

EINSTEIN *meets* MAGRITTE : The Scholar, Terpsichore and the Barfly*

Diederik Aerts

Center Leo Apostel
Free University of Brussels,
Brussels, Belgium
e-mail: diraerts@vub.ac.be

We present a short play that has been written for three actors: the Scholar, the muse Terpsichore and the Barfly. The play was performed as opening act during the 'Einstein *meets* Magritte' conference at the Free University of Brussels from 29 May till 3 June 1995. The scholar was interpreted by Moira Pastra, the muse by Catherine Fitzgerald and the barfly by Ross Feller. The author wants to thank Zygmunt Bauman for the suggestive ideas in his correspondence about the conference, An Vranckx, Catherine Fitzgerald, Moira Pastra and Ross Feller for their stimulating reading of the text - the whole concept of the play was created during this interaction about the text that I had with them - and Jan Broekaert for his help with the direction of the play.

1 The Elysean fields

The scenery: It is a sunny day and Terpsichore sits in the gras under a tree. The scholar stands and watches with a meditating smile over the fields. The barfly stumbles around with an empty bottle of wine in his hands.

Barfly (only half sober and shouting at the sky): Science and art. Do they embrace reality? Or do they make wicked plans to seize the world?

Terpsichore (shocked by the raspy voice of the barfly, but then looking again at the beauty of the landscape): Once upon a time, in the cradle of mankind, they were one. They walked hand in hand in Elysean fields, washing their hands in gurgling brooks, and resting down in the peace of a mountain side. The muses

*Published as: Aerts, D., 1999, "The scholar, Terpsichore and the barfly", in *Einstein meets Magritte: An Interdisciplinary Reflection* eds. Aerts, D., Broekaert, J. and Mathijs, E., Kluwer Academic, Dordrecht.

that dwelt near the springs of creation, they were the daughters of heaven and earth, custodians of knowledge and art, those that inspired life.

The white clouds in blue skies were their audience - the playing of their clear flutes, the rippling song of their choirs, their scathing parodies and noisy comedies, and exciting stories. Infused by a breathless admiration for the stars, their dances were as bewitching as their poetry of love.

Scholar (looking critically at the muse and neglecting the presence of the barfly, she reads from her book): Clio reflects on the things of the past, the stories that have been entrusted to her, history. Urania examines the stars, their movements and the powers that move them in their turn: physics. Eutherpe is the flute. But hers is also the drama of sounds and their meanings. Thalia is taken by the laughter of men. She looks on the bright side of life, and leaves it up to Melpomene to show some sympathy for the dramas and turbulence of man: his struggle with fate. Terpsichore fuses cheerful voices into harmonies, building alliances and connections. Erato sees to love, so she takes care of human perpetuation. Polyhymnia dances the celebration of human existence, while Caliope sponsors man's attempt to grasp human action into theories and descriptions [1].

Terpsichore: Science and art have walked hand in hand from the dawn of consciousness. They stood together, until rational forces impelled them along different paths. They would gaze at each other from a distance with admiration, or suspicion or even contempt. Science and art manifested themselves as man's grasp of the world, handing him the tools to participate in creation. They expressed his dreams about future worlds and reflected his anxieties about death and nothingness, his struggle and alliance with Fate. They tried to answer his many questions as to what could be the meaning of life and, inevitably, to satisfy his urge for power.

2 The stuff science and art are made of

Barfly (now suddenly interested and talking to the two others): It was a sunny day in the Peloponnesus. Pythagoras had gone for a walk when he came across a forge. The blacksmith was making long irons. He was sweating and working really hard. After all, the irons had to be ready before next week. They were to support a stage in Pieria, very close to Olympos. There was to be a great spectacle. It would bring together artists and scholars from all over the place. All cities had publicized the event from the rooftops, calling it "Uranus meets Appollo", science meets art.

When he passed the smithy, Pythagoras was deep in thought and didn't pay much attention to the blacksmith's heavy work. He stopped in the shade of an olive tree and his thoughts were disturbed by the loud beat of the hammer on

the irons. The smith was producing irons of different lengths, together, blow by blow, fast, trying to do as much while the metal was red hot. Pythagoras began to notice how the different sounds from the forge made a beautiful harmony. He picked out a recurring melody, one tone, another one -slightly higher, and yet in perfect harmony with the one that preceded it. Then another, also in harmony with the first. And so on. Pythagoras put his lips together and whistled, and tried to follow the smith's tune. He went over to the poor man who was sweating heavily. The smith was taken aback to see a mathematician interested in his work.

Scholar (reading again from her book): This is how Pythagoras discovered that sound harmonies were directly related to the unit length of the iron bars that the smith was preparing for the stage of "Uranus meets Appolo". He noted that two iron bars, one twice as long as the other, resonated in perfect harmony with another bar twice their length [2].

Barfly: Pythagoras thanked the smith for his patient demonstrations and rushed off home. He began experiments with strings and the sounds which they made.

