Paraconsistency, Social Software and Games

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Slogan: Paraconsistency for Human Behavior!

Paraconsistency helps us understand rational and interactive behavior.

Slogan: Game Theoretical Pluralism

Different game theoretical problems require different logics.

Outlook of the Talk

- Social Software and Paraconsistency
- Game Theory and Paraconsistency

Social Software and Paraconsistency

Social Software

The term *social software* was coined by Rohit Parikh in his 2002 paper.

Social software can be viewed as a research program which studies the construction and verification of social procedures by using tools in logic and computer science.

By definition, it relates closely to a variety of neighboring fields including game theory, social choice theory and behavioral economics.

Rohit Parikh, *Social Software*, “Synthese”, vol. 132, pp. 187-211, 2002.

Social Software

Let us read from (Parikh, 2002):

> *I want to argue that (...) no doubt we shall never have social procedures which work ideally, we can nonetheless have a theory of social procedures which is analogous to the formal theories for computer algorithms which exist in computer science. I am referring here to a whole group of theories, some of which have come into existence during the early seventies and some are newer.*

Social Software

I argue that the above quoted claim and, in general, the research program of social software, suggest the inclusion of formal tools beyond classical logic to study social software.

Plurality of social procedures and their various anomalies (such as lies, jokes and speech acts) necessitate a pluralistic approach.

Social Software

- Contradictions occur in social phenomena: People lie, cheat, make mistakes, and misunderstand each other, they happen to be wrong in their thoughts and actions.
- Various data from behavioral economics indicate that people usually do not reason in the way that the classical logic predicts (Kahneman, 2011; Ariely, 2008; Ariely, 2010).

  This observation, by no means, entails that people always reason in a non-classical logical way. However, it casts doubt on the soundness of classical logical tools and encourages us to consider non-classical logical apparatus.

Simple Example

As an illustration, let us consider a very simple example, the two horsemen, that Parikh also discussed.

Example Two horsemen are on a forest path chatting about something. A passerby, the mischief maker, comes along and having plenty of time and a desire for amusement, suggests that they race against each other to a tree a short distance away and he will give a prize of $100. However, there is an interesting twist. He will give the $100 to the owner of the slower horse.

Simple Example

I maintain that the way negation (or game duality) treated in this puzzle is not strong enough to generalize, and more importantly can be limiting for the overall agenda of social software. The idea of switching to the dual role (which is obtained by using the classical negation) is not a universal strategy that can apply to other similar games. In general, players do not necessarily deal with negated statements in this fashion. The dual game in this example possesses some simple properties: it is easier to determine, and the negation of *slow* is clear to decide. Yet, such properties do not exist in all games. Can we play checkers in this way? Can we play football as such?

Simple Example

For example, for the games with three players, computing the dual game and permuting the roles for the players are not trivial (Olde Loohuis & Venema, 2010). If we modify the example by allowing a third player, then we can have 2 “dual" games - the permutations of horsemen and horses where nobody rides their own horse. The number of “dual" games increases if we consider even more players and additional intermediate states besides slow / fast.

Russellian Barbers

Let us consider two Russellian barbers who can only cut the hair of the people who cannot cut their own hair themselves.

Assume that in the case of Russellian barbers, they were asked to compete in a game where the one who gets his hair cut fastest wins. Let us apply the solution concept which we mentioned for Two Horsemen example. If the barbers switch to the dual game and cut each others hair, they will be slow, and not even cut the hair. Then, it seems, then each barber should cut his own hair. If they commit themselves cutting their own hair, then they can compete to be the fastest, it seems.

Russellian Barbers

Yet, recall that these barbers are Russellian who only cut the hair of the people who cannot cut their own hair themselves. Thus, the strategy of switching to the dual game does not directly work for Russellian barbers.

The logical implications of this problems aside, this example illustrates how non-classical ideas can introduce interesting cases to social software.

Strategic Voting

Parikh mentions the well-known theorem of Gibbard and Satterthwaite that suggests that any social choice function which takes preference orderings of the voters as inputs, and returns a social preference ordering for the society, will be vulnerable to manipulation in the form of strategic voting.

Here, Parikh discusses the United States presidential election of 2004 as an example of Gibbard and Satterthwaite theorem, and concludes that “this is murky territory and I shall not venture further into it."

Strategic Voting

I believe that strategic voting and manipulations in elections constitute a very interesting focal point for social software, and they can be helpful illustrating the need to expand the agenda of social software.

If we consider voting as a form of utilitarian calculus, and take strategic voting as a legal and permissible strategy in it (which it is), then we will be puzzled with the results like Gibbard and Satterthwaite or Arrows Impossibility Theorem or even Sens result on the Impossibility of Pareto Liberal.

