

Paolo BOZZI (1990): *Fisica ingenua*. Milano: Garzanti, pp. 365, Euro 12,91.

Naive Physics [Fisica ingenua] is a colorful, well-rounded book on psychology.

It is a book you can dip into: it has many entrance doors, which are independent but at the same time necessary to each other. Like an opera score, each part precedes and justifies the next one, but may also stand alone as a “solo”.

It is a science book, but just as P.A.M. DIRAC says that a mathematical equation must be elegant in order for it to be good, BOZZI also demands that the style of the language he uses be on a level with the idea it expresses (BOZZI 1990, 89). Thus, the words of this book are like numbers or musical notes in that they are more precise and less ambiguous than the language traditionally used in literature.

It may seem at first glance that the book is a kind of scientific autobiography but that is not what it is. Neither is it possible to relegate this book to the genre of writing which represents a critical review of an area of research, in this case Naïve Physics, even though the book is essentially about this field, which BOZZI refers to saying:

“So what is this ‘naïve physics’? [...] on the one hand, it is a system of beliefs, not immediately evident but much more consistent than we would commonly suspect, which concerns the aspects of inanimate objects that form part of our daily experiences; on the other hand, it is a system of relationships, mostly as yet unexplored, that connects these beliefs to each other and to our way of perceiving events in the world around us, i.e. the way in which the physical properties of objects appear to us” (BOZZI 1990, 28).

If you look up “naïve” or “folk” and their respective cross-references in the *MIT Encyclopedia of Cognitive Sciences* (1999) you will find more than fifty entries belonging to different scientific, theoretical and methodological fields. This suggests how many everyday empirical experiences are dealt with in Naïve Physics and how important they are. BOZZI clearly knows contemporary experimental literature on this topic extremely well, and in fact widely quotes and discusses this in his book. However, the book as a whole aims to show that current studies on Naïve Physics in effect test hypotheses which demonstrate that certain beliefs have their biological foundations in the functions of our cognitive system that have remained unchanged through time. This is the reason why it is not by chance that there are traces of these beliefs in ARISTOTLEs theories, as these theories are founded on the same unchanged processes (BOZZI 1990, 59). In other words, the history of Naïve Physics is evidence of the fact that the perception of objects and events in the external world survives changes in “gods” and fashions in current theories in psychology.

In addition to the two most popular explanations concerning the origins of Naïve Physics - one referring to subjects’ past experiences, the other to an implicit and unconscious system of knowledge - BOZZI proposes a third “source”: imagination (BOZZI 1990, 58). In the author’s view, the relationship between perceiving events and imagining them forms the most empirically appropriate basis for Naïve Physics.

In all his writings, BOZZI explains concepts with clarity, using a style which reads like the plot of a novel and has the shape and the colors of a musical composition. As part of the theme of “imagination” he suggests six possible ways of connecting perceptual theories

to Naïve Physics. He discusses and discards five of these possibilities, but leaves the sixth without a conclusion at the end of the first chapter. In fact, it then takes the rest of the book to develop this conclusion. As he says:

“Finally, it is possible to connect the beliefs of naïve physics to the affordances of the motions characterizing our daily experiences, and also to the language that attempts to express them. However, to explain this brief statement, which contains thousands of well hidden references to a whole world of things, is not an enterprise that can be limited to a few lines. This task will take the rest of this book to realize” (BOZZI 1990, 65).

The last work written by the author was for the conference organized in Padua in 2002 by S.C. MASIN to discuss Gestalt Psychology, Perception and Experimental Phenomenology (cf. SINICO 2003). BOZZI had taken time after the lecture and before writing the text for publication to think things over:

“These pages are supposed to be the written version of the ‘Main Lecture’ that I gave at the opening of the Padua meeting on Experimental Phenomenology. While giving my talk on that occasion, but most of all after the lecture, I couldn’t escape the impression that the audience – all academic colleagues working in fields of research more or less close to mine and almost all of them in fact old acquaintances of mine – were listening to what I was saying as if I was a grandfather telling his story for the nth time, recalling old times, characters long dead and buried, and ancient scientific procedures, even though it was surely interesting in parts and in its own way maybe even topical” (BOZZI 2002, 13).