Scholar: The pythagorean system of music that arose from these discoveries not only started an entire tradition of Western music. It placed music in the thrall of mathematics forever. And yet, it would take physicists many centuries to reveal the ground for Pythagoras' discovery. When it became clear to them that sound is carried by vibrations of air molecules, they understood why differences in sound vibrations should be explained by the length of the bars which produced the sounds. This simple mechanism appears to be the ground for harmony.

Terpsichore: Pythagoras' discovery is the stuff science and art are made of. Many, if not all scientists after him, were guided by an identical quest for simplicity and harmony, beauty and perfection.

3 The harmonies of the spheres

Scholar: Johannes Kepler's explorations into the movements of the planets are an example. Kepler was obsessed by the idea that the structure of the planetary system could be related to the five regular polyhedrons. He took successive canonic spheres to inscribe the movements of the planets. His astronomy referred to pythagorean numeric speculations, and he was convinced the planetary system reflected the same mathematical harmonies. To his mind, the scientist was to grasp the same mathematical laws by which, obviously, the Maker had been inspired [3].

Barfly: Well, Keppler must have been disappointed...

Scholar: He was, when his observations of planetary movements revealed symmetries different to those he wished to find. Planets were not seen to describe polyhedrons. Nevertheless, the laws that Kepler formulated did open the way to Isaac Newton's discoveries.

4 The Principia

Barfly: I know the story well. Don't we all? It all happened when Newton had gone for the weekend to his summerhouse. He was obsessed at the time with the movements of the planets and the laws that Kepler had extracted. Nobody knew what they meant, but Newton was positive that they lead to a great secret. One sunny day - another sunny day - he went off for a pick nick and set out through the fields and the woods. When the sun was high he was starving and sat down under an apple tree, and began to devore his cheese sandwiches. His thoughts were far away, turning over Kepler's second law, when out of the blue an apple fell from above and nearly hit him on the head.

Terpsychore: Then it dawned on him the secret behind the motions of the planets. The force making the apple fall to the ground had to be the same force keeping the moon in its orbit about the earth, and the planets around the sun. What a discovery! The moon was not connected to the earth by some means, she was constantly falling to it, but in such a way that she always fell to one side, falling over and over again, never reaching her destination.

Barfly: He dropped his sandwiches and ran home - another one!

Scholar: Indeed, this is how Newton proved that the force of gravity caused all planetary motions, and he formulated his findings in the laws carrying his name[4].

Terpsychore: And then another area of reality opened up, an area that was even more beautiful than Kepler had ever conceived. Reality proved greater than human prejudice took it to be, but it also appeared much more cunning and sly.

Barfly: In my opinion, Newton's laws took away one misunderstanding, only to replace this with a new type of belief. This one took reality to be a large machine, a 'clock- work-orange', an automaton.

Terpsychore: Some would say a miracle had happened. Nature was there, independent of man, playing its own game.

5 The Camera Obscura

Barfly: Yes, but man was pushed into silence. He only had his eyes left. He could only watch like a camera.

Scholar: Indeed, the camera obscura was a Newtonian preconception, a place where reality and image coincided, and it substituted the Self with the passive retina. The lens analyzed the light beams that streamed in and hit the retina. This is how the retina viewed the projection as 'image'. When Newton's laws were polished by Lagrange and Hamilton, the prejudice was only to be confirmed. Important contemporary sections of art were being invaded by the power of this Newtonian paradigm. By that same process visual art was reduced to the mere act of looking, whereas before it had explored the whole of man's vision.

Terpsichore: 'Seeing' was replaced by 'looking'. Perspective brought us painters that pre-empted the photograph.

Scholar: The pendulum that propelled this Newtonian prejudice came to its climax at the end of the last century. The conceit of the 'camera obscura' even affected language, language the thing we can see in the dark, without camera obscura, without lens and retina. It reduced the understanding of what language was to a mere instrument of the romantic and emotional side of reality. It was no longer taken for a valuable attempt to build models of reality. On the other hand, language became the object of an obsessive attempt at formalization, the logical structure of the world, the Wiener Kreis [5].

6 The square root, the bird, the pipe, the glass and the key

Barfly: Till Kurt Gödel came along and said anyone following this path was sure to bump his head into a cardboard wall. vg,I guess that is when the paint began to peel.

Scholar: No earlier, the first hesitation was only skin deep. Physics was beginning to make apparently 'accidental' discoveries: Max Planck and the radiation of the black body, the quest for the atom model.

Terpsichore: The arts were drifting into the same model. When photographic techniques became available, they did away with the relevance of camera obscura painting. In this way, they were confronted with the trivialities of the prejudice in which they had become embroiled.

Barfly: And then probably Albert Einstein en René Magritte stepped onto the stage [6].

Terpsichore: What would Magritte and Einstein have talked about, had they met over a glass of wine in a candle lit Brussels restaurant near the Grand Place? Would they have talked openly about the motives that inspired both? Would they have discretely concealed the memory of the whispering voices of the muses, the voices they knew so well?

Barfly: Or did they put their cards on the table, and reveal their sources?