Strategic Voting

One of the main reasons for negative results in the social choice theory is that the theory does not generally take the moral and ethical compass of the society into account. Moreover, such considerations are not even representable in most social choice theories. The reason why people did not vote strategically in the 2004 US elections is not only epistemic, and perhaps epistemic reasons do not even count among the main reasons.

Strategic Voting

One of the real reasons, in my opinion, is that many people (if not most) people consider strategic voting as a betrayal to their political conviction for understandable reasons. For many people, voting represents their commitment and loyalty, and honoring their own opinions, and even if they feel that the party/candidate they support will clearly not win, they do not switch to another one for the aforementioned reasons.

Violating Obligations

Chisholm discusses those imperatives which are telling us what we ought to do if we neglect certain of our duties, and argues that the deontic logic (with its deontic modality O) is not sufficient to formalize them (Chisholm, 1963).

He argues as follows.

Violating Obligations

Ordinarily the rules of a game do not tell us how to proceed with the game after the rules have been violated. In such a case, we may: (1) go back to the point at which the rule was broken, correct the mistake, and resume the game; (2) call off the game; or (3) conclude that since one rule has been broken, others may now be broken, too. But these possibilities are not open to us when we have broken a rule of morality. Instead we are required to consider the familiar duties associated with blame, confession (...), punishment, repentance, and remedial justice, (...) to answer the question: 'I have done something I should not have done - so what should I do now?' For most of us need a way of deciding, not only what we ought to do, but also ***what we ought to do after we fail to do some of the things we ought to do***.

Game Theory and Paraconsistency

Parrondo's Paradox

Consider the following two games: Game 1 and Game 2.

In Game 1, you lose $1 every time you play.

In Game 2, if you have left an even number of dollars, you win $3, if you have an odd number of dollars left, you lose $5. Say, you start playing this game with $50.

If you play Game 1, you will lose all your money in 50 rounds.

If you play Game 2, you will still lose all your money in 50 rounds following the sequence:

50 - 53 - 48 - 51 - 46 - 49 - 44 - . . .

Parrondo's Paradox

However, if you play the games in the order of

"Game 2 - Game 1 - Game 2 - Game 1 - . . . ",

then you will always win following the sequence:

50 - 53 - 52 - 55 - 54 - 57 - . . .

The paradoxical result here is the fact that by combining two losing strategies, it is possible to obtain a winning strategy which is somehow surprising and unintuitive.

Non-classical logical elements in this analysis are quite striking.

Towards Economical Theory

For instance, Yves Smith, the author of the popular book *ECONned*, remarks the following.

> *The dominant economic paradigm, neoclassical economics, became ascendant in part because it offered a theory of behavior that could be teased out in elegant formulation. Yet it rests on assumptions that are patently ridiculous: that individuals are rational and utility-maximizing (which has become a slippery notion as to be meaningless), that buyers and sellers have perfect information, that there are no transaction costs, that capital flows freely.*
>
> *(Smith, 2010)*

Towards Economical Theory

Hartford argues along similar lines.

> *Fundamental to von Neumann's approach was the assumption that both players were as clever as von Neumann himself. (...) The second problem is that game theory becomes less useful if your opponent is fallible. If player two is not an expert, player one should play to exploit his mistakes rather than defend against brilliant strategies that will never be found. The worse the opponent, the less useful the theory is.*
>
> *(Harford, 2009)*

Towards a Broader Game Theory

Game theory does not resolve concrete problems or make predictions about player choices. It focuses on the complexity of the deci- sion interactions of persons conscious of being in interaction. As the renowned game theorist Ariel Rubinstein explains,

> *game theory is a fascinating and abstract discussion that is closer to philosophy than to the economics pages of the newspaper. It has no direct applications, and if it has any practical utility (which I doubt), then it is in the winding and inscrutable way that our minds absorb ideas and use them when the time comes for real action. And this too must be proved.*

(Reardon, 2009)

Game Theoretical Pluralism

Similar to logical pluralism, can we have *game theoretical pluralism*? (Beall & Restall, 2006)

I argued game theoretical examples require a broader logical basis.

Some games may need classical logics, some may need modal or intuitionistic, some may need paraconsistent.

The *ad-hoc* problem of determining the map between the underlying logic and the games remains a problem - similar to logical pluralism.

Conclusion

Conclusion

I argued that game theoretical pluralism, supported by the cases from Social Software, presents itself as yet-another argument for paraconsistency.

Thank you!

Talk slides and the papers are available at:

`www.CanBaskent.net/Logic`

C. B., *A Non-Classical Logical Approach to Social Software*, in “Rohit Parikh on Logic, Language and Society", 2016, forthcoming.

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