining, remembering, or even re-enacting an action decoupled from its original context and absent x may (or may not) require representation – but this says nothing at all about representation in action* (2008: 357).

I certainly agree with the last clause, of course. If we want to think of decouplability as a general condition on representation, then we cannot assimilate all decouplability to a model supplied by off-line reasoning contexts such as planning, imagining, and re-enacting. If one were the sort of person who believed in perceptual representations, for example, and one wanted them to be decouplable (since one regarded this as a general constraint on representation), then we would require a broader notion of decouplability that acknowledges the relevant differences between perceptual and imaginative representation. If you take perceptual representations out of a context where there is something causally producing them, then you are no longer dealing with perception at all. But this makes it mystifying why Gallagher thinks decoupling the action from the ball or the piano makes it an entirely different sort of action. This would be true only if we were thinking of decouplability in terms appropriate to imagination or re-enactment: a waving of fingers in the absence of a piano. But since this cannot be regarded as a general model of decouplability, what reason is there for holding deeds up to this bizarre and unmotivated standard?

In *Body Language* I argued that if we want decouplability to be a general constraint on representation, and thus a feature of all representations, then all we can reasonably expect from it is a way of typing tokens of mental representations independently of the character of their immediate environment. Thus, the immediate environment provides neither a physical nor logical constraint on the occurrence of the relevant representation. It is in this sense that the decouplability constraint, if understood as a general feature of all representations, collapses into the misrepresentation constraint. But on this way of understanding decouplability, deeds are indeed decouplable from their environment.

6. How to (and How Not to) Think About Representation in Cognition

My response to Gallagher, therefore, turned on the distinction between an item qualifying as *representational* (in virtue of satisfying informational, normativity, misrepresentation, decouplable, and combinatorial constraints) and qualifying as *a representation* (in virtue of it satisfying those constraints plus an additional explanatory constraint). I now suspect that, while this is a step in the right direction, it does not go far enough. The idea of a representation can be analysed into distinguishable components that can be expressed as constraints: normativity, informational, misrepresentation, decouplability, combinatorial and explanatory constraints (and perhaps others not identified here). The impetus for *Body Language* was, in effect, provided by the idea that the explanatory constraint can come apart

from the other ones: that an item might satisfy the other constraints but fail to satisfy the explanatory constraint. This, I argued, was true of deeds.

However, once we acknowledge that these components are distinguishable, there is no reason in principle why this situation might not apply more generally. Of course I have argued for a close connection between the middle three conditions – normativity, misrepresentation and decouplability. The first condition subsumes the remaining two. However, there is no reason, in principle, why an item should not satisfy say, the normativity condition and not the informational (in effect, an implication of teleosemantic approaches), or vice versa (in effect, an unfortunate implication of pure informational approaches). There is no reason why an item should not satisfy the misrepresentation condition, but fail to satisfy the combinatorial condition. Once we identify distinguishable components of the concept of representation, it is always an open possibility that an item may satisfy some components but not others.

There is a quintessential philosophical move that occurs when a certain phenomenon – let us call it 'X' – is identified as comprising conceptually distinguishable elements. An item is shown to satisfy some of these elements but not others. Then we are presented with the almost inevitable question: But is it or is it not an example of X? Underlying this question is the philosopher's desire for generality. We want to know not merely whether it satisfies some or other specific constraints, but whether it falls under the more general category X. But this question, I am suggesting, may have no answer – and I suspect that is the case for the category of representation. Does cognition require representation? Well, some items that seem to be involved in cognitive processes may satisfy some of the conditions of representation, others may satisfy others of those constraints. And that is all we can say of the question of whether cognition requires representation.

This paper began with a piece of tactical advice: let us do way with the idea of representation. It ends with an understanding of what this tactical advice amounts to. We can focus on the extent to which an element of a cognitive processes stands in a normative relation to the environment, the extent to which it carries information about the environment, the extent to which it is capable of misrepresenting the environment, is decouplable from the environment, forms part of a larger combinatorial structure, plays a role in explaining (producing, guiding) behaviour. There may well be other constraints to be identified. But what we cannot after we have examined these issues is ask ourselves another question: Is this element of a cognitive process a representation or is it not? To the extent this question means anything at all it is reducible to the questions that we have already and (hopefully) answered.

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Where is my mind?

Mark Rowlands on the vehicles of cognition[47, 48]

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Abstract

Do our minds extend beyond our brains? In a series of publications, Mark Rowlands has argued that the correct answer to this question is an affirmative one. According to Rowlands, certain types of operations on bodily and worldly structures should be considered to be proper and literal parts of our cognitive and mental processes. In this article, I present and critically evaluate Rowlands' position.

Keywords: extended mind; intentionality; ownership; Rowlands Mark; vehicle externalism.

1. Two Types of Externalism

Perhaps the best known variety of externalism is the *semantic* or *content* externalism. This is the type of externalism associated with the works of Putnam (1975) and Burge (1975). It holds that the contents of some mental states of a subject *S* depend for their individuation on factors external to *S*. Assuming that there are mental states that possess their content essentially, then semantic externalism turns out to be a thesis about the *individuation* of those mental states. And although it can also be understood as a thesis about the *constitution* or *location* of mental states (given certain assumptions about the nature of mental content), typically it is not.[49] As a thesis about mental or cognitive *states*, semantic externalism does not commit one to an externalist thesis concerning the nature of mental or cognitive *processes*. That is to say, whereas the contents of certain cognitive states might depend on external factors, the cognitive processes that give rise to those cognitive states can

[47] Please note that sections 4 and 5 of this essay draw heavily upon material found in Elpidorou (2012). And although these two sections ultimately develop, and expand upon, ideas and themes found in Elpidorou (2012), there is still substantial overlap between the two works.

[48] I am grateful to two anonymous reviewers for their helpful comments and suggestions.

[49] For further discussion on this issue, see Rowlands (2006) and Rupert (2004).

still be internal: they can still be located inside the head of the subject (or organism) insofar as they can be identical to, or realized exclusively by, brain processes.[50]

Semantic externalism can be contrasted with a different type of externalism: *vehicle* externalism. Whereas the former is a thesis (primarily, at least) about the individuation of the content of mental states, the latter is a thesis about the constitution and location of the vehicles of those states. Vehicle externalism, I shall assume, is the thesis according to which mental or cognitive processes may extend beyond the brain. That is, vehicle externalism denies that mental or cognitive processes have to be identical to, or exclusively realized by, brain processes. Instead, certain types of operations on bodily and worldly structures can also be proper parts of mental or cognitive processes. (Henceforth, the expression "cognitive process" will be understood broadly, insofar as "cognitive process" and "mental process" are assumed to be co-referential.)

For over a decade, Rowlands has been arguing in support of vehicle externalism. He has maintained that *some* cognitive processes do not merely depend on external processes, but are *constituted* by them. To be clear, Rowlands' claim is not that there are *purely* external cognitive processes; nor does he hold that cognitive processes *must* be externally constituted. For Rowlands, external processes (i.e., the manipulation or transformation of information-bearing items that are located outside the boundaries of the brain) only *partly* and *contingently* constitute cognitive processes.[51] External processes, in other words, can be literal parts of some cognitive processes. In what follows, I present and evaluate Rowlands' externalist account of the mind.

2. The Evolution of Cognition

Why should we accept vehicle externalism? Rowlands argues that there are evolutionary reasons it its favor (1999: 64-99; 2003: 162-9). Suppose that an organism needs to accomplish a task *T* and that the successful completion of *T* increases the probability of survival of the organism or organisms of that lineage. Suppose fur-

[50] Semantic externalism can also be true even if the phenomenal character of experiences is narrowly individuated. In other words, even if the semantics of a phenomenally conscious state is externally individuated, its phenomenality need not be.

[51] A process is *external* if the structures that it manipulates, exploits, or transforms lie outside the boundaries of the brain. Difficulties pertaining to how to precisely circumscribe the brain's boundaries can be sidestepped. There is no need to adjudicate whether glial cells or the spinal cord, for instance, constitute parts of the brain. Rowlands' objective is unaffected by such adjudication. His aim is to show that processes incorporating structures that *clearly* and *unambiguously* lie outside the boundaries of the brain can partly constitute cognitive processes. Regardless of how liberally one might draw the boundaries of the brain, it is unlikely that muscular compositions or artificial tools, for instance, will turn out to be parts of the brain.

ther that there is a "choice" between two evolutionary strategies in accomplishing *T*: a manipulative and a non-manipulative strategy. The former consists in the manipulation and use of certain environmental structures by the organism. The latter does not – or if it does, it does so to a substantially lesser extent than the manipulative strategy. In the scenario according to which the adopted strategy is a non-manipulative one, evolutionary forces result in the development and maintenance of certain features of the organism that permit it to accomplish *T*. Whereas in the non-manipulative scenario the organism does all or most the work in accomplishing *T*, in the manipulative scenario the environment is used in a way as to do some of the work *for* the organism. Here is an example: suppose that *T* is the task of lifting a weight. A manipulative strategy might involve building a lever, the use of which will allow the organism to perform *T*. A non-manipulative strategy will instead consist in the organism growing stronger so as to be able to lift the weight by itself. Rowlands holds that "strategies that involve the manipulation by organisms of structures in their environment typically (but not necessarily, and perhaps not even always) have a more favorable [evolutionary] cost–benefit analysis than strategies which do not" (1999: 74). Manipulative strategies are thus typically more selectively advantageous than non-manipulative ones. Assuming that (i) the reason why cognitive processes have evolved is to accomplish evolutionarily determined tasks and (ii) cognitive processes have followed the most efficient evolutionary route, then evolutionary considerations provide support for vehicle externalism: evolution favors manipulative strategies in accomplishing cognitive tasks and manipulative strategies give rise to (at least some) cognitive processes that extend beyond the boundaries of the organism.

Although suggestive, the argument is not conclusive. First, it is unclear whether assumptions (i) and (ii) should be granted. Rowlands recognizes this difficulty. In response, he treats the argument as a conditional one: *if* we are correct to assume (i) and (ii), then evolutionary theory can be used as support for vehicle externalism. But skepticism about (i) and (ii) notwithstanding, there are additional problems with the argument. Take a concrete example of a cognitive task, one that recurs in Rowlands' works, namely, having to transmit a rather lengthy message to your conspecifics (1999: 126ff; 2010: 37-41). Let us assume that such a cognitive task is evolutionarily determined. The non-manipulative strategy for the accomplishment of that task would consist, presumably, in the development and maintenance of at least two abilities: first, the ability to store in one's own brain a large amount of information; second, the ability to recall and transmit the stored information. The manipulative strategy would take a different path. The organism would develop the capacity to employ certain parts of the environment in order to accomplish the task. In other words, the organism would develop the capacity to offload part of the task onto external structures by developing and employing a system of "language." External structures will be used in a manner analogous to the way that we use notepads. Once the organism acquires the capacity to store

information in external structures and the capacity to read the information from such structures, there is no need for the organism to remember the whole message.

Which of the two strategies is more evolutionary advantageous? Rowlands' suggestion is that the manipulative strategy is more evolutionarily advantageous (1999: 143; cf. 2010: 41). The non-manipulative strategy would require the development of a memory capable of storing a great amount of information. According to Rowlands, such a development would be, in evolutionary terms, rather costly. As he writes, "an expansion of biological memory capacities would eventually be stymied by considerations of evolutionary cost, energy requirements, etc" (1999: 143). The manipulative strategy would also result in an increased memory capacity. This increase, however, would not be due to the development of an advanced biological memory capacity. Instead, it will be the product of "the development [and use] of external representational systems" (144). The latter way of increasing the memory capacity of an organism is, according to Rowlands, more "economic" (144). Biological capacities are evolutionarily costly. Hence, manipulative strategies, which eschew the expansion of biological capacities, make evolutionary sense.

But consider what is required in performing the task at hand if the manipulative strategy is adopted. The organism must have developed (a) the capacity to code information in external structures and (b) the capacity to extract this information from external structures (i.e., the capacity to perform certain computations that allow it to read the stored information). Capacities (a) and (b) are fairly advanced and only organisms with a certain type of brain are capable of performing them. Indeed, one might argue that *more* biological resources – more neural structures – are needed in order to develop and perform (a) and (b) than to simply store and recall a lengthy message (see Jacob 2002). If that is so, then given Rowlands' own assessment of the evolutionary costs of biological capacities, it would be the manipulative strategy that turns out to be more costly. Suppose that an organism can be thought, for present purposes, to be analogous to a computer. Whereas the non-manipulative strategy would result in a computer with greater storing capacity, the manipulative strategy would give rise to a computer with much less storing capacity but with a better processor. Judging by today's price, it would be cheaper to upgrade memory than processing power.

I do not mean for this objection to be a devastating blow to the evolutionary argument. There are ways around of it. First, Rowlands could insist that there are benefits associated with the manipulative strategy – benefits which I failed to mention – that end up making it more evolutionary advantageous. Second, Rowlands does not hold that *every* single cognitive process has to be extended, nor does he insist that manipulative strategies are always more evolutionarily advantageous that non-manipulative ones. Consequently, he could allow that natural selection did not favor the development of extended remembering and still maintain that evolution has favored (or more strongly: resulted in) the development of other extended cognitive processes. Still, neither of these two responses undermines the main

claim that the objection makes, namely, that the task of determining which strategy is more evolutionarily advantageous is not a trivial one. Evolutionary considerations should thus be used with caution.

The evolutionary argument faces an additional, more serious problem. Suppose that we grant Rowlands that evolutionary considerations favor the development of cognitive processes that include the manipulation of environmental structures. Does that show that evolution has given rise to *extended* cognitive processes? Recall that vehicle externalism is not the thesis according to which cognitive processes involve or even depend upon the use or manipulation of environmental structures. Rather, vehicle externalism holds that cognitive processes are *constituted* by the use of such structures. What Rowlands thus needs is an argument that shows the following: manipulated external structures become proper parts of a cognitive process because the evolutionary costs associated with a strategy accomplishing a cognitive task are reduced by the involvement and manipulation of external structures. But no such argument has been provided. Return to the example of lifting a weight. The fact that the manipulative strategy of lifting the weight is evolutionarily more advantageous than the non-manipulative strategy does not show that the lever should be considered to be a literal part of me. Similarly, why should the use of external structures – even if they make evolutionary sense and have been the products of natural selection – turn them into proper parts of cognitive processes? (see also Adams and Aizawa 2010: 147-50; Rupert 2010: 149-53).

