Mechanisms of science

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ABSTRACT. This is an introduction to the mechanisms of scientific research, from the ancient times up to nowadays, from the perspective of game theory. We first discuss game theory in general, and the main tools of social science. Then we go on a discussion of old science, from the game theory perspective, followed by a similar discussion of modern science, and its various complications. Finally, we examine various things that can happen, in the future, to our scientific research, depending on the model used.

Preface

You are certainly committed to science, most likely as a science student, with learning more things, with no questions asked, being your daily occupation. And so are we, me and my scientific colleagues, with learning more things, on this or that topic of our choice, that we chose for various reasons, with no questions asked, being our daily job.

This being said, why not asking that unasked questions, say as a matter of better knowing who we are, and what we want. What is science, scientifically speaking?

And here, the starting point can only be individual science, that is, what you can learn and discover yourself, as an individual. Which brings us right away into the human brain, and its functioning. There is a lot of knowledge accumulated there, and everything is alive and vibrant, with various pieces of scientific knowledge fighting each other, and with the better and newer ones regularly replacing the older, weaker ones. Which sounds quite exciting, reminding things like games, or evolution, or economics.

When getting to science as we know it, that is, as something collective, things only get more interesting. Again, everything very competitive here, with all sorts of pieces of knowledge fighting each other, and with the new, better ones usually winning, over the time. Which again reminds things like games, or evolution, or economics.

So, as a conclusion to this, is our human science a game? It certainly does look so, hope you agree with me here. But then, in view of this, why not having a look at science, past, present and future, precisely from this point of view, that of game theory.

Which sounds quite good, so here we are now social scientist apprentices, trying to find the appropriate social science tools, and beware of all the damn stuff that can be found there, as to have a cold, scientific look at what we love the most, science.

We will be talking about such things in this book. Our guide will be, of course, the father of modern social science, which is Karl Marx. So, expect all sorts of dirty and blasphemous things, Capital style, with money being of course replaced by other things, basically scientific fame, that all players in the game are trying to achieve. And with the comment that, when talking about science in our modern times, where things like scientific grants are ubiquitous, good old money itself is a good indicator, too.

PREFACE

More in detail now, the book is organized in 4 parts, with Part I discussing game theory in general, and the main tools of social science, then Part II going into a discussion of old science, from the game theory perspective, then Part III dealing with the modern science, and its complications, such as the money issues mentioned above, and finally Part IV examining various things that can happen, in the future, and let's hope not.

Many thanks to my cats, for their daily social science teachings. Normally I am quite used to Karl Marx, his methods and philosophy, having been raised, as a teenager, in a communist country. But now that I live and work in the West, sometimes I tend to forget the basics, as everyone here does. Fortunately my cats are there, reminding me on a daily basis the main principle of science, and of marxism: everything that happens, must happen for a reason, and more specifically, for a quite down-to-earth reason.

Cergy, January 2025 Teo Banica

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Part I

Game theory

I've been around the world Looking for my baby Been around the world And I'm gonna, I'm gonna find him

1a.

1b.

1c.

1d.

1e. Exercises

Exercises:

Exercise 1.1.

EXERCISE 1.2.

EXERCISE 1.3.

EXERCISE 1.4.

EXERCISE 1.5.

EXERCISE 1.6.

2a.

2b.

2c.

2d.

2e. Exercises

Exercises:

Exercise 2.1.

EXERCISE 2.2.

EXERCISE 2.3.

EXERCISE 2.4.

Exercise 2.5.

EXERCISE 2.6.

3a.

3b.

3c.

3d.

3e. Exercises

Exercises:

Exercise 3.1.

Exercise 3.2.

Exercise 3.3.

EXERCISE 3.4.

EXERCISE 3.5.

Exercise 3.6.

4a.

4b.

4c.

4d.

4e. Exercises

Exercises:

EXERCISE 4.1.

EXERCISE 4.2.

EXERCISE 4.3.

EXERCISE 4.4.

EXERCISE 4.5.

EXERCISE 4.6.

Part II

Old science

They've got cars big as bars They've got rivers of gold But the wind goes right through you It's no place for the old

5a.

5b.

5c.

5d.

5e. Exercises

Exercises:

Exercise 5.1.

Exercise 5.2.

Exercise 5.3.

EXERCISE 5.4.

EXERCISE 5.5.

Exercise 5.6.

6a.

6b.

6c.

6d.

6e. Exercises

Exercises:

EXERCISE 6.1.

EXERCISE 6.2.

Exercise 6.3.

EXERCISE 6.4.

EXERCISE 6.5.

Exercise 6.6.

7a.

7b.

7c.

7d.

7e. Exercises

Exercises:

Exercise 7.1.

Exercise 7.2.

Exercise 7.3.

EXERCISE 7.4.

Exercise 7.5.

Exercise 7.6.

8a.

8b.

8c.

8d.

8e. Exercises

Exercises:

EXERCISE 8.1.

Exercise 8.2.

Exercise 8.3.

EXERCISE 8.4.

EXERCISE 8.5.

EXERCISE 8.6.

Part III

New science

I never had to say goodbye You must have known I wouldn't stay While you were talking about our life You killed the beauty of today

9a.

9b.

9c.

9d.

9e. Exercises

Exercises:

Exercise 9.1.

Exercise 9.2.

Exercise 9.3.

EXERCISE 9.4.

Exercise 9.5.

Exercise 9.6.

10a.

10b.

10c.

10d.

10e. Exercises

Exercises:

Exercise 10.1.

EXERCISE 10.2.

Exercise 10.3.

EXERCISE 10.4.

Exercise 10.5.

EXERCISE 10.6.

11a.

11b.

11c.

11d.

11e. Exercises

Exercises:

EXERCISE 11.1.

Exercise 11.2.

Exercise 11.3.

EXERCISE 11.4.

EXERCISE 11.5.

EXERCISE 11.6.

12a.

12b.

12c.

12d.

12e. Exercises

Exercises:

EXERCISE 12.1.

EXERCISE 12.2.

Exercise 12.3.

EXERCISE 12.4.

EXERCISE 12.5.

EXERCISE 12.6.

Part IV

The future

Obscured by the sun Apocalyptic clash Cities fall in ruin Why must we die

13a.

13b.

13c.

13d.

13e. Exercises

Exercises:

Exercise 13.1.

EXERCISE 13.2.

Exercise 13.3.

EXERCISE 13.4.

EXERCISE 13.5.

EXERCISE 13.6.

14a.

14b.

14c.

14d.

14e. Exercises

Exercises:

Exercise 14.1.

EXERCISE 14.2.

Exercise 14.3.

EXERCISE 14.4.

Exercise 14.5.

EXERCISE 14.6.

15a.

15b.

15c.

15d.

15e. Exercises

Exercises:

Exercise 15.1.

EXERCISE 15.2.

EXERCISE 15.3.

EXERCISE 15.4.

EXERCISE 15.5.

EXERCISE 15.6.

16a. 16b. 16c. 16d.

16e. Exercises

Congratulations for having read this book, and no exercises for this final chapter.

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