Is it possible to apply Richardson's model for solving conflicts?

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Introduction

This article summarizes a discussion via researchgate.net. It is known that Lewis Fry Richardson has studied mathematical model for conflict resolution. For instance: http://www.math.purdue.edu/~smw/m303/resources/war.pdf

My question is: Considering prolonged conflicts between Ukraine-Russia and also between Israel-Palestine, then is it possible to apply that Richardson's model to help solving those conflicts? Perhaps that model will be useful for policy makers and peaceful efforts.

What is your opinion on Richardson's model? Is it useful for conflict resolution? Your comments are welcome.

Answers:

[1] **Ioannis Karatsompanis**

As you already know, Richardson's models describe quite simplistic situations arising mainly from WWI. For instance in Vietnam's war Le Duk Tho (Vietnam's politician) was already considered the war as a three player game: Vietnam, US administration and US public opinion. Obviously Richardson's models do not apply in this case. Today's conflicts are much more complicated, involving energy diplomacy, the markets and many other factors which are not easily fit into a ODE model.

[2] **Victor Christianto**

Thank you, Ioannis, for your answer. Yes you are right that The original Richardson's model is too simplistic for today problems. But i mean is it realistic to expect that some kind of modified mathematical model is still useful for solving conflicts? Thanks

[3] **Ioannis Karatsompanis**

Hi Victor. The case of Israel - Palestine is actually a real estate problem. There are many protocols e.g. Brams - Taylor, for fair division. Hence the on-going conflict shows that nobody wants a "fair" solution based on some status quo. Thus we fell into the Rubinstein bargaining model, which is what we actually see all these years. For the Ukraine-Russia case I don't have any opinion and for what it worth it seems as an old Czar chess play.

[4] **Victor Christianto**

Dear Ioannis, thank you for your answer. Would you mind to explain more on Rubinstein bargaining model?

Btw, i just found a long article on conflict resolution by R.J. Rummel, which perhaps you may find interesting: http://www.hawaii.edu/powerkills/TJP.CHAP10.HTM

[5] **Ioannis Karatsompanis**

Dear Victor, here is a pie of magnitude 1. I propose (x,y) i.e. I take x and you take y, where of course x+y=1. If you accept game is over. If not then you propose (x',y'), etc. The pie shrinks over time by a factor d1<=1 for me and d2<=1 for you. The solution to this problem was a mystery until A.Rubinstein solved it at 1982, iirc. Here it goes: I take (1-d2)/(1-d1d2) and you take d2(1-d1)/(1-d1d2), in a one shot game. Guess who takes the most: Yes, the one with the greater endurance and patience. Exactly what we see there all those years.

[6] **Victor Christianto**

Thanks Ioannis, yes i just found Rubinstein paper at http://econ.ucdenver.edu/beckman/Research/readings/rubinstein-econometrica-82-bargaining.pdf

Somewhere i also read about differential game, my question is: is it possible to express Rubinstein bargaining model in differential game? Another question: how come that Rubinstein bargaining model is related to Israel-Palestine conflict, because it appears too simplistic. I mean there are other countries that play their role in this conflict too.

[7] **Ioannis Karatsompanis**

Fundenberg and Tirole place Rubinstein on multiple stage games, p.113, while they examine differential games on p. 520 in Markov equilibria. But this is only technical. Of course you can state a bargaining problem in a "differential mode" form and this is what Francis Ysidro Edgeworth did in 19th century with his famous box and his bargaining curve namely the steepest descent of normals to indifference curves. Isaacs book on the other hand, the only accessible, is mainly example-driven. I recall a major example there, the so called protracted war model (attrition and attack in F.T. terminology) which somehow advances Richardson's models. Now, concerning the simplicity of Rub. model, things are much more worse. He proposes a one shot game where you take that I'll take this. However what reality reveals is that players don't do this: They keep exchanging "offers", often in the form of civilians bombarding (the shrink factors d1, d2 in the form of political cost). But if you try to match those quantities numerically you'll be disappointed.

[8] **Ioannis Karatsompanis**

Concerning those other countries you are referring to, their strategic significance is null, since they have zero casualties and hence are not called by their people to explain consequences of their decisions.

[9] **Victor Christianto**

Thank you so much, Ioannis. Yes, i think we should extend to repeated game/bargaining. And also the cost of destruction perhaps should be introduced. Anyway, do you think that there are other elements in the real process which are not considered in

Rubinstein bargaining model? For instance, perhaps there is some kind of ideology of "development is possible after destruction" in the Israel side? (I mean the same ideology of the "order out of chaos" kind). Thanks

Concluding remarks

From this discussion, we can conclude that Richardson's model is too simplistic, and perhaps a modified form of Rubinstein bargaining model can help to explain Israel-Palestine conflict. But of course, many models remain models, i.e. they are pretty far from the real situation.

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