3. Information Processing and Cognition

The success of the evolutionary argument does not determine the success of Rowlands' position. Indeed, in *The Body in Mind*, Rowlands advances a different type of argument in support of vehicle externalism. His argument unfolds in two broad steps. First, he provides a characterization of *cognitive process* in terms of a cognitive task. Specifically, he holds that "[a] process *P* is a cognitive process if and only if (i) *P* is essential to the accomplishing of a cognitive task *T*, and (ii) involves operations on information-bearing structures, where the information carried by such structures is relevant to task *T*" (1999: 102-3).[52] Second, Rowlands argues that if we understand cognitive process in this manner, then many cognitive processes will turn out to be extended. Take, for instance, visual perception and, specifically, Gibson's ecological account. The optic array is an external information-bearing structure. Its structure nomically co-varies with features in the environment. As such, it carries information about the environment of the organism. The organism can manipulate the optic array by performing certain actions, such as moving in space or turning its head. In doing so, the organism makes information available to it –

[52] Similar definitions of *cognitive process* are also found in Rowlands (2003) and (2006). Here, I put aside the biconditional formulation of Rowlands' characterization of cognitive process and focus instead on the sufficient conditions that he provides.

information that was not available prior to the manipulation of the optic array. The act of making information available is a form of information processing. But since the information that is made available to the organism by manipulating the optic array is essential for accomplishing a perceptual or cognitive task – for instance, in determining the size of an object – we should conclude that the manipulation of the optic array is a cognitive process (see 100-118). Thus, even if visual perception does require internal information-processing operations, the vehicles of perception are not purely internal. Operations on structures in the environment (in this case, the optic array) are also constituents of cognitive or perceptual processes. The lesson that Rowlands invites us to draw is this: once we permit that "the information processing that a perceiving organism achieves extends, in part, outside its skin, then it seems, we have little reason for denying that its cognitive processes extend in the same way" (39).

Rowlands' argument is, however, open to criticism. Specifically, one might argue that it relies on a characterization of cognitive process that is too permissive. If we accept Rowlands' characterization, then too many things turn out to be cognitive. But it is not clear, to say the least, that those things should be counted as such. Suppose that I am using an abacus in order to perform an arithmetical operation. The abacus is an information-bearing structure and thus my use of it is a manipulation of an external information-bearing structure that makes information available to me. Since, however, the use of the abacus is essential in the performance of a cognitive task – say, the addition of two numbers – then, assuming Rowland's characterization of cognitive process, we should conclude that my manipulation of the abacus is a literal part of cognition. If one has doubts whether the use of an abacus meets the conditions that Rowlands provides, one can always run the example with a laptop, calculator, or microscope instead.

Assuming Rowlands' characterization of a cognitive process, the use of an abacus or calculator should be taken to be a literal part of cognition. But this result turns out to be problematic for Rowlands' account: it renders his account too liberal. In line with Rowlands (2010: 86), I shall call the objection according to which vehicle externalism is based on a characterization of cognition that is too (i.e., problematically) liberal the "cognitive bloat objection." Ultimately, the objection holds that the conditions that Rowlands specifies as sufficient conditions for a process *P* to count as cognitive are not sufficient after all. By failing to specify sufficient conditions, Rowlands' position mistakenly treats causal accompaniments of cognition as constituents of cognition. If Rowlands' characterization of cognition is accepted, then simply too many items become cognitive. A more stringent account of cognition or cognitive process is needed.

Note that even if Rowlands were to insist that, despite appearances, his conditions are indeed sufficient for rendering a process cognitive, he would still need to provide reasons in support of this contention. That is especially so given that there is a competing view to Rowlands' extended view which (a) maintains that "typical cognitive processes depend, in surprising and complex ways on the organism's use of

resources . . . but cognition does not literally extend into the environment" (Rupert 2010: 5); (b) accommodates the empirical findings that Rowlands cites; (c) accounts for the successes of cognitive psychology; and (d) unlike Rowlands' account, neither postulates new entities as cognitive nor counts as cognitive what, *prima facie*, seems to be non-cognitive. Hence, unless there are substantial reasons that favor Rowlands' extended view, one could argue that there is little or no motivation to choose his account over the more conservative alternative one. (For an elaboration of this argument, see Rupert 2010.)

4. A Revised Account of Cognition: The Problem of Ownership

In defending vehicle externalism, Rowlands is faced with a choice. He can either provide a more stringent characterization of cognition in the hope of avoiding the cognitive bloat objection, or embrace the conclusion of the cognitive bloat objection but demonstrate that there are benefits in adopting a liberal characterization of cognition. In *The New Science of the Mind*, Rowlands takes the former option and advances an updated and more stringent mark of the cognitive. According to Rowlands' most recent position, a process *P* is a *cognitive* process if it satisfies the following conditions:

1. *P* involves *information processing* – the manipulation and transformation of information-bearing structures.

2. This information processing has the *proper function of making available* either to the subject or to subsequent processing operations information that was, prior to this processing, unavailable.

3. This information is made available by way of the production, in the subject of *P*, of a *representational* state.

4. *P* is a process that *belongs* to the *subject* of that *representational state* (2010: 110-1).

It is important to note that conditions (1) – (3) are still too permissive. For example, the processes inside my computer involve the manipulation and transformation of information-bearing structures, and such information processing not only has the proper function of making available in me information that was previously unavailable, it actually makes available this information in me by way of the production of a representational state. The same goes for processes that are located inside a network of computers far away from me but which I can access remotely through my smartphone. If conditions (1) – (3) were sufficient, then the processes

of the remotely accessed computers (or at least, the processes that constitute the smartphone and remotely accessed computers system) would count as cognitive. But such a result would again give rise to the problem of cognitive bloat.[53]

In order for Rowlands' updated mark of the cognitive to avoid counting as cognitive processes that should not be counted as such, or at least processes for which we have no good reasons to count as cognitive, he needs more than just conditions (1) – (3). For Rowlands, it is condition (4) (in conjunction, of course, with [1] – [3]) that can adequately and accurately demarcate cognitive from non-cognitive processes. If conditions (1) – (4) constituted, as Rowlands holds that they do, an "adequate and properly motivated mark of the cognition," then any process that meets conditions (1) – (4) would be correctly counted as cognitive: it would be constitutive and not a mere causal accompaniment of cognition (95). Rowlands' criterion of cognition, if adequate, would then restrict the bounds of cognition so that processes inside computers, calculators, or microscopes would not turn out to be cognitive (in a sense that I explain below). Nonetheless, it would not restrict the bounds too much so as to exclude the use of extended processes from being cognitive.

But how should we understand condition (4)? That is, what does it mean for a subject to *own* a process that meets conditions (1) – (3)? Given the distinction between personal-level processes and subpersonal-level processes, the question or problem of ownership of cognitive processes arises for both types of processes. Regarding subpersonal-level processes, Rowlands suggests that their ownership should be understood in terms of the idea of integration. Specifically, a subpersonal-level process P_{sub} belongs to a subject only if P_{sub} is "appropriately integrated into the subject" and P_{sub} is appropriately integrated only if "it makes some contribution to the personal-level cognitive life of the subject" (151; 147). The proposed understanding of the ownership of subpersonal-level processes requires, however, that we already have an account of ownership for personal-level processes. After all, to evaluate whether a subpersonal-level process makes a contribution to the personal-level cognitive life of a subject, one must already be in position to make sense of the idea that the subject has or owns a cognitive life.

The problem of ownership for subpersonal-level processes thus leads to the problem of ownership for personal-level processes. Rowlands' solution to the latter problem unfolds in three steps. First, he invites us to think of personal-level processes as *activities* that can be subsumed under a "general activity-type" (152).

[53] Of course, a proponent of vehicle externalism could insist that those processes should be counted as cognitive. As mentioned before, the problem with such a liberal account of cognition is that it needs to be accompanied with a story as to why we should switch from an understanding of cognition that does not count processes inside computers as cognitive to a more liberal one that does. Does the liberal account of cognition accommodate empirical data better than the more conservative account? Or is such a liberal account in agreement with the mandates and practice of cognitive science? Without answers to those questions it is hard to see what the benefits of changing our understanding of cognition might be.

Second, he suggests that we can provide a preliminary solution to the problem of ownership by determining the way in which we can own this general activity-type (151ff.). Finally, he argues that we own this general activity-type when we have *epistemic authority* over it. As a result, a subject owns a personal-level process when the subject has epistemic authority over that process.

It is important to emphasize that this is only Rowlands' preliminary solution to the problem of ownership. As he insists, the idea of epistemic authority is merely symptomatic of a more fundamental feature of cognition – and it is to that feature that we need to turn in order to solve the ownership problem (156ff.; 163-5). Having said that, epistemic authority is still assumed by Rowlands to be "a reasonably reliable accompaniment of personal-level processes that we own" (157). Furthermore, even if the idea of epistemic authority does not provide the final answer to the problem ownership, Rowlands still holds that the idea of epistemic authority suffices to provide a solution to the cognitive bloat objection.

Indeed, assuming that the notion of epistemic authority is a reliable guide to ownership of personal-level processes, Rowlands can deny that processes occurring inside computers or microscopes are *personal*-level cognitive processes. Condition (4) is not met, for we do not have epistemic authority over such processes (155). Nonetheless, the very same processes can turn out to be *subpersonal*-level cognitive process, if a subject subpersonally owns them. All that is required is for those processes to be "appropriately integrated into the subject's (personal-level) psychological life" (155). In effect, Rowlands responds to the cognitive bloat objection by treating it as two separate objections: one applying to subpersonal-level processes and one applying to personal-level processes. In regards to subpersonal-level processes, Rowlands admits that there is cognitive bloat, but such bloat turns out to be innocuous. Processes inside computers, telescopes or smartphones can be subpersonally cognitive, if they are properly integrated into the psychological life of a subject. Yet, their cognitive status should be understood as being "on a par with, for example, the operations that transform the raw primal sketch into the full primal sketch" (155). To admit cognitive bloat of this sort does not amount to saying that "the processes occurring inside telescope, calculator, or computer are cognitive processes on a par with perceiving, remembering, reasoning, and thinking" (155). That would be true only if there was cognitive bloat on the personal-level. But since ownership of personal-level processes is more demanding than ownership of subpersonal-level processes, personal-level cognitive bloat is avoided. Perceiving, remembering, reasoning, and thinking do not occur inside telescopes, calculators, or computers.

A complete evaluation of Rowlands' solution to the problem of cognitive bloat will have to wait until the next section. However, enough has been said to allow me to voice two concerns regarding Rowlands' solution. First, I am not convinced that the idea of epistemic authority does the work that Rowlands wants it to do, i.e.,

that it either reliably picks out personal-level cognitive processes or that it is a reliable accompaniment of such processes. This problem with the idea of epistemic authority, I wish to argue, has consequences for Rowlands' solution to the cognitive bloat problem. Let me explain. Rowlands explicates the notion of epistemic authority with the use of the following example (152-4). Consider the activity of building a home and specifically that of laying bricks. According to Rowlands, one has epistemic authority over the activity of laying bricks when one is "acquainted with the bricks in all relevant and necessary ways" and when one can discern "the characteristics of good mortar" (153). Suppose that when it comes to laying bricks or building a house epistemic authority is indeed a "tolerably reliable indicator" of the ownership of such activities (155). We still need to examine whether epistemic authority over personal-level *cognitive* processes is a reliable indicator of ownership of such processes.

Consider thinking. In the case of bricks or mortar, epistemic authority amounts to knowledge about characteristics of bricks and mortar. But in the case of reasoning, knowing whether a reasoning pattern is valid or invalid, for instance, does not make that pattern of reasoning mine. Furthermore, I can own a thinking process, i.e., I can be its author, even if I do not know whether such a process embodies a reasoning pattern that is valid or invalid. Or consider remembering. What is the epistemic authority that I have over such personal-level cognitive process? Is it knowledge of certain characteristics of the products of such process, i.e. memories? It does not seem likely. Knowledge of memories does not seem to be sufficient in order to render such memories mine. Arguably, I can know plenty about the memories of someone else. Perhaps, epistemic authority over remembering amounts to a more specific kind of knowing: either knowing *how* to recreate imaginatively (aspects of) memories or knowledge *that* memories have a specific phenomenal character when recalled. This proposal fares better, but still it does not seem quite right. The former suggestion appears to be incongruous with what the laying-bricks example suggests epistemic authority to be. In what sense is the ability to recreate in imagination (aspects of) my memories something that deserves the label *epistemic*? In the laying-brick example, epistemic authority amounts to knowledge *that* the bricks have certain characteristics, not to the ability of laying bricks in a certain way. If we take the latter suggestion, then it is worth asking whether it is (logically) possible that a subject *A* might imaginatively recreate (aspects of) memories of a different subject, say, *B*. In other words, is it possible for two subjects to undergo two phenomenally identical experiences? It certainly seems so and if such a case were to take place, we would not claim, I take it, that *A* owns *B*'s process of remembering. I should point out that Rowlands does not hold that having epistemic authority over a process is a sufficient condition for owning that process. Thus, he could allow for the possibility of a subject who has epistemic authority over remembering – insofar as the subject has the ability to imaginatively recreate memories – but who does not own that process of remembering. But even if Rowlands can circumvent this (logical) issue, there is an additional issue that needs to be addressed: if we agree that epistemic authority over

the process of remembering is to be understood in terms of the ability to imaginatively recreate (aspects of) memories, then we need to investigate the extent to which subjects are capable of performing such a task. If it turns out that subjects are typically bad at performing such a task, then it will also turn out that epistemic authority is neither a reliable indicator nor an accompaniment of ownership.[54]

Perhaps a more fruitful way of understanding epistemic authority might be to look at cases in which one lacks epistemic authority. I could only find one instance in which Rowlands is explicit about what a lack of epistemic authority over a process amounts to. He writes: "I am not author of, but hostage to, the processes that, for example, transform the raw primal sketch into the full primal sketch" (155). But even this understanding of epistemic authority needs further refinement. In what sense am I the author of the (personal-level) process of perceiving? Or am I not, at least often, hostage to certain thoughts, emotions, and even decision-making processes? (See, for instance, Miller 1962; Neisser 1967; Latané and Darley 1970; Isen and Levin 1972; Carver et al. 1983; Bargh et al. 1996; Bargh and Ferguson 2000; Fazio 2001; Keizer et al. 2008; and Bargh and Morsella 2009.) Would we, then, discount those thoughts, emotions, and decision-making processes as personal? I think not.

