Representation Without Metaphysics

Representación sin metafísica

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Suárez, M. (2024): *Inference and representation: A study in modeling science*. Chicago, London: The University of Chicago Press.

Modelling is a customary research practice in all sorts of disciplines and areas of knowledge. From modest scale replicas of river basins to sophisticated mathematical accounts of astronomical properties, it seems reasonable to think of models as a (if not *the*) basic vehicle of understanding in science. However, it is hardly the case that present-day researchers are aware of the long tradition behind the tools of their trade as they know and cherish them today (Suárez, 2024: 19). Likewise, the same concern arises about the notion of *representation*, the overarching concept that lies behind the activity of modelling and informs the use of models in practice. In an age where ever-evolving technical advances make it virtually impossible not to become obsessed with the *how*, we seem to be at a constant risk of losing sight of our main purpose at the time of carrying out any kind of research activity that involves the representation of phenomena. In this regard, *Inference and representation: a study in modeling science* (Suárez, 2024) can be understood not only as a theoretically sound account of a particular conception of representation, but also as a guide for understanding modelling and representation practices past and present.

Inference and representation is arguably the culmination of a decades-long inquiry into the art of modelling in science. Throughout the chapters of this volume, Suárez presents a compelling and impeccably reasoned defence of his *inferential conception* of scientific representation— an idea partially developed in many of his previous works (e.g. Suárez, 2003, 2004, 2005, 2015, and, most notably, 2016; Suárez and Pero, 2019). This inferential conception or [inf] (Suárez, 2024: 166) aims to "answer pragmatic questions about modelling practice, not analytic questions regarding the metaphysics of the relation between our thought and the world" (id. 4). On this subject, Suárez aptly coins the slogan "representation without metaphysics" (id. 16)

to state his desire to put aside any questions about semantics or truth. Suárez, then, aims to focus exclusively on a theory of representation in context, for which he draws lessons from practice to build his theory (id. 5) instead of the other way around.

The volume contains nine chapters structured in three coherent parts that build upon one another. The introductory chapter serves not only as a declaration of intentions but also as a glossary of key distinctions around the concept of representation, such as *source* and *target* (the representing versus the represented objects; Suárez, 2024: 6) and *means* and *constituent* (the relation between source and target employed by scientists versus whatever relation is sufficient and necessary to represent the target; *ibid.*). This introduction is followed by the beginning of Part 1, *Modeling*, which focuses on the emergence of the modelling attitude (also recently explained in Suárez, 2025) and model typologies. The former is developed in Chapter 2, *The modeling attitude: A genealogy*, which traces the roots of this activity as we know it today back to the days of James Clerk Maxwell and William Thompson and their first attempts to derive a solution applicable to a real object and its properties from a series of abstractions (Suárez, 2024: 23). This so-called English-speaking school paved the way for a second wave of modellers in the German-speaking sphere who perfected the craft, with Hermann von Helmholtz's dynamic representations (1858, 1870) and Ludwig Boltzmann's version of Bildtheorie (1905/1974) as the most notable contributions. As argued at the beginning of the chapter, these men represented "the first generation of scientists and the last generation of natural philosophers" (Suárez, 2024: 20), a fact that helps Suárez strengthen the point that the scientific and philosophical perspectives on modelling ought to reconcile someday (ibid.).

Chapter 3, *Models and their uses*, is an illustrated recollection of the different types of models that exist, demonstrating how models function representationally (Suárez, 2024: 46). First, Suárez details Gelfert's (2017, following Black, 1962) classification, which distinguishes between *scale*, *analogue*, *mathematical* and *theoretical* models. The author then goes on to detail three case studies in modelling practice: the Forth Rail Bridge, Hesse's Kinetic Theory of Gases and the Hertzsprung-Russell law. By doing so, Suárez encourages the reader to make sense through practice of several issues that arise in modelling practice, such as the immense amount of background knowledge that is needed to explain a model as a representation of its target (Suárez, 2024: 64), how the building of a model is indeed a crucial part of the research process into the nature of the target (id. 65), and how approximate guesses and assumptions can be built into models to facilitate correct inferences (id. 73), respectively. These examples will

come up throughout the different chapters of the book to further illustrate or test particular claims.

Part 2, *Representation,* includes Chapters 4 of 7 and constitutes the core of the volume. These chapters detail particular problems in previous accounts of representation and develop a series of arguments in favour of a so-called *deflationary* account of representation, that is, one that focuses on representational function— the one aspect shared by all models (Suárez, 2024: 83). This part of the volume culminates in Chapter 7, where Suárez's [inf] is finally laid out in full.

As stated above, Suárez starts building his case for [inf] in Chapter 4, *Theories of Representation*, where he classifies the different attempts at tackling the issue of representation that have been made after the inception of the modelling attitude. First, Suárez establishes a distinction between the *analytic inquiry*, which is commonly associated with analytic philosophy and the metaphysics of relations, and the *practical inquiry*, related to philosophy of science, whose main concern is understanding modelling practices (Suárez, 2024: 84-86). In true analytical fashion, this distinction is followed by the definition of two additional contrasts: *reductive* against *primitivist* accounts of representation, according to whether the representational relation is defined in terms of something else (i.e. needs to be reduced to something else) or cannot be further analysed, and *substantive* against *deflationary* accounts of representation, depending on whether representation is considered a robust property of the relation between targets and sources or not (id. 90). Grasping these distinctions above is crucial to understanding the bold criticisms of substantive approaches that follow in the next chapter. Before moving on, Suárez anticipates these criticisms by describing the two principal substantial approaches to representation (id. 94-102): similarity or [sim] (the relevant relationship between source and target is one of similarity between their properties) and isomorphism or [iso] (the relevant relationship between source and target is a mapping between the elements in their domains).