This is not only a warning to avoid misunderstandings. This forms the basis of BOZZI’s style when he talks about science, publicly and privately. His stories, as a man and as a scientist, and the history of psychology as he tells it - that is Italian psychology since its foundation by BENUSSI in Padua, followed by MUSATTI, KANIZSA and METELLI - are never told as anecdotes. What appear to be individual anecdotes are in fact what many would consider to be hard and fast rules concerning methods and theories. A good example of this can be found in the discussion on stimulus error, at the conference dedicated to him held in Verona (1997). The warning about being careful to avoid stimulus error in order to comply with good research practice, as told by speakers from the laboratories of Padua and Trieste, was presented as if it were advice about the correct use of instruments, rather than an established rule from a philosophy of science textbook. After all, the “anti-theoretical” approach of the maestro KANIZSA was well-known:

“To speak quite frankly, I was envious of Kanizsas ability to quickly identify, simply by looking around, the most interesting phenomena, visual paradoxes – the things which anyone could have right under their noses every day but not see, especially if they are stuffed up with physics and physiology. Kanizsa was not really very keen on this subjects and it’s this that makes it easier for him to pinpoint problems. Easier, as I said, but nevertheless there is a critical step between the potential to do something and doing it. It’s not enough to have one’s mind free of scientific dogmatism [see Metzger’s Eleatic postulate] or even to be resistant to any kind of subtle theoretical activity. He had the ability to make the phenomena under observation to seem commonplace, cutting through to essential factors. This is not something that can be taught. However – I thought – it is something that can be handed down” (BOZZI 1990, 255).

I repeat, *Naïve physics* is not merely a book about the history of psychology in Trieste and Padua, although it also tells this story and is unique in its kind. Neither should it be regarded as a book that connects studies on Naïve Physics to the private life of a special person. It should be presented as a first intelligent treatise on many of the aspects in the hundreds of studies concerning children’s and adult’s beliefs about perceptual phenomena. These phenomena are the same that physicists or mathematicians translate into logical or mathematical equations, and that KANHEMAN and TVERSKY refer to implicitly in their research on decision making.

BOZZI surely had his own reasons for giving the following titles to the chapters after

the first one, which was titled "Naïve Physics": "Violins", "Tertiary Qualities", "Names and Things", "Anthropomorphisms", "Books", "Pendula", "Laboratory", "Projectiles", "Narrow". These reasons, however, BOZZI does not explain.

Once upon a time there was a carpenter [...], who made his grandson Paolo's first violin (Chapter 2). This is the first indication that music and musical tempo are a theme throughout this book. He refers to the metronome (an upside-down pendulum) and to Galileo comparing his pulse to the rhythm of a swinging lamp. He also mentions a whole host of characters in the villages of Gradisca and Sagrado where he grew up: the violin player at local dances Mosestigi; his schoolmate Gatteschi; Bellot from the shop next-door; the carpenter Quargnal; the amateur musician Giusto; the maestro Franzot; the grocer Pepi Patuna; the maestro Eulambio and the maestro Lipitzer (whose biography BOZZI wrote). All these people "kept time to the music". Paolo listened and then kept time to the music himself for the rest of his life. He made no distinction between music and science when playing the violin and composing music or when doing research on how children would describe an event as it develops through time to an hypothetical Chinese person and later on (BOZZI 1990, 255) when he recounts how he saw a fly-whisk, hanging on a vegetable stall in Milan. This gave him the impression that it was swinging too quickly, and he suddenly saw a connection between GALILEO and his lamp, KANIZSA, ARISTOTLE and the tempo of violin music.