The above considerations can be summarized in the form of a dilemma: either there is a correlation between epistemic authority over a personal-level cognitive processes and ownership of such a process, or there is not. If the former, then certain paradigmatic cognitive processes such as remembering or thinking would no longer be taken to be personal-level cognitive processes. Such a result, however, undermines the value of the notion of epistemic authority. If the latter, then the fact that we lack epistemic authority over processes inside computers or telescopes should not lead us to conclude that such processes are not personal-level cognitive processes. As a consequence, Rowlands' position remains vulnerable to the cognitive bloat objection.

There is potentially an additional problem with Rowlands' proposed solution to the problem of cognitive bloat and specifically with his claim that processes inside computers or telescopes could count as cognitive. Recall that for Rowlands a subpersonal-level process is appropriately integrated only if "it makes some contribution to the personal-level cognitive life of the subject" (147). I think that Rowlands is correct to hold that some kind of integration (i.e., contribution to the personal-level cognitive life of the subject) is sufficient for rendering a subpersonal-level process cognitive. Still, it is important not to lose sight of the fact that integration

[54] One might suggest that epistemic authority over the processes of remembering or thinking amounts to knowledge that either the processes themselves, or the products of such processes, are mine. But this does not help. Epistemic authority over a process P_{per} cannot just be knowledge of the fact that P_{per} belongs to me, nor can it be knowledge of the fact that the products of P_{per} belong to me. The claim that a process P_{per} (or a product of P_{per}) is mine if I know that P_{per} (or a product of P_{per}) is mine, does not solve the problem of ownership. It only postpones it.

comes in degrees. That is to say, although some kind of integration might be sufficient for rendering a process subpersonally cognitive, another kind of integration might not.

Recently there has been great success in the implementation and use of neural interface systems for restoring mobility for people with long-standing paralysis (see, e.g., Donoghue 2008; Gilja et al. 2011; Scwartz et al. 2006; and Green & Kalaska 2011). After having been implanted with a device that could record and transmit neural firing patterns, subjects were able to perform certain types of movements. In a remarkable case, a subject suffering from a long-standing tetraplegia was able to move and control a robotic arm just by willing to move the robotic arm (Hochberg et al. 2012). In this case, it seems that the processes of the device that records and transmits the relevant neural firing patterns should be counted as cognitive and that is precisely for the reasons that Rowlands advances: the processes are appropriately integrated in the cognitive life of the subject for they allow the subject to perform certain movements or tasks.

Now, contrast the provided example with Rowlands' example of processes located inside computers or telescopes. What I would like to suggest is that in the case of neural interface systems, the implanted device that facilitates the movement of a robotic arm is integrated in the cognitive life of the organism to a greater extent than processes located inside telescopes or computers – but not because one is located intracranially whereas the other is not. The implanted device needs to be calibrated to the subject. That is, there is a necessary and often long training phase during which the device records the neural firing patterns of the subject in order to be able to translate them into control signals. The implanted device is hence subject-specific. And by being subject-specific, the device can be said, in a rather meaningful sense, to belong to the subject. There does not seem to be an equivalent training phase for computers or telescopes -- there might a phase during which one learns how to use a computer or a telescope, but not a phase during which the computer or telescope becomes calibrated to the subject. That is corroborated by the fact that different computers or different telescopes can be treated, for certain purposes, as interchangeable. I can check my email, for example, on all sorts of computers, but I cannot use all kinds of neural interface systems (cf. Sterelny 2010: 475-477).

My point here is not that Rowlands is mistaken in thinking that processes inside computers could turn out to be cognitive if certain conditions are met. Rather, what I wish to point out is that the conditions for ownership of subpersonal-level cognitive processes demand better articulation. Given that there can be substantial differences in the way in which two processes can be integrated in the psychological life of a subject, the concept of *integration* needs to be further delineated. Specifically, how much integration is enough integration to make a process subpersonally cognitive? The absence of such an articulation may invite proponents of vehicle externalism to deny the cognitive status of processes inside computers or telescopes. In fact, they might hold that such processes are integrated but not

enough. That is to say, they are not integrated to the extent to which implanted neural interface devices are integrated in the psychological life of the subject. Consequently, they should not be counted as cognitive

5. Intentionality as Revealing Activity

The notion of epistemic authority is used by Rowlands only to provide a preliminary solution to the problem of ownership when it comes to personal-level process. As Rowlands makes clear, epistemic authority is not a criterion for personal-level ownership. And although it is a "reasonably reliable accompaniment of personal-level processes that we own," epistemic authority is symptomatic of something more basic or fundamental (2010: 157). Indeed, the core of idea of ownership is to be found in the idea of revelation or disclosure:

> *The idea of revelation or disclosure supplies the ultimate basis for our ownership of cognitive processes. There is no such thing as revelation or disclosure in itself. Disclosure is always disclosure to someone or some thing. Personal-level disclosure is disclosure to someone; subpersonal disclosure is disclosure to something* (163).

Furthermore, cognition, Rowlands tells us, is a revealing or a disclosing activity because it is intentional. Hence, in order to fully understand and solve the problem of ownership, we need to understand intentionality. In fact, the task of delineating the nature of intentionality carries for Rowlands a double significance. First, it should provide us with an understanding of ownership more fundamental than that provided by the idea of epistemic authority. Second, it should demonstrate the truth of vehicle externalism. As Rowlands writes, "the ideas that cognitive processes should be embodied and extended are utterly quotidian – practically banal implications of a proper understanding of intentionality" (164).

What is thus the proper understanding of intentionality? It is helpful to first consider the nature of our experiences. According to Rowlands, experiences "are not just items *of* which we are aware;" they are also "items *in virtue* of which we are aware, both of non-mental objects and their properties and also of other experiences" (169). Experiences, in other words, "are not just object of awareness, but also *acts*" (169). But insofar as experiences are also items in virtue of which we are aware of something, then there will always be something of which we are not aware – something that cannot be turned into an object *of* experience. (Indeed, even if we were to turn the items in virtue of which we are aware of something into an object *of* awareness – that is, even if we were to turn the act of experience into an object of experience –the very attempt to do so would require a new act.)

Rowlands argues that a similar conclusion applies to the idea of mode of presentation – as this is found in the standard account of intentionality according to which intentionality has a threefold structure: act, object, and mode of presentation. Rowlands' view is that a mode of presentation can be understood both as that of which we are aware and as that in virtue of which we are aware (183ff.). Of these two ways of understanding a mode of presentation, it is the latter that captures the essence of intentionality: intentionality is best understood as that in virtue of which we are made aware of objects or as a type of revelation or disclosure. Insofar as experiences and cognition are intentional, they are types of revelation or disclosure; but insofar as "disclosing is, in general, indifferent to its location," cognitive and perceptual processes are extended (187).

What are the consequences of Rowlands' argument, assuming it to be sound? That is, suppose that we grant that (a) the transcendental conditions of cognition are not items of which we are aware, (b) these conditions constitute a form of disclosing or revealing, and (c) theoretically and abstractly speaking, disclosing is location-independent insofar as its vehicles are location-independent. Having assumed all of that, have we shown that cognition extends? Yes, but in a sense which will be granted by a good deal of opponents of vehicle externalism. That is because what we have shown is the *possibility* of extended cognition. Nonetheless, the debate surrounding vehicle externalism is primarily a debate about whether cognition is *actually* extended or embodied. After all, if what we were after were the conclusion that it is possible that cognition is extended, then the truth of the thesis of functionalism would have sufficed in establishing such a conclusion. Hence, what Rowlands needs to demonstrate is that some of the aspects of intentionality in virtue of which things are disclosed to us are located (at least, partly) outside the boundaries of the brain. Or since the kind of disclosure relevant to the vehicles of cognition is causal and not constitutive (191-196), Rowlands needs to show that the "causal disclosure of the world does not take place purely inside the head of a subject" (195).

Rowlands does provide examples of what he takes to be extended vehicles of cognition: the cane of a blind person (196-198), saccadic eye movements (202-203), the activities involved in the identification of sensorimotor contingencies (204-205), and the manipulation of the optic array (205-206). According to Rowlands, these examples count as extended vehicles of cognition because they are external and causally disclose the world to the subject. But just as with the notion of integration, I suspect that skeptics of vehicle externalism will find the notion of causal disclosure to be in need of further articulation. It seems unlikely that every entity that causally contributes to the disclosure of a personal-level state is an entity *in virtue of which* things are disclosed to us. If causal disclosure is understood so broadly, then, arguably, the sun would have to be considered as a vehicle of cognition. Rowlands, I think, needs to restrict causal disclosure to entities that meet certain conditions. This requirement, however, ultimately takes us back to the search for an adequate mark of the cognitive. But the crucial condition of Rowlands' own mark

of the cognitive, i.e., condition (4), does not seem to be of help: either ownership is understood derivatively in terms of epistemic authority, or it is understood as a feature of disclosure (214-217). If the former, then, as I suggested in the previous section, it is unclear to what the relationship between epistemic authority and ownership amounts. If the latter, then the notion of ownership is unhelpful in demarcating the relevant causal contributions from the irrelevant, for ownership is itself given in terms of causal disclosure. As Rowlands himself states, "[a]t the personal level, a cognitive process is mine when it causally discloses the world to me" (216). The notion of ownership, if understood in terms of causal disclosure, cannot be used to explicate causal disclosure. Thus, neither solution to the problem of ownership seems to yield a criterion of cognition which is accurate, properly motivated, and that shows that cognitive processes are extended. To be more precise, neither solution to the problem of ownership as presented in Rowlands (2010) secures vehicle externalism. Of course, that is not to say that a future articulation of ownership will not succeed in establishing Rowlands' desired conclusion. Given the writings of Rowlands so far, one can expect that such an attempt to vindicate vehicle externalism is forthcoming.

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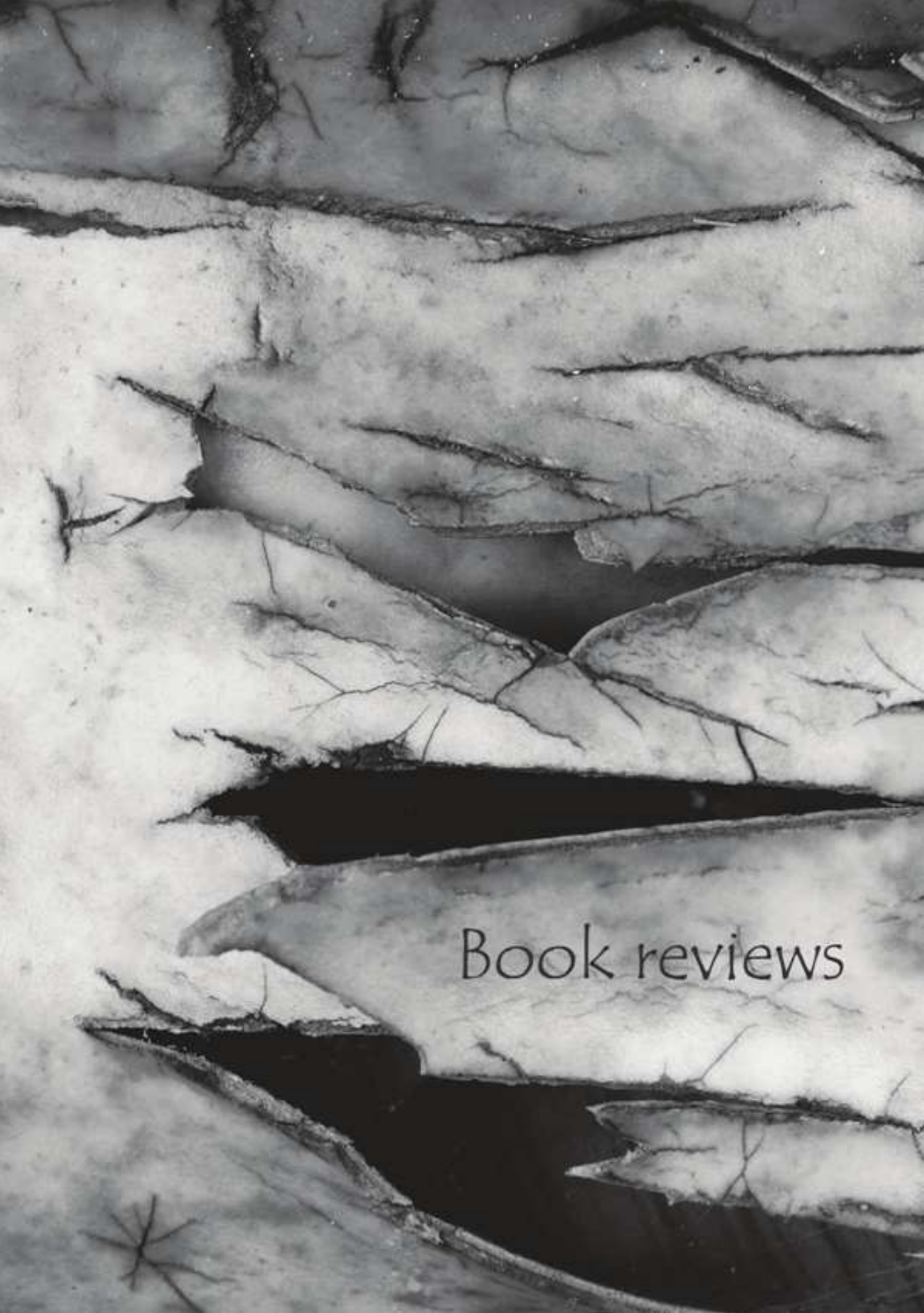

Book reviews

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Varieties of Presence
A book review

Author: Alva Noë

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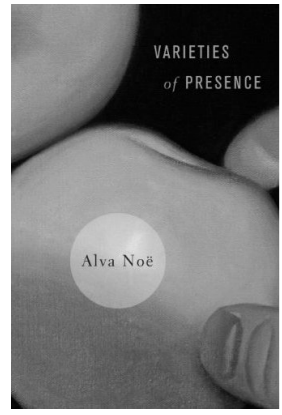
Release date: 2012
Number of pages: 188



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There's a lot to like about this book. We'll have something to say about what we like about it and what we do not like about it soon enough. For now, let's take a look at the cover and at how handsomely the volume is presented by its publisher. The ochre tones and sensuous forms of the fruit and fingers on the cover come courtesy of a painting by Alexi Worth, and the indigo used for the title, the end flaps and the Harvard University Press seal complement the art beautifully. This is not incidental for a text that claims to have been informed by art and for a philosophical practice that aspires to the practices of art.

Appropriately, there is more to this cover than at first appears, because for Alva Noë things do not appear. They show up for us. The "varieties of presence" named in the title refer to the different and diverse ways things show up for us based on the skills we have at our disposal for perceiving or, rather, Noë would say, achieving what we might otherwise suppose appears. We can make an example of the cover art to illustrate this point.