Scholar: Einstein might recall how his quest for beauty had seduced him into formulating a theory of relativity that woke mankind into a world that would never be the same again. And how this world had caused a first blow to the Newtonian camera obscura. After this blow, the retina and the lens lost trust in each other. Einstein might say how man returned to the picture of reality as a by-stander, one occupied with watches and measuring rods. He might continue his story, hinting at his struggles with quantum mechanics which had shown a glimps of more exotic places, so staggering as to hold him back from attempting to explain the formal abstraction that he thought bore the imprint of another kind of being. Quantum mechanics brought a sledgehammer blow to the old Newtonian prejudice. The lens and retina were blown apart, and the blindman was forced to sacrifice his worldview in order to learn to see.

Barfly (in a rastafarian rhythm): You see, I am here again, I am, speaking loud and clear, there is so much of me, sensual, colorful, smelling loud and swearing.

Terpsichore: Einstein would complain bitterly, that the popular classification of his work as an opponent of quantum mechanics did him no justice. If only they could see how much more sweat and emotion that he had spent on quantum mechanics than on relativity.

Barfly: Yes, I remember that they all thought that was his babe.

Terpsichore: He would try to convince Magritte how it was actually his deep interest and fascination that had warned him about the cuts and cracks that quantum mechanics had already caused. And why he had refused to chime in with the enthusiasts of the first hour, who had been primarily interested in destruction, deconstruction, ruins, blindness rather than seeing anew. Whereas he had always wanted more. He wanted to find out what was going on, why, and where this was to bring mankind. He wanted to 'see' again. Magritte smiled at this turn of the conversation, listening to Einstein's fervor.

Barfly: Yes, of course he understood very well... All those clouds and pipes and bowler hats

Terpsychore: He would have pointed out that the ordinary is never ordinary and light up his pipe.

Scholar: He would conjure up an image for their meeting, reflecting and transforming it, and reflecting it once again. He would tell how he 'systematically' disrupted each dogmatic image of the world and was not just exploring just new expressive techniques.

Terpsychore: He preferred exploring the nature of this expression, which was generally taken for granted, even by his best friends, the avant-garde.

Barfly: But are we so sure about that?

Terpsychore: Einstein would run a hand through his hair and say that he was actually in it for the deeper beauty and simplicity of the nature of things.

Scholar: He would recall the frustration of the discussions he had had with many of his colleagues, who mostly had been interested in the formal aspects of the new theories, and not in their meaning.

7 René and Albert

Barfly: By this time, Magritte would have told Einstein to call him René and asked him if he would call him Albert.

Terpsychore: Having come this far, they would realize how much their mutual explorations were inspired by a common pattern; Magritte's canvasses inviting the observer to doubt every reality that is revealed to him. Each of his creations carry the suggestion that it is actually something else, and even many different things at the same time. In this way, the object carries with it the possibility of all the other objects that it might have been. Some of these potentialities are realized in the interaction with the observer, but ultimately which of the potentialities is realized is decided through the interaction between the observer and the object.

Barfly: interaction, potentialities, quantum mechanics?

Terpsychore: ...situations which have the potential to toss and turn about the moment any measuring device comes into play; situations that show how measurement determines which of the potentialities will be realized when it enters the scene.

Scholar: In quantum mechanics, the state of an entity is determined by the Schrödinger wave function. In most cases, the measurement changes the state

of the entity under study, and a particular measurement result can only be predicted with a certain probability, depending on the state and the measurement[7].

Barfly: Albert and René would call for another bottle as the candle flickered, and talk into the wee hours of the morning.

8 References

- [1] **Hinds, S.**, *The metamorphosis of Persephone: Ovid and the self-conscious Muse*, Cambridge University Press, Cambridge, 1987.
- [2] **Gorman, P.**, *Pythagoras: a life*, Routledge and Kegan Paul, London, 1979, **De Vogel C.J.**, *Pythagoras and early Pythagoreanism: an interpretation of neglected evidence on the philosophischer Pythagoras*, Van Gorcum, Assen, 1966.
- [3] **Kepler, J.**, *Le secret du monde*, Les Belles Lettres, Paris, 1984, **Gerard, S.**, *Kepler: astronome, astrologue*, Gallimard, Paris, 1979, **Curtis, W.**, *Astronomy from Kepler to Newton: historical studies*, Variorum, Aldershot, 1989, **Field, J.V.**, *Kepler's geometrical cosmology*, Athlone Press, London, 1988.
- [5] **Aerts, D.**, *Construction of reality and its influence on the understanding of quantum structures*, International Journal of Theoretical Physics, **31**, 1815, 1992.
- [6] **Aerts, D.**, (ed.), *Einstein meets Magritte*, Kluwer Academic Publishers, New York, 1995.
- [7] **Heisenberg, W.**, *Über den anschaulichen Inhalt der quantentheoretischen Kinematik und Mechanik*, Zeitschrift für Physik, **43**, 172, 1927, **Bohr, N.**, *The quantum postulate and the recent development of atomic theory*, Nature, **121**, 580, 1928, **Schrödinger, E.**, *Die gegenwärtige Situation in der Quantenmechanik*, Naturwissenschaften **23**, 807; 823; 844, 1935, **Einstein, Podolsky and Rosen**, *Can quantum-mechanical description of physical reality be considered complete?* Physical Review, **47**, 777, 1935.