In the chapter that follows, aptly named *Against Substance*, Suárez explores a range of arguments against [iso] and [sim]: the argument from variety, the logical argument, the argument from misrepresentation, and the necessity and nonsufficiency arguments (Suárez, 2024: 103-118). While these five counterpoints are enough to reject substantial accounts of representation as a working framework for the author's purposes, Suárez does list some refined versions of [iso] and [sim] that, while cannot be considered to remain substantive once their main faults are amended (strengthening, thus, the author's solid stance against this type of approaches to representation), can be useful for crafting a working portrait of representational function in context (id. 119-124).

In the same vein, in Chapter 6 Suárez provides the reader with a complete historical and conceptual background for a *semantic* view of representation (in contrast to *syntactic* and *pragmatic* views, as seen in Winther, 2020a, 2020b), or, in other words, one that asserts that "a scientific theory is a set of models" (Suárez, 2024: 136). In coherence with his goals to remain in context and focus on the means and not the constituent of the representation, Suárez's chosen departure point for [inf] is a *representational semantic view* (RSV), that is, one that does not precise a strict definition of what models are but rather simply considers that "models are representations" (id. 138-139). After that, Suárez goes on to explain deflationary views of representation in general and R. I. G. Hughes' (1997) denotation-demonstration-interpretation (DDI) account in particular, which alongside the RSV can be considered a stepping stone for [inf].

As previously mentioned, the complete account of [inf] is developed in Chapter 7, *Representation as inference* (Suárez, 2024: 155). Suárez builds this account around the concepts of *inferential capacity* and *representational force*, which are promptly and respectively defined by two succinct slogans: "nothing represents unless it has the capacity to license some surrogative inferences" (id. 157) and "nothing represents unless it is used as such by someone in some context" (id. 160). These two ideas, which belong solely to the realm of the source and do not impose any conditions on the target or its nature, are the only necessary conditions for representation and "can be understood only as part of a thickly normative set of modelling practices" (id. 186). Suárez manages, then, to accomplish his purpose of depicting a truly functional view of representation— in full alignment with a deflationary and minimal but inclusive approach to the issue: [inf], which —again— focuses only on the means of representation, may be thought of as a no-frills account of scientific representation that can be readily adopted in all sorts of research contexts and practices. In the second half of the chapter, the author challenges his own account of representation by applying the objections raised against [sim] and [iso] in Chapter 4 —which [inf] overcomes satisfactorily— and reviews the three case studies from Chapter 3 in the light of this new account of representation.

Lastly, *Implications,* the final part of the book, is devoted to the applications and consequences of [inf]. Chapter 8, *Lessons from Philosophy of Art*, takes a detour and explores the numerous analogies between artistic and scientific representation. As Suárez delves into conventionalist and phenomenological theories of depiction, Wollheim's (1968/1980, 1987) notion of *seeing-in* is compared to that of representational force, which prompts the author to describe the numerous parallelisms that give rise to an even broader application of [inf]. Finally, Chapter 9, *Scientific epistemology transformed*, ambitiously discusses the implications

of [inf] for the epistemology of science, as "an understanding of representation as inferential practice also has consequences for any practice-based epistemology of scientific knowledge" (Suárez, 2024: 225). After revising Ian Hacking (1983) and Nancy Cartwright's (2007) versions of experimental realism through the lens of a deflationary conception such as [inf], the author moves on to shed some light onto social practice in science, as "the inferential conception also endorses the insight that value judgments play a normative role in representational practices" (Suárez, 2024: 243). These lessons will culminate in a final discussion on the nature of scientific explanation and scientific understanding. Suárez concludes that, while "successful scientific representation does not amount to successful robust explanation" (id. 259), the ability to self-generate theoretical knowledge is not an intrinsic feature of models; conversely, the mere fact that a model is able to generate scientific understanding without the need of resorting to theory should be considered a valuable achievement in and of itself (ibid.).

However impactful the epistemological consequences of [inf] may unimately be, it is clear that different profiles of readers will find different lessons and nuances in this essay. For instance, most philosophers of science may appreciate its profuse explanations, the richness and depth of its examples and its abundance of references, while a certain breed of analytic philosophers might find some of Suárez's criticisms irritating at best. Nevertheless, it may be the case of model users where *Inference and representation* resonates the most: for many practitioners, the book will surely read as a thrilling inquiry into the *why* of their *how* at a time when they need it the most. More than a no-nonsense approach to representation in science, *Inference and representation* is a manifesto for a sense of purpose in scientific practice and a vindication of the modelling attitude. Though seemingly redundant at times for the initiated philosopher, it may be precisely this insistence in laying out a solid canvas of explanations what allows Suárez to reach audiences beyond the usual scope of his publications. Brilliantly crafted, *Inference and representation* excels at the difficult task of reconciling theory and practice, as it manages to bring theory back to earth and inform modelling practices in their contexts at the same time.

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