As it turns out, the image on the cover follows a motif used in other paintings by Worth where, by cropping and foreshortening, an object is represented as held up for our inspection. Framing this object by fingers, the image nicely imbricates seeing and touching, a theme that is important for Noë's account. Ideally, the fruit in the cover image for a book by Alva Noë would show up for us as tomatoes. Here, they show up as apples, and they show up as such from what we have read in reviews of Worth's work and from what is left of the blossom that became one of these fruit and shows up as a star on the book's spine. Seeing the fruit as apples,

the fingers can take on a sexual connotation (as they have in a review of Worth's painting by Ken Johnson, "Art in Review: Alexi Worth," *New York Times*, 2 January 2009). What we notice in the cover image is that the fingers are represented as using two apples to prop up a third.

A very similar design shows up in Worth's *Pyramid* (2008). In fact, the image on the cover of Noë's book is taken from a painting, cropped and reduced, oil on canvas, titled *Pyramid (Yellow)* also from 2008. And while in the one painting we have five apples and a sight through the pyramid they form of a man wearing a grocer's white apron using his hands to arrange the apples, in our image we have the fingers from two right hands with no sign of the man or woman whose hands are making this arrangement. The fingers show up as belonging to two right hands by our making out the proximity of the knuckle and nail of what we would call a thumb in the image on the front of the cover and the curve of the fingers in the image on the back. This puzzle is clearer in the uncropped original of *Pyramid (Yellow)*.

Now, Noë likes puzzles and likes to think he's solved several puzzles about perception and thought in his book. Worth likes to paint puzzles that don't admit of easy solutions. Like many of Worth's images, the puzzle in *Pyramid (Yellow)* stages a dialog with photography. With the flatness of the image and the sharp contrasting areas of light and dark Worth arguably pictures the effect of a photographic flash on its subject. With the isolated detail presented as cropped we may say he presents the image as the result of a photographic enlargement. In remarks about his work Worth has commented about the ubiquity of photography in our world. As we have no doubt noticed ourselves, virtually everyone who carries a phone carries a camera. And while the history of art teaches that photography eclipsed the purpose of painting by giving us the faithful double of the world painting aspired to achieve, the ubiquity of photography ironically returns painting to that aim; photographs have become a part of the world that art aims to double, and it is not entirely clear that photography has any privileged access to a world that includes photographs. This leaves an artist like Worth to paint the world as it shows up, in a photograph, to someone with a specific skill set. Worth paints what a painter sees in a photograph – the specific ways a photograph represents and, *a fortiori*, distorts its subject – and in this way makes the world show up for us in ways it would not otherwise.

Our aim is not to judge Noë's book by its cover but to point out that the cover image will show up or become present to a variety of readers in a variety of ways based on their capacity to see it or make it present in one way or another. This, at least potentially, makes the art especially appropriate for the book it covers. In his introduction, subtitled "Free Presence," Noë uses the example of a work of art that may have left you flat coming alive or coming present to you because of something you overhear from another patron in the gallery. Noë's point is that the work of art

in this example does not become present to you for free or without effort but only with the application of your recently heightened understanding of it. You have to work to achieve the art in this painting as we have worked to achieve a meaning for the art on the cover of Noë's book.

So, now, what about the meaning on the pages printed between these covers? Well, it comes down to this. "The world shows up for us," Noë writes, "thanks to our mastery and exercise of skills of access. We achieve the world," he continues, "by enacting ourselves. Insofar as we achieve access to the world, we also achieve access to ourselves" (12-13). What does this mean? It means that the world that shows up is present to us. And the presence of that world is an achievement of a "form of practical knowledge that is independent of language-use and that is shared by humans and nonhumans alike" (24). It means that the world that shows up for us is the world we understand. And without this distinctly sensorimotor understanding, "there is no access" to the world "and so no perception" (20). Further, since thought is largely, and exclusively when it is directed to an object, extended perception (28), thought, as perception, is an achievement of this understanding. Exercising and mastering skills of access, we enact ourselves. And in enacting ourselves, we achieve a world. It is, however, only for the sake of achieving a world that we enact ourselves. In giving a general theory of access, Noë gives an account of how we become what we are in a world that shows up for us and those like us.

For those wedded to a representational or causal model of thought and perception, this account will not be persuasive, and nothing Noë says or I can add by way of summary and exposition will likely change their minds. Apart from their deep-seated convictions and commitments to shared evidence and the findings of neuroscience, they will want to know something about this understanding which is a precondition for thought and perception. They will want to know more about the sensorimotor character of this understanding, about what it means to say the world shows up "not to our eyes, or brain, but to us" (32). The brain, they might well suppose, has a fundamental structure shared by all sentient beings, and this is the basis for the world appearing the same to all those beings. If an objects shows up to us but not our brains, how does the language independent, practical knowledge we variously enact lead to a shared world? Won't the world that shows up for me and my skills of access be different from the world that shows up for you?

Those trained in a continental philosophical tradition, on the other hand, will appreciate Noë for making a case for a view close to their hearts in an idiom that will not be dismissed as obscure by those once called analysts. Readers versed in the writings of Edmund Husserl and in the important revisions of Husserl's phenomenology by Maurice Merleau-Ponty will be quite comfortable with the idea that things show up for us and not our brain. They will also readily accept that changes in my physical relation to an object changes the way that object shows up for me.

They may be confused, though, when a discussion of thought as a kind of extended perception is presented as a new idea or when the idea of styles of thought and perception is presented without a citation to Merleau-Ponty who introduced the idea so many years ago.[1]

In a short section of text (52-55), Noë addresses what he calls "Merleau-Pontyan contextualism," a concept he wrangles from Sean Kelly's interpretation of Merleau-Ponty's philosophy.[2] Noë's discussion, in a chapter titled "Real Presence," occurs in the context of an attempt to rectify the claims of perceptual constancy and perceptual nonconstancy. "A satisfying account of perception," Noë tells us, "must explain how the silver dollar can look both circular and elliptical, how the tomatoes can look to be the same in size and yet different in size" (47). Noë rejects what he takes to be Kelly's suggestion that context plays a normative role in seeing the coin as constantly circular in the face of its nonconstant varieties of elliptical presentation, because, he says, perception does not vary with the purposes it is put to; perception does not, that is, see the coin relative to some optimal presentation of it. Noë also balks at the idea that we can be aware of the context in the course of perception and, so, judge one way of seeing the coin as not optimal because in a different context we would see more of it than we do now.

Kelly's point, however, following Merleau-Ponty, is that context is a positively indeterminate presence in perception. It is not what has not yet been determined, a view of the back of the tomato we do not see but might, which is a part of the context for seeing the tomato from one side only as a three dimensional object. For Merleau-Ponty, as Kelly tells us, a sight of the back of the tomato is a positively indeterminate presence in our perception of the tomato from one side only as a fully fleshed out piece of fruit. This would appear to be a variety of presence Noë would want to embrace, and he comes close in declaring that the Merleau-Pontyan contextualism he is considering "seems to collapse into something like the view" he is advocating (54). Yet, Noë falls back to a position we might more readily identify with Husserl when he declares that we encounter the roundness of the coin in encountering its elliptical presentation because of a "practical appreciation" that the apparent shape "depends on my spatial relation to the coin and would, therefore, be modified by movements" (54). Noë may be right to say that the perceptions of the coin as elliptical (the way an artist wanting to represent the coin would see it) and as circular are not incommensurate even if we cannot see the coin as elliptical and circular at the same time. It may not be right, however, that one cannot attend to the color and shape of an object at the same time; this would seem to be something artists do as a matter of course.

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[1] See Maurice Merleau-Ponty "Indirect Language and the Voices of Silence," in *Signs*, trans. Richard C. McCleary (Evanston: Northwestern University Press, 1964), 39-84; "Eye and Mind," in *The Primacy of Perception*, trans. Colin Smith (Evanston: Northwestern University Press, 1964), xx-yy; and *The Prose of the World*, trans. John O'Neill (Evanston: Northwestern University Press, 1969).

[2] Sean D. Kelly "Seeing Things in Merleau-Ponty," in *Cambridge Companion to Merleau-Ponty*, ed. T. Carmon and M. Hansen (Cambridge: Cambridge University Press, 2005), 74-110.

Getting back to style, Merleau-Ponty introduced the idea in a discussion of what is positively indeterminate in language and art. Literature, Merleau-Ponty thought, pushes the determinate conventions of language to be expressive and arouse attention by tending toward what is indeterminate. "The writer's task," according to Merleau-Ponty, "is to choose, assemble, wield, and torment" linguistic conventions "in such a way as to induce the same sentiment of life that dwells in the writer at every moment" (Merleau-Ponty 1969: 48). This sentiment of life is the writer's style which is not, as Malraux may have thought, a means for recreating or the consequence of a way of perceiving the world but a translation of the writer's otherwise indeterminate relation to the world (Merleau-Ponty 1969: 56). Style, in painting, Merleau-Ponty writes, emerges "at the point of contact between the painter and the world, in the hollow of the painter's perception, and as an exigency which arises from that perception" (Merleau-Ponty 1969: 59). Generalized to the everyday experience of those who have not made a career from art, we might describe what Merleau-Ponty calls style as a comportment, or as Noë might put it, a sensorimotor disposition that signs the way we experience the world.

In fact, there is a lot in Merleau-Ponty's account that squares appreciably with what Noë says he is after in this book. "This is a book," Noë writes, "about presence, and its fragility. This is a book," he continues, "about style

> *about the foundational importance of the idea that we achieve the world for ourselves through different styles of active involvement…. Style is the face of a practice – it is its perceptible, recognizable quality* (153).

With one important exception, this is perfectly consistent with what Merleau-Ponty is trying to say. To the end of his life, Merleau-Ponty struggled with the rubric of interior and exterior positing, finally, an entwining of consciousness and the world he called "flesh." Noë, to his credit, is pushing to a place that is no longer burdened with this struggle (154). In the actionist or enactive direct realism Noë is advocating, "perceiving is a direct relation to the world," "an achievement of the sensory motor understanding" (65). There is no interiority of concepts that makes experience of the external, physical world possible. Perceptual experience and thought are achieved by the exercise and mastery of skills, the deployment of a sensorimotor understanding Noë says we possess (69) but that he has also called the face of our practiced engagement with the world (153).

For, if all that is the case is the world we achieve by enacting ourselves, and we enact ourselves to achieve this world, then the self we enact is the self that achieves this world. On Noë's view, it would seem that perceiver and the world perceived come about together in the same sensorimotor achievement. There is no worry about entwining an inner experience of indeterminate meaning with the determinate world outside us. We achieve the world by enacting ourselves and achieve ourselves in achieving this world. This is not the result of an understanding we possess so much as it is the face of our sensorimotor capacities, our style.

What Noë calls sensorimotor understanding is the practical disposition of the affordances and skills that bring us into contact with the world. It is in this sense that perception can be "a nonintentional relation to the world" and an enactment of the understanding that enables us to achieve this relation (73).

One difficulty with this view as Noë presents it is that the affordances that might enable us to achieve a world are not equally accessible. Noë follows James J. Gibson in calling affordances "the possibilities for action provided by things" (120). His focus, as Gibson's, is on opposing this view to the "perception-as-classification" model of traditional cognitive science. He seems to allow that the world affords different things to different people, because they have different skill sets, but he does seem to notice that there may be artificial barriers to the acquisition of certain skills and limits to the access some individuals will have to the world. Affordances are not just picked up "the way we might pick up pebbles on the beach" (29n8). They show up for us as a result of the skills we exercise, the worlds we achieve and the selves we enact. And these exercises, these worlds, these selves will vary in ways we are not always free to decide.

Still, what Noë says in his "Afterword" holds out the promise for changes in the availability of affordances and the access these affordances enable us to achieve. For while our access to the world is achieved by what we know and can do, and limited in the same way, this access, Noë says, is liable to disruption, worries and doubts. More promisingly, Noë writes, "The *question of style* – the need for different, maybe better ways of carrying on – is always with us" (154, italics in the original). Our "captivity," he says, by pictures and advertising, architecture and ideology, is never total and "this tension between the ways our understanding opens up and the ways it closes off the world for us is a conversation we can't help but keep having" (154). This conversation is the work of philosophy and art, and it is this conversation that enables us to remake ourselves, our skills and our understanding.

These conclusions are all well and good, but Noë ends his book by an appeal to grace. "*We* can't invent new languages or new pictorialities, new ways of thinking," he writes. "But we also can't stop them from inventing themselves" (155, italics in the original). This is puzzling. Perhaps Alexi Worth is only discovering new pictorialities and not inventing them, but if the question of style is always with us, we will not wait for grace to discover the worries and doubts that can disrupt our settled understanding of things. If the question of style is always with us, we will seek out these disruptions and actively enter into conversations that enable us to think differently and open access to the world for ourselves and others.[3]

[3] Special thanks to Alexi Worth and Heidi Lange of DC Moore Gallery for their assistance in writing about the cover art for this book.

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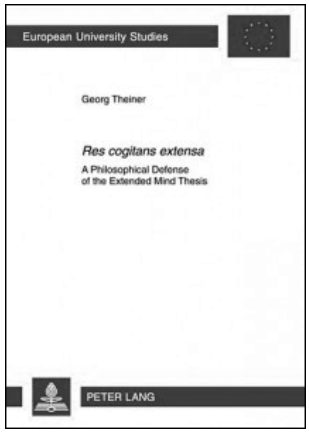
Res cogitans extensa

The review of George Theiner's *Res cogitans extensa. A philosophical Defense of the Extended Mind Thesis*

Author: Georg Theiner
Publisher: Peter Lang GmbH
Release date: 2011
Number of pages: 268



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For centuries, it was believed that if the mind has a spatial location at all (contra Descartes), then it must be located within the confines of the body, or skull to be more exact. The extended mind hypothesis (HEC) proposed by Clark and Chalmers (1998) in their now classic paper has challenged this idea. These authors noted that some external objects can be utilized in such a way that they can be seen as extensions of the mind itself, thus (purportedly) showing that some cognitive processing has an extent that goes beyond the boundaries of the brain and the body. In other words, cognition *can* happen and, with the use of proper cognitive artifacts (which category could, according to Clark and Chalmers, include something as mundane as a simple pen and notebook), *does* happen outside the head/body. Due to its originality and controversial nature, this thesis has been challenged by some researchers, but also embraced, further developed and reinterpreted by others.