"Surely, it is not because of past experiences that I was convinced that pendulum was swinging too fast. When I had seen pendula before they were evidently complying with textbook laws of physics. I had even seen pendula of the same length as the fly-whisk on the vegetable stall and they no doubt swung at the same speed as the one I was looking at. The only difference is that then I hadn't noticed the curious quickness of that rhythm. You sometimes see 'tempo giusto' written at the beginning of a piece of music. However, who has ever defined 'tempo giusto'?" (BOZZI 1990, 261).

The fundamental problem for BOZZI was to find the "natural" ("or *mittelmässig* as FRIESCHEISEN-KÖHLER, who I studied in depth, used to say", BOZZI 1990, 267) free motion of a pendulum given a specific ratio between the length of the pendulum and the amplitude of the period of oscillation. This search for the "tempo giusto" kept BOZZI busy. He spent a great deal of time in laboratories, among pulleys, rotors and springs, with participants to experiments invited to observe the tertiary qualities (see Chapter 3) of different oscillation frequencies.

"[...] when Professor Metzger (who sometimes came to Trieste from Münster and who had a wonderful eye for phenomena – really only one, since the other was fake) participated in my experiments, he reported that the pendulum seemed to be moving 'too slowly as if it were suspended in a viscous substance' – a sharp observation, which suggested the reason for the lack of natural motion" (BOZZI 1990, 276).

BOZZI presented his first results on pendula at the *XII Conference of Italian Psychologists* in 1958. MUSATTI – who was sitting in the front row – was full of praise. Someone in the audience suggested "publishing the experiment in a technical journal, while separately sending the references to *Galileo* and the history of science to a journal for philosophers. I thought this idea was totally wrong [...]" (BOZZI 1990, 294). Undaunted, BOZZI ends Chapter 8 of *Fisica Ingenua*, entitled "Laboratory", with nine bibliographic references, six of them for ARISTOTLE, GALILEO and the History of Science. In the following years, his research into the perception of "tempo giusto" in falling masses and inclined planes, and into the "tempo giusto" and the "right shape" for the trajectories of projectiles continued to contain references to the theories and basis underlying these studies from classical times. This is typical of BOZZI regarding all of his bibliographic references. This may be the reason why he dedicates an entire chapter (Chapter 6) to books, placing in the same

category DANTE, Pinocchio, the books of his father's library, LUCREZIO, KANT, RUSSELL, W. JAMES and "Fisica dilettevole" ("Physics for Pleasure") – even if it is not clear whether he is referring to the Bemporad or Sonzogno edition. It is in this chapter that he introduces Leo. Leo is almost the same age as Paolo and they met during the night in the tunnels of the watchtower near Paolo's house, forced there by an air-raid warning. He was "bundled up in an S.S. uniform and absurdly armed with a rifle" (BOZZI 1990, 215). Paolo and his father hid him from the Nazis in their cellar and this marked the start of a lifelong friendship. There was a period of intense correspondence between Paolo and Leo when the latter was invited, as a result of his reputation, to work in Montpellier as assistant to professor BRAUN-BLANQUET. Leo had never even finished the third year of a technical training course and was unemployed. He had never met a "scientist" in his whole life and yet went to France as botanist and self taught naturalist with two papers already published and some orchids bearing his name. It was Leo who sent Paolo his first edition of ARISTOTLE's *Physics* from France.

Just as I said at the beginning that there are many doors to enter BOZZI's book on Naïve Physics, so there are many exits.

I would like to conclude by referring to a sentence from his last work, which I mentioned earlier, *Experimental Phenomenology* (2002). This sentence helps to clarify many things regarding those who taught BOZZI, how they observed the world and their empirical approach to science. It also throws light on BOZZI's concept of Naïve Physics and gives a clear definition of the particular essence of Experimental Phenomenology that, still today, deserves attention:

"Experimental Phenomenology is a branch of the Natural Sciences and is part of the naturalistic approach to the theory of knowledge. I believe it forms the basis of a naturalistic concept of knowledge" (BOZZI 2002, 15).

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