An Austrian philosopher, Georg Theiner, is one the latter authors. In his book *Res cogitans extensa. A Philosophical Defense of the Extended Mind Thesis*, he is concerned with explaining and systematizing the current state of the debate regarding the HEC, as well as with defending its core, namely the very idea that the cognition partially takes place beyond the body. The book is not an introduction to the HEC, but rather a voice in the debate regarding this hypothesis. Theiner reconstructs

and supplements ideas expressed by other authors and defends the HEC against the counterarguments posed by its adversaries. The book consists of six parts and a conclusion. Its 284 pages contain some of the most significant themes, problems and controversies connected to the HEC, covering both foundational conceptual issues, as well as cases of more specific cognitive artifacts, including language. The book is well-designed. The reader is led by the author through a maze of problems that are gradually explained and discussed in considerable detail; every chapter is concluded with a brief and helpful summary.

In the first chapter of the book, Theiner attempts to situate the HEC on a larger theoretical background by showing its relations similar, but conceptually distinct outlooks on the nature of cognition, namely the embodied, situated and distributed approaches. In the same chapter, he introduces three "ground rules" for his discussion, which indeed affect the way subsequent chapters unfold. One of those rules, for example, is the "extended fairness" rule, according to which we should avoid burdening HEC with theoretical problems that could just as well be posed for other theories (including more traditional, internalist ones).

The second chapter is an in-depth discussion of a theoretical cornerstone of HEC, namely the principle of parity (PP), which is based on Clark's and Chalmers's proposal that ”If, as we confront some task, a part of the world functions as a process which, *were it done in the head*, we would have no hesitation of recognizing as part of the cogni-tive process, then that part of the world *is* (so we claim) part of the cognitive process.” [Clark & Chalmers 1998, p. 8]. In other words, according to PP, the functional equivalence between internal and external processes can justify categorizing the former as genuinely cognitive. Theiner presents different dialectical roles PP may play in a debate and subsequently discusses some specific issues that can be (and in fact were) raised in the context of this principle. Those issues include, among others, the desired functional fineness of grain in judging the equivalence between the internal and the external, and the epistemic role of folk psychological intuitions in attributing a cognitive status to some external processes.

The third part of the book centers on the relations between embodiment, dynamical approach to cognitive phenomena and HEC. The author describes some interesting research carried out in robotics, cybernetic biology, and computational neuroethology. He tries to convince the reader that it is erroneous to say that the brain is the central manager responsible for intelligent acts and that the body is only a passive receiver of those commands. Theiner also criticises other classic approaches to cognition, including the classic theory of control that separates morphology and computing. Referring to the principle of parity, this time the parity of control, he shows that both the body’s morphology and the computing processes carried out by the brain are equally important in the process of control.

The fourth and fifth chapters are respectively devoted to language as a cognitive extension and the role of external representational systems in reasoning. The fundamental insight on which the former chapter is based is the idea that re-

descriptions of certain information in different representational formats are cognitively significant, i.e. they significantly impact the ways in which the information can be cognitively processed and employed by the subject. Among others, Theiner uses this assumption to challenge what he calls a "written language bias" (which he attributes to most authors working on language as a cognitive artifact, including Clark), which is based on failing to see and appreciate the fact that the cognitive effects of literacy skills go significantly beyond the ones afforded by spoken langue. To back up his proposal, Theiner discusses interesting archeological data on the evolution of written symbolic systems used to represent numeracy.

In the sixth and last chapter of the book, the author concentrates on an metaphysical issue related to HEC, namely the idea of an extended selves, i.e. ones that go beyond the body boundaries of an individual. The author reconstructs and challenges Robert Rupert's arguments against the idea of extended selves. For example, Theiner challenges Rupert's argument that is based on an assumption that selves need to be stable, contextually invariant entites, so that including cognitive extensions as parts (or co-constitutents) of selves would lead to unintuitive and unnecessary proliferation of selves.[55] The book finishes with a short conclusion that summaries the most important points.

[55] Very broadly speaking, author does this by attempting to show that it is unsatisfying and inconclusive to limit the boundaries of selves to the boundaries of cognitive systems, i.e. contextually invariant collections of integrated cognitive mechanisms and capacities. However, it is worth noting that there seems to be another way to challenge Rupert's argument, one that is actually in broad agreement with the basic insights of this author. According to this alternative line of reasoning, one can accept being included in a cognitive system as a "mark of the cognitive", while also defending extended selves by claiming that something does *not* have to be included in the body to be a part of a cognitive system. Let us imagine a scenario that seems logically and nomologically (at least if functionalism is true) possible. In this scenario, a person loses one or couple of her cognitive skills (say, mindreading) due to a localized brain damage, e.g. one which selectively impacts temporo-parietal junction. Now, imagine that we know enough about the brain that we can help the patient by (1) constructing an artificial device whose computational-functional workings closely simulate the computational-functional workings of temporo-parietal junction and (2) appropriately integrating this device with the rest of the person's brain. Imagine, however, that for some reason - due an engineering constraint or simply a fancy preference on the patient's side - this device is not located inside the person's skull, but is rather attached to her back (or hidden in her pocket, etc.) and from there wired, or even wirelessly connected to the rest of her brain. Although the new, artificial, external temporo-parietal-junction-equivalent is in principle detachable from the rest of the system, the person in question actually "wears it" all the time. *Prima facie*, the new device meets all the reasonable criteria for being a part of a person's cognitive system (i.e. it is functionally equivalent to a specific brain part, it systematically co-occurs with other mechanisms across different contexts and is integrated with them in suitable ways). In other words, the cognitive system as a collection of contextually invariant cognitive mechanisms and skills remains the same, although one part of it happens to be located outside the biological body. Of course, even if this proposal is correct, then Clark's and Chalmers's pen and notebook example might still be not enough co-ocurrent and integrated with the rest of the cognitive system to be counted as a part of it. Still, if sound, the present proposal at the very least shows that accepting Rupert's premises (as Theiner reconstructs them) does not exclude the very possibility of extended selves.

Theiner's work is a very interesting study of some of the most important issues connected to HEC. In a competent and engaging manner, the author demonstrates the gravity and significance of the theory. He contrasts the arguments of the supporters and the opponents of the theory, underscoring the advantages in the argumentation of the former. As we have noted before, the book should be considered a voice in a debate rather than an introduction to the subject. Thus, it might prove to be a little overwhelming for readers who are not already following the debate at least marginally. However, for people already familiar with it - including those who embrace HEC, those who oppose it, as well as curious, but largely neutral spectators - the book should prove to be a valuable read.

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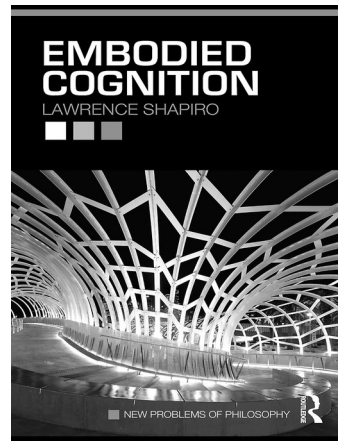
A Critical History of the Embodied Cognitive Research Paradigm

A review of Lawrence Shapiro's *Embodied Cognition*

Author: Lawrence Shapiro
Publisher: Routledge
Release date: 2011
Number of pages: 233



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Embodied Cognition by Lawrence Shapiro is a fine text that focuses on the issues of body, embodiment, and the environment in cognitive science, philosophy, and psychology. As the title suggests, Shapiro's book offers us a glimpse into the broadly defined, and still growing, research paradigm known as "embodied" cognition. Within this particular paradigm the body and environment are placed in the foreground when it comes to both theoretical and empirical work on cognition and the mind. In terms of the audience for this particular text, we suggest that with its combination of systematic rigor, lucid prose, and multiple well structured examples, it is a worthwhile read for scholars, casual readers, or as a useful addition to any course that contains elements of philosophy of mind or a focus on cognitive science.

One way of understanding Shapiro's project is by looking at the text in two sections. The first section, equivalent to the first three chapters, lays down the basic foundations in preparation for the heavy theoretical and conceptual work found in the second section. Indeed, a combination of several questions motivating this book – taken in conjunction to make up what Shapiro calls its "meta-theme" – are presented by Shapiro as the following: Does the subject material of embodied cog-

nition and standard cognitive science overlap? If so, how should we approach embodied cognition as a result; is it a harmonious extension of standard cognitive science or part of a crippling criticism that presents us with an alternative research paradigm?

In order to figure out the manner in which we should respond to this "meta-theme", the first section of *Embodied Cognition* presents us with an overview of standard cognitive science, explaining its theoretical and methodological grounding as well as offering specific examples of several standard cognitive science experiments (Dawson 1998). In addition, this section includes a discussion of some precursors to the embodied paradigm (such as a detailed and insightful review of Gibson's ecological psychology and connectionism) as well as several different ways the notion of "embodiment" has been interpreted in the embodied cognition literature (Rowlands 1995; Clark 1997). We suggest this section as most useful for people who lack any background in cognitive science or embodiment. However, we furthermore suggest that chapter three is a worthwhile read for even those with some previous knowledge in cognitive science, connectionism, or ecological psychology. Chapter three is not only a solid overview of differences in the embodied cognition literature but, moreover, it plays the most important role in grounding the second section of the book.

In the second section, Shapiro turns from this broad overview to a more rigorous process of taxonomy and comparison between embodied approaches and the standard cognitive science approach. This section is more substantial than the first in regards to both length and depth, containing approximately 2/3 of the book and a focus on adjudicating between several key issues in the field. Shapiro here fleshes out three thematic hypotheses that were first presented briefly in his introductory remarks. In addition, after taking the time to work through each of these themes in detail - highlighting their strengths and weaknesses and several related developments and research methodologies (such as dynamical systems theory) - Shapiro concludes *Embodied Cognition* with an assessment of the field as it stands in regards to both his meta-theme and the particular themes contained therein.

The three themes - Conceptualization, Replacement, and Constitution – correlate to three broad strands of research occurring within embodied cognition (as well as chapters four, five, and six, respectively). Some of the important debates and nuances within these themes are summed up below:

1) The Conceptualization hypothesis is centered on the relationship between an organism's body and the concepts that organism acquires over time (Lakoff and Johnson 1999; Glenberg and Robertson 2000). For example, a common problem faced by the standard cognitive science account is the symbol-grounding problem: how is it that this arbitrary symbol has come to have this meaning? Or, in broader terms, how does linguistic thought acquire meaning? On the Conceptualization account, even the most abstract of concepts are rooted in characteristics of our bodies and our embodied interactions with the surrounding environment. Several

other questions of note under debate in relation to the Conceptualization hypothesis include the relationship between spatiality and language, and the relationship between embodiment and metaphor.

2) The Replacement hypothesis asserts that there is a conflict between standard cognitive science and embodied cognition in which the embodied paradigm should replace standard cognitive science (Brooks 1991; Van Gelder 1998). In general those who assert the need for replacement hold there are deep and irreparable flaws with the standard cognitive science approach. These flaws are generally linked with the standard approach's assumption that cognition is representational and computational. At the same time, the depth and breadth of the Replacement critique stands open to interpretation. For example, is it the case that cognitive states *never* have representational content or *never* take place in a computational manner? The main point of contention in this research strand is figuring out the overall scope of the Replacement hypothesis. If we grant embodiment conflicts with the aforementioned assumptions of standard cognitive science, a way of phrasing the internal debate concerns whether or not an embodied approach should fundamentally replace the entirety of the standard approach, or if it possible to incorporate elements of the standard account into an embodied approach.

3) The Constitution hypothesis deals with an ontological question: what is a cognitive state and where are such states realized? A supporter of the Constitution hypothesis posits a unique role for the body in which the non-neural body literally plays a role in instantiating, or constituting, a putative part of certain cognitive process as opposed to playing a merely causal role in helping to bring about the cognitive states in question. There has been serious debate in terms of how to interpret this ontological claim (Wilson 1994; Clark and Chalmers 1998; Adams and Aizawa 2008). Should we assert, as Clark and Chalmers (1998) do, that the body and environment *constitute* a cognitive state or, on the other hand, should we follow Adams and Aizawa (2008) and argue that this strong claim goes too far in suggesting the mind may occasionally "leak" into the body and world? Another name for Adams and Aizawa's critique is the *coupling-constitution fallacy* and, in light of the Constitution hypothesis, where one falls in terms of supporting or rejecting Constitution can be gauged first and foremost by her intuitions regarding this fallacy.

If we expand our view from the state of embodied cognition to 4E cognition broadly speaking – i.e., the *embodied, extended, enactive,* and *embedded* paradigms – we find the issues Shapiro faces throughout his text are indicative of a deeper set of conceptual issues bursting forth from within 4E cognition as a whole. As others have noted, although the 4E paradigms were originally presented as a "package deal" of sorts, it does not follow that we should uncritically assume they must operate as a homogenous whole. We may even utilize Shapiro's meta-theme concerning embodiment and standard cognitive science as an analytical tool to help sort through the issues currently arising between the different 4E paradigms.

With the reflections from the last paragraph notwithstanding, there is an important cautionary note one must remember in applying a one-to-one mapping of Shapiro's taxonomy to a broader taxonomy of 4E cognition. Since all paradigms of 4E cognition are still growing and forming, it is difficult to get a grasp on what exactly falls within each domain; moreover, it may even be the case that these paradigms are more hostile to each other than standard cognitive science. As such, insofar as we utilize a taxonomy that is not inherently structured to be mutually exclusive - as is the case with Shapiro's taxonomy, where the three different paradigms do not, in themselves, cleanly demarcate all current or potential research questions into solely one of the three hypothesis presented - we run into a high degree of difficulty in reaching an ultimate conclusion about the status of the various paradigms in question. Nevertheless, and with this limitation in mind, Shapiro's work stands out as both an important step in gaining more clarity in the field of embodied cognition, as well as providing us with a solidly grounded taxonomy from which to begin. As Shapiro himself has noted, his taxonomy is one which we could update in the future based on new empirical findings and theoretical work.

In short, anyone who is interested in gaining a grasp on the evolving field of embodied cognition, or anyone who is looking to further enrich her or his knowledge of cognitive science, psychology, or philosophy, should make sure to pick up a copy of *Embodied Cognition.*

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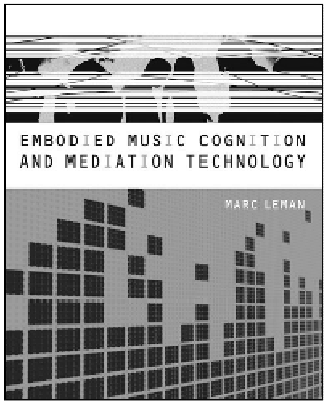
Dancing about music, rather than talking about (the musical mind's) architecture:
a review of Marc Leman's *Embodied Music Cognition and Mediation Technology*

Author: Marc Leman
Publisher: MIT Press
Release date: 2007
Number of pages: 320



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Leman's latest book is a refreshing treatment for the traditional (by which I mean: disembodied) cognitive science of music. What is more, the book serves as a starting point of an almost natural (given the recent variety of empirical data from empirical musicology and the studies on musical gestures, musical movement and the biomechanics of the body) application of the paradigm of embodied cognition into musical research, this work most certainly stands as a manifesto of the paradigm of what the author calls the theory of embodied music cognition (hereafter: EMC). By the means of looking at the role of the body in music processing, Leman's work encourages us to shift away from the classical (disembodied) research on music (including aesthetics, and more generally: philosophy of music, still relying mainly on the linguistic descriptions of, for instance, musical experience), hence, the reference to the Frank Zappa quote[56] in the title of this review. *Embodied Music Cognition and Mediation Technology* is exciting due to its being grounded in the out-

[56] "Talking about music is like dancing about architecture". The actual source of the qoute is unknown, yet it is often attributed to Frank Zappa.

comes of empirical research, as pursued mostly by Marc Leman in his laboratory based at the University of Gent, Belgium.[57]

Not only is Leman's attempt at providing tools for answering the questions of how the body shapes our musical minds inspiring, but it may also serve as a welcoming invitation for theorists (including philosophers) to this field of study. In the preface to the book, the author nicely states:

> *I thought that such a unifying approach could be of value to a broad range of scholars and students with backgrounds in musicology, philosophy, engineering, physics, psychology, and neuroscience. However, I realize that my ambition is a very tall order and that this book is just the starting point of that idea. In that sense, this book is more a philosophical essay about the foundations of music research and a journey into possibilities rather than a survey of all empirical research results that would support my viewpoint.* [p. XI]

And, in my opinion – and looking at the history of my own research – an inspiring starting point it is! Interestingly enough, as the title suggest, Leman's study consists of the provision of the EMC paradigm and the technology of mediating between the musical experience ("mind") and the sound energy ("matter"). The book is based on a hypothesis regarding the nature of musical communication, namely that the abovementioned mind/matter relationship is based on the idea of the human body as a biologically designed mediator which transfers an idea, or a mental representation, into a material or energetic form; this two-way mediation process is seen by the author as constrained by bodily movements that are herein assumed to play the central role in all sorts of musical activities [p. XII]. Thus, EMC assumes that the musical mind results from the embodied interactions with music.

The following review consists of a short and superficial description of the structure and the contents of the book.[58] The first chapter of the volume introduces the practice of music signification, being the main theme of the book. This practice, according to Leman, is based on musical experiences, but it also involves music description when these experiences are communicated. Herein Leman argues in favor of the practice of musical signification which is based on action and the action-based descriptions of music. As such, this approach holds that the natural mediator for music (the human body) can be extended (with artificial mediation technologies) so that the mental activity can cross the traditional boundaries (of the skull) into (musical, digital or virtual) environments that cannot otherwise be accessed by the natural mediator. Interestingly enough – and sadly for those who thought about the very idea of extended cognition while reading this description –

[57] Lab's interesting website with a number of research articles: http://www.ipem.ugent.be/ (University of Gent Institute for Psychoacoustics and Electronic Music).

[58] For a sharp and detailed critique of the book see: Schiavio & Menin (in press).

Leman does not go into details here. Yet, it is obvious that this approach carries certain promises for the development and application of a variety of philosophical theories. The book can be divided into two parts (the chapters from the third to the fifth are focused on the development of a theory of embodied music cognition, while the very application of this theory is discussed in the sixth and the seventh chapter). The second chapter of *Embodied Music Cognition and Mediation Technology* provides a historical and (quite inadequate, to be honest…) philosophical overview of the major music research paradigms that seem to be important as the background for author's deliberations. In this chapter, Leman starts with the ancient Greek philosophy, goes through Descartes (and the misfortune that he caused for the philosophy of mind) while focusing on the differences between the disembodied and the embodied approaches to music, and describing the role of the empirical approaches and technology in the modern music research. In the following, third chapter, the author starts constructing what he dubs the "ecological model" for understanding how subjects can achieve the transformation from physical energy to cultural abstractions. Here, Leman shortly mentions the famous work by Varela, et. al. (1991). The fourth chapter focuses on the coupling of action and perception while aiming to investigate how music can be understood as having an action-based and goal-directed character. In the following, fifth chapter, Leman explores different examples of the degrees of corporeal engagement to music: from synchronization to attuning and to empathy, and from observation to imitation and to emotional engagement. In the two (sixth and seventh) concluding chapters of the book, the author examines the utility of EMC in the two core areas of the modern music research, namely: (1) the interaction with musical instruments (that is, how to build mediation tools that allow for a spontaneous expression of artistic ideas; interestingly, the author still does not provide any application of extended cognition!) and secondly, (2) the musical search and retrieval (namely: how to build mediation tools that allow the search for and retrieval of music in a database of a digital music library).

To conclude, Marc Leman's ambitious book most certainly serves as a promising attempt to include music cognition into the broader research paradigm of embodied cognitive science. The book may be especially interesting for those researchers and academic audience who have grown dissatisfied with the traditional (disembodied) cognitive science and psychology of music. It is also definitely worth recommending to researchers working in other fields, as the ideas presented in *Embodied Music Cognition and Mediation Technology* almost beg for further development (for instance, in philosophy: for the application of extended cognition hypothesis in the chapters on musical instruments and mediation technologies, as suggested above). So… let the music begin.

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University of Gent Institute for Psychoacoustics and Electronic Music's website: http://www.ipem.ugent.be/

Studies on musical practice

In a perfect world we would not need to talk about the music.
(...) an activity that on the surface of the world
seems to be making music
– beneath the surface converges with everything.

[Matthew Shipp, *Interview*]

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"Immunology of music"?
A short introduction to cognitive science of musical improvisation[59]

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Abstract

Studies on music in the area of cognitive sciences – quite varied despite their short history – meet with scepticism. The author of this introduction, presenting some spectacular examples of research on musical improvisation, tries to demonstrate that they enrich rather than reduce our understanding of this phenomenon.

Keywords: cognitive science; creativity; interdisciplinarity; musical improvisation; reductionism.

Humankind seems to approach creativity with particular pride. Its role in science, education or management is immeasurable; nevertheless, many of us appear to consider artistic creation, and particularly music, to be its pinnacle. Musical creativity is researched within an ever-widening theoretical and empirical spectrum, including in conjunction with education (Mazzola et al. 2012). In this context, the art of musical improvisation appears to be creativity magnified. It does not merely constitute, in the framework of playing music, an important value added to the musical composition, but, ever so often, the latter is overshadowed by the former (Berkowitz 2010; Benson 2003).

As other forms of human activity, music has also become the subject of analyses and scientific research. Humankind remains child-like in this aspect: after all, children do not merely play with a toy, but they also strive to understand its structure and the way it works, to look inside (often with irreversible results). Nevertheless, a degree of scepticism or even resistance can be detected when it comes to analysing and researching music. It is no coincidence that the saying "talking about music is like dancing about architecture" has gained such popularity and

[59] Special acknowledgments to Jakub R. Matyja whose valuable suggestions I have used in this text.

wide use. Let us not forget, however, that while reflection and speculation have accompanied music for thousands of years, research into biological underpinnings of creativity and musical perception is relatively new. This research is accused of ignoring the "intangible" aspect of the phenomenon or of simple reductionism (Przybysz 2006). The word "neuroaesthetics" receives a cold welcome also in academic circles, in the form of sceptical or ironic comments from lecturers asking "what do neurons and aesthetics have to do with one another?"[60] Well-known composers and musicians likewise declare their aversion to neuroresearch into music (e.g. Branca 2011; Zorn 2012; cf. Sting's reaction in the film *The Musical Brain*)[61].

Does science really try to compete with the musicians' opinions, to explain "better" and to "demistify" (cf. Fidlon 2010, with a telling title)? If so - then perhaps music does need defence against scientific reductionism, demonstrating what remains outside the grasp of science, its own "immunology"? Especially considering the fact that some musicians have opted to even assist neuroresearch with personal input - as some of the cited sources attest (cf. Norgaard 2011).

In light of the accessible data, I venture to state the following interpretative hypothesis: research into music arising from the cognitivist paradigm does not compete with the musicians' opinions, nor with those of classical musicologists; on the contrary: it answers completely different questions. I believe that it is worthwhile to pay attention to books on the subject of musical improvisation - as it is considered to be such peculiar a phenomenon, ostensibly outside the rules of music, but by some, seen to constitute its very core (i.a. Benson 2003).

Let us make it clear what phenomenon we are discussing here. To put it short: improvisation comprises creating a piece of music while performing it. It is the art of controlled reorganizing of sound. The spontaneous element is no accident or free choice, because the art of improvisation is too deeply rooted in individual experience and musical knowledge. Specialists in the subject have been known to compare musical improvisation to language: free choice in the latter does not consist in making up new words, and similarly, in the former, improvisers use e.g. phrases which they know well, and do not make them out of thin air. In conclusion: idiomatic compositions, presented by the improviser *in statu nascendi*, are the result of musical education and hard work (Berkowitz 2010; Knittel 2010; Fulara 2012; Henderson 1992). It does not seem as though neuroscientists were attempting to pin down the phenomenon of musical improvisation differently, or from the position of ignorants. Charles J. Limb - one of the preeminent researchers of improvisation - writes that he does not want to approach this phenomenon differently than musicians do[62]. Therefore, it is worthwhile to acquaint oneself with what cognitive science of music actually says.

[60] One of similar statements heard in academic circles.
[61] *http://www.sbs.com.au/documentary/program/570/The-Musical-Brain*.
[62] Source: an e-mail exchange between the Editorial Board and the Researcher (2012).

Neuroresearch into music posits a remarkable opportunity for a better understanding of the organization of the human brain (Levitin 2006). As musical creativity involves only a specific section of society, research into it can help to bring us closer to understanding human potential in this domain (Peretz and Zatorre 2003). Not everyone realizes how many processes are involved in the creation and reception of music. These include, after all, perception, emotions, attention, learning, remembering, semantic creativity, human interaction, etc. Just the psychology of music involves a wide interdisciplinary range (Koelsch 2012). In cases of neuropathology, the phenomenon of music appears to us from an unusual perspective (Sacks 2008). Research into these issues is also part of cognitivist and philosophical disputes between classical and embodied approaches to cognition (Raffman 2011; Leman 2007).

As examples of research projects regarding musical improvisation, we would like to list a few rather spectacular and, at the same time, diverse ones, as they provide an outlook of the vastness of this domain of study. As such we have deemed (1) research within the computational model, (2) the alternative to the former, namely research within the dynamic paradigm, (3) an experiment involving an improvising robot, (4) an experiment involving children with autism, and (5) a report from a neuronal study of the undercurrents of spontaneous musical performance, conducted with the use of a functional magnetic resonance imaging (fMRI).

The author of the first work, Philip N. Johnson-Laird, adopting the paradigm within which music is integrally connected to improvisation - often more so than with composition - consistently defends computational analysis of musical creativity. Analysing the case of jazz improvisation, he concludes the existence of three types of algorithms associated with such creativity (including “neo-Darwinian” and “neo-Lamarckian”), each of which implies a certain set of limitations (Johnson-Laird 2002).

David Borgo and Joseph Goguen suggest using non-linear theory of dynamic systems for research into musical improvisation, as in their opinion it allows for the adequate accounting for the unpredictable behaviour of the sets. Without offering a tool for a comprehensive and detailed grasping of the richness of this phenomenon of musical creativity, they place considerable value on utilizing within this research such categories of the dynamic model as “basin of attraction” and “direction of motion”, which do not reduce the aspect of complexity and spontaneity (Borgo and Goguen 2004).

The robot named Shimon is an odd musician, playing the marimba in the company of humans. Its improvised playing is assisted by visual expression of gestures, in interaction with its partners - human musicians. On the basis of this experiment Guy Hoffman and Gil Weinberg argue that musicality constitutes not merely the generating of sequences of sounds, but also the entire choreography of movements and communication with the remaining members of the band as well as the audience (Hoffman and Weinberg 2010).

Jinah Kim, Tony Wigram, and Christian Gold present the results of intriguing studies involving pre-school aged children with autism. The results show how strongly they were influenced by musical therapy involving improvised music. As the authors claim, it resulted in significant improvement of attention and a range of interpersonal skills - compared to children who were only playing with toys during the study (Kim, Wigram and Gold 2008)[63].

In the experiment described by Charles J. Limb and Allen R. Braun, experienced pianists performing improvised jazz were examined with fMRI. This enabled the monitoring of the sections of the cerebral cortex active at the given moment. Such studies bring us closer to identifying the characteristic neuronal model of musical performance in which brain sections responsible for specific psychological processes are involved (Limb and Braun 2008).

The scope of research into creation and perception of music shows what a broad and vast domain of human nature this field of study touches upon. One cannot describe it as reducing the "essence" of the phenomenon to biological categories or as discrediting the authority of a musician. One should remember that this research, especially into improvisation, is in its infancy. The aforementioned Charles J. Limb states that he sees no "demystifying" effort in his research, as his goal is only to improve the understanding of this phenomenon. He merely wants to know the neurobiological underpinnings of this incredible area of human activity, and he is still far from accomplishing that[64].

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Matthew Shipp
by Phil Freeman

I've written about Matt Shipp almost annually for over a decade. I've reviewed his albums, interviewed him, profiled him at length in *Burning Ambulance* magazine, and discussed the work of other musicians with him in person, on the phone, and by email. I am not an objective observer when it comes to Matt Shipp or his work. I consider him a friend.

Despite this blurring of the line between critical appreciation and personal friendliness, I think it's safe to say that Matt's doing the best work of his career right now, that his voice on the piano has matured into something powerful, unique, and almost instantly recognizable. He even manages to make the piano trio sound interesting, something I might otherwise have argued was impossible in 2012.

Matt's most recent trio album, *Elastic Aspects*, is a perfect example of how he's breaking the rules governing the jazz piano trio while still creating music of great, and accessible, beauty. He grants a tremendous amount of space to bassist Michael Bisio; indeed, there are times when the piano is almost totally absent, when it's just bass, or just bass and drums, and yet the music retains the feeling of suspense, of continuous forward movement and multiple co-participants' simultaneous concentration on a single shared idea that is the heart of jazz.

He has long abandoned many of the clichés of the avant-garde, having arrived at a sound that is far more indebted to post-bebop piano players of the 1950s and early 1960s than to so-called free players of the '60s and beyond like Cecil Taylor, Bobby Few or Dave Burrell, though he'll happily praise those men, too. Matt aims for a kind of cosmic, post-free spiritually exploratory jazz, something that conjures the same spirit of letting the universe flow through one's fingers and onto the keys that Alice Coltrane, Sun Ra and even players like Randy Weston or Muhal Richard Abrams seemed to make their own. He seeks to become a conduit for something much larger than himself, larger than the audience, larger than mortal existence itself. He is a mystic of sorts, without the gimmickry of robes or incense or twirling dances as he approaches the piano. He simply walks out, sits down, and allows the music and the moment to take over. He is both the impetus for what happens, and a mere passenger on the same journey the listeners are on.

When I listen to his records, I feel like I'm hearing music of genuine importance. This is not true of most jazz I hear in 2012. There are a lot of records I enjoy, but very few that I think aspire to anything beyond being enjoyable. If they do, they fail. Most jazz now, whether avant-garde or traditionalist, whether it's new music or one more run through the old standards, is pretty take-it-or-leave-it stuff. It's extremely rare to hear anything that I could claim with a straight face has changed the way I think about anything. I mean, piano, bass, and drums—what could be more clichéd than that?

Matt has found ways to make the piano trio exciting not by doing anything radical to any of the three instruments (he plays a regular, non-"prepared" piano; Michael Bisio's bass is acoustic; Whit Dickey sits behind a small jazz kit, not some progressive rock-sized monstrosity), but simply by composing pieces, and then improvising on them, in a manner that induces deep emotional responses in the listener. His music is just better than other pianists'.

For example, let us return to the subject of *Elastic Aspects*. The debut studio recording by his current trio, previously heard on one disc of 2011's live two-CD set *The Art of the Improviser*, is a dense series of short, percussive vignettes that should almost be co-billed to Shipp and bassist Bisio; the latter gets several solo spots ("Alternative Aspects," "Explosive Aspects" and "Rainforest"), one of which opens the disc, and his thick, bowed drones are a dominant presence at all times. This allows Matt to focus on his melodies, which are structured like tiny cells of sound laid end to end, with intense energy and fierce concentration. Only one track on the album, "Elastic Eye," has the kind of hammering power he displayed on older trio records like *Prism*, *Circular Temple*, or *The Multiplication Table*. *Elastic Aspects* feels like a suite, even if the tracks aren't explicitly linked through melody or rhythm. And it's an album that can't be absorbed in a single listen. It almost demands to be heard again as soon as it's over, not just because it has a somewhat looping structure but because the level of emotional and intellectual involvement clearly audible on a performance level works its way into the listener's mind and heart, and makes you want to commit to it as fully as the three players did. That's something that just doesn't happen with other jazz records, at least not to me.

As I write these words, Shipp and Bisio have just released a duo record, credited primarily to the bassist, called *Floating Ice*. It's more improvised than their work within the trio context, and more of an exchange of ideas between equals—Bisio is not Matt's bassist on this disc, they are partners working together to elucidate something that cannot exist without total commitment from both at all times.

Matt works in duo format surprisingly often—he's paired off with saxophonist Rob Brown, guitarist/bassist Joe Morris, and bassist William Parker twice each, and a bunch of other people, including violinist Mat Maneri, saxophonists Sabir Mateen and Evan Parker, and guitarists Mark O'Leary and Jason Spaceman, once each. Clearly, there's something about direct one-to-one communication that appeals to

him. Something about the focus it permits. The intensity of expression, the unfilteredness, the ability to transmit concepts with nearly 100 percent purity even as the ideas and concepts of one's creative partner are given maximum consideration and support.

Listening to a Matt Shipp duo performance with another musician is a lot like having a conversation with him. He's got a lot to say, but he's really listening—he doesn't just watch your lips move until they stop, then launch into whatever he was gonna say anyhow. Despite being one of the most confident players around, and one of the most committed composers, thoroughly immersed in his own vision of his music, he cares about encountering new perspectives and always allows for course corrections based on new information. That's as key to his music as it is to his relationships to other human beings. It's why I call him a friend, and it's why I keep listening.

* * *

Phil Freeman is a music critic, writing for newspapers and magazines such as the *Aquarian Weekly*, *Alternative Press*, *Magnet*, *Jazziz*, *Don Beat*, *Juggernaut*, *Metal Hammer*, *MSN Music* and *The Wire*. Author of *New York Is Now!: The New Wave of Free Jazz* (2001). He is keen on avant-garde jazz, hardcore and death-metal. Editor of *Burning Ambulance*: a journal of music and the arts. For more information:

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Matthew Shipp's website: *www.matthewshipp.com*

Picture by Peter Gannushkin

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About the music in an imperfect world

Interview with Matthew Shipp

Picture by Lena Adasheva

Witold Wachowski

Music is for listening, painting is for looking at and so on. However, people have always liked to talk about them. People can talk a lot about everything – even about silence. Does it irritate you?

In a perfect world we would not need to talk about the music – it would just exist in its isness – there is an old saying: if Johnny can paint a picture, why would Johnny want to talk about it – talk is cheap, but I guess the human experience being what it is, we have to construct constructs about the things – we do.

It seems impossible to define what jazz is today – but it is good for jazz. However – is it possible to define what is (modern) music today? What do you think about the most extreme experiments in philharmonic music and in other arts today?

I have no opinion about anything – I don't really keep up with the current extreme experiments in other arts and music – if people are exploring certain things, then I assume that the world has a need of those things being explored.

You don't like to speak about music in terms of definitions and models. What about your ways of communicating with other musicians? Is improvised music a kind of language for professional musicians? Or is it nothing special? (When I was a teenager I loved to listen to the technical, incomprehensible conversations of my favourite musicians...)

I try not to talk about music with the people I play with – we know where each other is coming from, so unless there is a specific technical thing about a piece that we need to talk about in a rehearsal, then unless that is the case we might as well talk about other things – of course we sometimes talk about other musicians who inspire us or a certain album but it's not in a highly technical language.

How well do you need to know musicians to play well with them? Is it enough if they are excellent at what they do, or do they have to impress you?

I need to feel very close to the musicians I play with – as long as I know we are coming from the same place then I have an unconscious bond with them – that unconscious bond is what is important – that is where the real communication takes place.

Last year I saw your concert in Torun, Poland. You were performing with three Polish musicians. Allegedly, you had hardly any rehearsals before the concert, but the concert was very cohesive. What's the secret?

I don't know what the secret to that concert was – I think of myself as a good and responsive musician who is very intentive to do whatever needs to be done to make a concert a whole experience about the ensemble – so if that is my intent and all the other musicians are mature and have the same intent we will find a way to make the concert a unified experience that has balance and cohesion of some sort.

You are often asked about the convergence of jazz and the classical tradition. Is there any convergence between your compositions and other arts or other human activities? Is it possible?

My music converges with many realms of thought for I don't believe there is any such thing as music – to me the universe is all vibration and energy and it seems to cohere into separate activities like making music, but at base making music and linguistics and any other science like boxing are all the same – the generation of a

force field of structure – so an activity that on the surface of the world seems to be making music – beneath the surface converges with everything.

You have once brilliantly compared jazz to boxing. Both of them require co-ordination of movements, as well as improvisation. In your opinion, is there still an element of challenge, opposition or even struggle in this music? Or do they no longer exist?

I don't know what challenge – opposition or struggle is in the music as pertains to boxing – everything has an element of going to war in it – if it did not the elements would never metamorphose into other things.

We were happy to know that you object to monopolizing jazz and funding musical conservatism. Do you agree that this objection is, to a degree, reflected in your music?

The music is the music – so the objection to the fascism of the Lincoln Center and the jazz neo conservatives is not directly reflected in the music in an overt way – other than the fact that they could never produce music like I do, because their minds and spirits are sick, and I would never want to produce music like they do.

What do you think: what are the sources of education for the avant – garde art's audience? On the one hand, there is the artist who says: 'Fuck the world, I do my own music'[65]. On the other hand, people like their habits...

Life is the source of education for avant art audiences – mainly being exposed to a lot of things.

In your opinion, are young listeners resistant to attempts at manipulating their musical tastes? Does any threat exist in this context?

If you get a person while they are young and if you teach them to have a flexibility of mind, they are open to a lot of things – mainly they should be shown that if there are different expressions of music and art, there must be a reason why groups of artists do certain things, so except for thinking something is weird, why don't you investigate the worldview and the motives of the artists involved. Of course it is hard to even get there because people see everything as a commodity now.

[65] The quotation is from your interview (by Dave Reitzes, Perfect Sound Forever magazine, 1999): *So, in Monk's case, you have this iconoclastic pianist whose attitude is, 'Fuck the world, I do my own music.'*

Going back to the subject of improvisation: until the 17th century it was something common in music. Later, this changed – and now, one can talk about improvised and non – improvised music. Is it very harmful – with regard to musical education, performing music...?

If the premise of improvisation was accepted in western culture, it would be natural and the teaching it would be as natural as "teaching" to breathe, which of course we don't have to teach – it is instinct. Even though improv existed in classical music and of course exists in so-called jazz now, the premise has never been accepted in western world, for our sickness of mind makes us scared of unconscious processes – so a controlled event like writing out on paper makes us more secure – and, hence, since the Western world does not except unconscious process, how to teach improv or how to open up these processes is foreign to our constructs of who we are.

Changes in music are accompanied by changes in the way instruments are played. There is such a thing as musical education, but you have once said that jazz shouldn't be taught at school but in individual contact with musical masters. Is there such a thing as the proper way of using an instrument?

I have no idea if there is a proper way to play an instrument – in fact I would think there is not – what is an accepted practice is just that – an accepted practice, but it could have developed in infinite ways – and the sound in your mind is what is important – if that is a strong image, you can physically produce the sound even with a supposedly wrong technique.

What can you tell us about the piano you usually use for practice? What are your expectations from an instrument you play?

I have no expectations for an instrument except for it to work and be in tune – even if it is not, I have to approach the instrument for what it is – find its personality and make it work for what it is – every piano has its own personality.

I ask about the piano because saxophone or trumpet players can easily travel with their instruments, even they should have more than one – you, on the other hand, have to rely on unfamiliar instruments in unfamiliar places. Someone could say that it is difficult for a piano player to have such a close personal relationship with an instrument as musicians playing smaller, portable instruments can have, as they are hardly ever apart. Is that the case?

Again every piano has its cosmos – you have to figure out what it is and make it work for what you are... whether it was an old upright or a concert grand, Monk could superimpose his personality on it and make it all sound like him.

You are a very busy man. Do you have a regular day timetable? What time do you get up?

I get up at 8 – answer email and facebook – eat – take care of business – talk to my agent and record company – go to post office and take care of some things like that. The afternoon is piano practice and composing! – at night answer phone calls, read – more emails – then try to surf internet and watch some news.

In one of your interviews you mentioned that you are inspired not by specific things or phenomena in the world but by movement, the energy flowing through this world. Is there any mystical or intellectual tradition you are close to?

Mystic tradition I feel closest to is the tao – then kundalini yoga – and mysticism as it exists in American transcendentalism, Emerson, Whitman, Thoreau.

Could the fact that you focus on energy and process be a useful hint for musicians' education? Or should it be focused on practicing playing instruments and, at that point, any philosophy is superfluous?

Early education should be focused on learning to play correctly – whatever that means – as you start getting your own ideas, then you should transition into developing a technique to express your own ideas, even if that goes against everything you learned when learning to play correctly – whatever that means.

Biographies of musicians are full of anecdotes regarding sudden, brilliant beginnings of their passion. If you were to point to such a – mostly symbolic – event in your life, would it be seeing Ahmad Jamal and Nina Simone on television when you were twelve, or another, earlier event?

The early years of learning are so rich – and complex and murky because so much is going on that it is hard to find those exact eureka moments, but seeing Nina and Ahmad were two very important things for me – TV, which usually deadens the mind. actually opened mine up in these two instances.

If you were to assess your musical road up until now, is there anything you regret or that you are ashamed of?

I regret nothing and am ashamed of nothing – I am who I want to be and had I changed anything, I would be someone different.

Can you imagine not being a musician? Is there any activity you could devote yourself to in such case?

I can imagine being anything – I am meant to be the new music jazz musician I am – but if I had had the talent of throwing and ducking punches, I would have gone into boxing – etc, etc.

Which one of your albums do you recommend for young listeners who are still unfamiliar with your music?

I think my new CD – ''Elastic Aspects' is my best – from there I would say ''Zo'' and ''New Orbit'' are good introductions to my music and maybe my electro acoustic CD ‘Equilibrium’.

Artists of the issue

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Surf and *Mountain Range*

Interview with Monica Linville – Painter of the issue

Przemysław Staroń, Witold Wachowski

You have placed your artworks into three categories: Abstracts, Magical Realism and Contemporary Realism. Are borders between these categories strict?

To be perfectly honest, labeling my styles is done strictly for "commercial" reasons. First of all, if I want people to find my website on the internet, I need to use key words that people might use when searching for art. Truth be told, I would rather not use labels at all, especially since I use so many different techniques to serve the purpose of each individual painting. In person, when someone asks me what style I work in or what kind of painter I am, I'm often at a loss for words. I use whatever style I think best fits the subject I am focusing on at the time. That changes from painting to painting. Aside from the practical purposes of categorizing, I've also found that people seem to *need* to be told what they're looking at, or what they will find when they click on a button or open a portfolio. When trying to entice gallery owners, for example, to look at my work, if it doesn't say the right thing on the cover, the portfolio isn't even opened. Over the centuries styles, techniques and movements have been labeled, not just by gallery owners, museum curators and critics but by the artists themselves!!! Why is it so important? Perhaps if artists spent more time painting and less time trying to define themselves the work would be more pure? But reality is this. Labels have been created, the public has been told what has value and what hasn't, the starving artists have tried to meet those demands in order to gain access to the showrooms of the world and put bread on their tables and the creative process suffers. Ahem. Sorry. Perhaps I rant.

Has anyone of old masters of painting influenced you?

Rembrandt and Caravaggio. My goal, with my paintings, is to create connections between myself and the painting and between the painting and the viewer. I want to create a refuge for the mind to wander in at will, away from the craziness that is everyday life. I want to strike a chord with the viewer and to elicit an emotional response. I believe it's the use of light that makes that happen and I learned this by gazing at these two great masters' works. I may work in a number of different styles, but in each case I choose to work low key, with dramatic contrast between light and dark. This is their influence. Oh, and the animators at Disney Studios.

Abstract forms often reminds figures to the viewer (accordingly to Gestalt conception). Is it a problem for ambitious abstractionist? Does this tendency bother you?

This doesn't bother me in the least. I truly believe that once I finish a piece, it's no longer mine. It belongs to the universe. No matter what my intentions are with a painting, abstract or realistic, once finished any interpretation is entirely subjective. Because I work abstractly, realistically and somewhere in between, people tend to look for hidden things in paintings where none consciously exist. Their discoveries delight me. Sometimes they find things that I had no intention of putting in the painting but when seen through their eyes, I realize are there and, most importantly, are true. That can be an enlightening experience for me, as I believe that the truth of the artist always surfaces in a work of art. Other times I never see what they see, but find great satisfaction in knowing the work struck a chord with them because they are engaged in *seeing* the work.

How much are your paintings filled with real world and to which level contains it phantasies?

This is not an easy question to answer, believe it or not. The imagery I use, the colors, the light and the textures are all informed by what surrounds me in the real world. But I paint from my gut, not from my eyes. Even when painting in a realistic style, my color palette is not based on what I'm looking at but on what I'm feeling when I see. When I paint abstractly, the textures and colors I use are not selected consciously, but yet, when seeing my environment you cannot help but notice the connection between my real world and what ends up on the canvas. Sooooo…. I guess my work is suspended somewhere between the two worlds?

Are your art a way of communicating with people? If yes – does it refers also to you abstract works?

It very definitely is. I think that is true of all art though, whether the artists admit to it or not. If we are not trying to communicate something, why do we (in this

case, painters) put our work up on walls for people to see rather than burn it when finished? While sometimes I do indeed have specific messages in my paintings, in *all* cases I am attempting to make a connection between myself and the viewer. I intend to embrace you. I intend to establish an intimate relationship with you. I intend to communicate that everything and everyone is connected in some manner. This applies to every painting I do, realistic or abstract.

If you were to add some colours to the world, which one would you use?

I would use color combinations, rather than specific colors and no doubt they would be analogous. Each individual color that sets next to another on the color wheel, in progression, is a delight on its own but when placed next to the color on either side of it serves to enhance and be enhanced by that that surrounds it. True for color; true for the world.

In your opinion: is it really possible to divide people into two groups: artists and non-artists?

I suppose it's possible but I simply don't think it's necessary. My wish is that *all* of us think creatively because, god knows, at this point in our existence we need all the creative thinking we can get. *"The old don't work no more"- Monica Linville.*

You live in such special place in world; this fact certainly has an impact on your paintings. Is it conscious impact – or rather unconscious and uncontrolled?

I have been painting my whole life, (which is a lot of years!) and if I had to try and guess, %75 of that time was spent painting realistically. As a result, my brain is filled with imagery from my environment. Now, when painting abstractly, when I wish to introduce texture, color or light, I naturally gravitate to very organic forms. I laugh because in my mind, my work is universal, not regional, because that's how I see it. However, apparently it's not how others see it!!! I recently had someone tell me that my work *"screams tropical"*. I smiled but in my head I was asking "how can that be?" I recently did a retrospective exhibition of my work going back over 50 years. It was interesting to see what characteristics of style I started with as a child in the northern United States that are still with me today. They are intense color, high contrast and texture. I ask you.... is that tropical??? (laughing)

Monica Linville's website: *http://www.monicalinville.com/*

Picture source: Monica Linville's archives.

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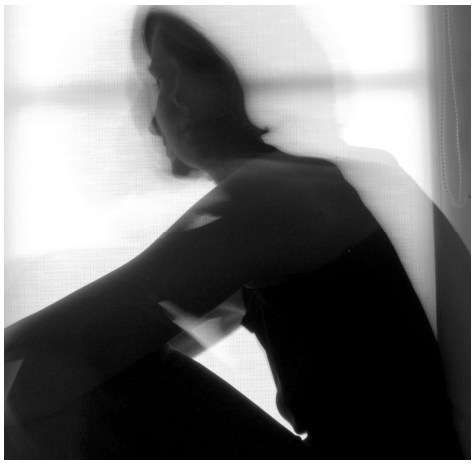
Agnieszka Sroka
photographer of the issue



Trained as a child psychologist, a graduate of the University of Opole. She has experience in working with children with various types of disabilities, including autism. Simultaneously – she is a self-taught photographer. The theme of many of her pictures is the dynamics of a seemingly immovable environment, both in nature and artifacts. The dynamics is a result of the passage of time, and factors other than deliberate human action. These are unusual forms and textures (as well as color) resulting from physical, chemical and organic changes, wear, accidental destruction, and even the unforeseen consequences of repairs or improvements. What is commonly seen as used and ugly takes on personality and artistic gesture in her photographs.

The other important theme of the photographic work of Agnieszka Sroka are people. She recently found herself in photojournalism, by participating in Photojournalism Workshop, with the result in the form of an exhibition organized within the Opole Festival of Photography (*http://offoto.pl*). She is especially keen on photographing children[66].

Selected works available on: *www.zielonasciana.wordpress.com*

Picture source: Agnieszka Sroka's archives.

[66] Prepared by Witold Wachowski.

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Uri Hershberg

Assistant Professor in School of Biomedical Engineering, Science & Health Systems at Drexel University. Research keywords: bioinformatics, immunology, neural computation, system biology, somatic selection, autoimmunity, genetic stability, germline diversity, dendritic cell, transcription elements, computational and mathematical modeling, complex systems, cognition, inflammation.

Profesor asystent w School of Biomedical Engineering, Science & Health Systems na Uniwersytecie Drexel. Główne zainteresowania to: bioinformatyka, immunologia, neuronalna obliczeniowość, biologia systemowa, selekcja somatyczna, autoimmunizacja, stabilność genetyczna, różnorodność linii zarodkowej, komórki dendrytyczne, modelowanie matematyczne i komputacyjne, układy złożone, poznanie i gorączka.

Anna Karczmarczyk

A graduate in Psychology at Kazimierz Wielki University. A PhD student in Department of Cognitive Science and Epistemology at Nicolaus Copernicus University. Scientific interests: philosophy of mind, cognitive science and interdisciplinary studies on self.

Absolwentka kierunku psychologia na Wydziale Pedagogiki i Psychologii Uniwersytetu Kazimierza Wielkiego. Doktorantka w Zakładzie Kognitywistyki i Epistemologii Uniwersytetu Mikołaja Kopernika. Jej główne zainteresowania to filozofia umysłu, kognitywistyka i interdyscyplinarne badania nad jaźnią.

Dawid Lubiszewski

A PhD student in Department of Philosophy of Science at Institute of Philosophy, Nicolaus Copernicus University. His main scientific interests are theory of complexity, cellular automata and cognitive science.

Doktorant w Zakładzie Filozofii Nauki Instytutu Filozofii Uniwersytetu Mikołaja Kopernika w Toruniu. Do jego zainteresowań należą teoria złożoności, automaty komórkowe i kognitywistyka.

Jakub R. Matyja

A PhD student at the Graduate School of Social Research, Polish Academy of Sciences & University of Lancaster, UK Dual. His main scientific interests are embodied and enactive (music) cognition and its relations to sociology (of music).

Doktorant w Instytucie Filozofii i Socjologii Polskiej Akademii Nauk oraz na University of Lancaster. Do jego naukowych zainteresowań należą ucieleśnione i enaktywne poznanie muzyczne oraz ich związki z socjologią (muzyki).

Yair Neuman

He received his Bachelor's degree in Psychology and Philosophy and his PhD in Cognition (Hebrew University, 1999). Interdisciplinary researcher who has contributed to various fields from cognition to theoretical biology and information technology. Author of numerous academic papers and two manuscripts. He is currently working on his third book to be published by Cambridge University Press.

Prowadzi badania interdyscyplinarne, poczynając od poznania, przez teoretyczną biologię, aż do technologii informacji. Jest autorem wielu akademickich publikacji i dwóch manuskryptów. Obecnie pracuje nad swoją trzecią książką, która zostanie wydania przez Cambridge University Press. Posiada tytuł magistra psychologii i doktora filozofii na Uniwersytecie Hebrew (1999 r.).

Jacek S. Podgórski

A PhD student in Department of Philosophy of Science at Institute of Philosophy, Nicolaus Copernicus University. His main scientific interests are interdisciplinary studies in immunology.

Doktorant w Zakładzie Filozofii Nauki Instytutu Filozofii Uniwersytetu Mikołaja Kopernika w Toruniu. Do jego zainteresowań należą interdyscyplinarne badania w immunologii.

Mark Rowlands

Professor of Philosophy at the University of Miami. Author of books on the philosophy of mind and cognitive science, the moral status of non-human animals, cultural criticism. He is one of the principal architects of vehicle externalism, or the extended mind. Author of *The Nature Of Consciousness, Externalism: Putting Mind and World Back Together Again, The New Science of the Mind, The Philosopher and the Wolf* (a kind of memoirs) and others.

Profesor filozofii na University of Miami. Jest jednym z twórców teorii rozszerzonego umysłu. Autor wielu książek z dziedziny filozofii umysłu i kognitywistyki, a także moralnego statusu zwierząt i krytyki kultury. Napisał m.in.: *The Nature Of Consciousness, Externalism: Putting Mind and World Back Together Again, The New Science of the Mind, Filozof i wilk* (polski przekład).

Kevin Ryan

He is a recent graduate of Villanova University, where he earned a BA in Philosophy, Humanities, and Global Interdisciplinary Studies. He is currently attending the University of Edinburgh for a MSc in Mind, Language, and Embodied Cognition. His primary research interests include embodied music cognition, auditory perception, and others.

Absolwent Villanova University (licencjat z filozofii, nauk humanistycznych i Ogolnych Studiów Interdyscyplinarnych. Obecnie jest magistrantem na University of Edinburgh (dziedzina umysłu, języka i ucieleśnionego poznania). Jego główne zainteresowania to ucieleśnienie poznania muzycznego, percepcja słuchowej i inne.

Neeraja Sankaran

(Ph. D., Yale University, 2006) is Assistant Professor of the History of Science, Technology & Medicine at Yonsei University in Seoul, S. Korea, with research interests in the history of biological and medical science in the 20th century.

Jest profesorem asystentem na Wydziale Historii Nauki, Technologii i Medycyny na Yonsei University (Korea Południowa). Posiada tytuł doktora uzyskany na Yale University w 2006 roku. Jej główne zainteresowania badawcze obejmują historię nauk biologicznych i medycznych w dwudziestym wieku.

Przemysław Staroń

A graduate of psychology and cultural studies at Catholic University in Lublin. Teacher of ethics and knowledge of the culture, psychologist, trainer at the Centre for the Development "Jump", and expert in SWPS Press Center. He works creatively with young people, adults and seniors.

Absolwent psychologii i kulturoznawstwa Katolickiego Uniwersytetu Lubelskiego. Nauczyciel etyki i wiedzy o kulturze, psycholog, trener w Centrum Rozwoju „Jump", ekspert w Centrum Prasowym SWPS. Na co dzień pracuje twórczo z młodzieżą, dorosłymi i seniorami.

Bartłomiej Świątczak

He received a PhD degree in Philosophy (Nicolaus Copernicus University) and in Life Sciences: Foundations and Ethics (University of Milan). Currently he holds a position of an Associate Researcher in the Department of History of Science at the University of Science and Technology of China. His work is focused on the concept of homeostasis (and relative concepts of a balance and equlibrium) in the immune system.

Uzyskał stopień doktora filozofii na Uniwersytetu Mikołaja Kopernika oraz doktora *Life Sciences: Foundations and Ethics* na University of Milan. Obecnie zajmuje stanowisko Associate Researcher na Wydziale Historii Nauki na University of Science and Technology of China. Interesuje go kategoria homeostazy (a także równowagi i ekwilibrium) układu odpornościowego.

Alfred I. Tauber

Zoltan Kohn Professor emeritus of Medicine and Professor emeritus of Philosophy at Boston University. Philosopher and historian of science, originally trained as a biochemist and hematologist. Author of many publications on biochemistry, cell biology, biomedicine, the development of modern immunology, the doctor-patient relationship, and contemporary science studies. Author of *The Immune Self: Theory or Metaphor?*, *Patient Autonomy and the Ethics of Responsibility* and other books. Recipient of the Science Medal from the University of Bologna. Doctor of Philosophy *honoris causa* from University of Haifa.

Emerytowany profesor medycyny oraz emerytowany profesor filozofii na Uniwersytecie w Bostonie. Filozof, historyk nauki, wyedukowany również w biochemii i hematologii. Autor wielu publikacji z dziedziny biochemii, biologii komórki, biomedycy, rozwoju współczesnej immunologii, związku lekarz-pacjent i problemów w nauce. Autor książek: *The Immune Self: Theory or Metaphor*? i *Patient Autonomy and the Ethics of Responsibility* i in. Otrzymał takie wyróżnienia i nagrody jak: Science Medal Uniwerystetu Bologna oraz tytuł doktora filozofii *honoris causa* na Uniwersytecie w Haifie.

Witold Wachowski

Cognitivist philosopher (Nicolaus Copernicus University 2011), currently affiliated with the Centre for Philosophical Research in Warsaw. Manager of the Avant Projects supported by Ministry of Science and Higher Education. Research interests: Embodied, Embedded and Distributed Cognition; Science, Technology and Society Studies.

Kognitywista i filozof (Uniwersytet Mikołaja Kopernika 2011), obecnie związany z Ośrodkiem Badań Filozoficznych w Warszawie. Kierownik naukowego projektu Avant wspieranego przez Ministerstwo Nauki i Szkolnictwa Wyższego. Zainteresowania badawcze: ucieleśnione, osadzone i rozproszone poznanie; badania nad nauką, technologią i społeczeństwem.

Monika Włudzik

She is a doctoral student in literary studies at Nicolaus Copernicus University in Toruń. Her research interests include anthropology of the body and medical humanities. She translates texts on cognitive science, philosophy and practice-based art research.

Jest doktorantką literaturoznawstwa na Uniwersytecie Mikołaja Kopernika w Toruniu. Jej zainteresowania badawcze obejmują antropologię ciała i medyczne nauki humanistyczne. Tłumaczka tekstów z zakresu kognitywistyki, filozofii i badań nad praktyką artystyczną.

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