The Problem of Other Players: In-game Cooperation as Collective Action

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ABSTRACT
This paper explores the development in game design of collaborative relationships between players, proposes a typology of such relationships and argues that one type of game design makes games a continuous experiment in collective action (Olson, 1971). By framing in-game conflict within the framework of economic game theory the paper seeks to highlight the importance of already well-developed models from other fields for the study of electronic games.

Keywords
Multiplayer games, cooperation, collective action, economic game theory

In multiplayer games, the problem, of course, is often the other player(s). This is blatantly obvious when the human-controlled enemy spaceship locks its torpedoes onto your own damage-stricken vessel or when that other player heads mercilessly for your unguarded soccer goal. In another sense the other player may also be a problem in fully cooperative games in which complex maneuvers must be agreed upon, coordinated and carried out in efficient unison. Here, it is not the other player's goal which is the problem but the very fact that he has a mind of his own, a mind which might not share your exact priorities, strategic preferences or analysis of the situation. Finally (at least if we stick with very broad categories) the other player is a problem in semi-cooperative games; games where there is some degree of tension between individual and collective interest. In a standard multiplayer console RPG, for instance, cooperation is necessary for the advancement of the adventuring party. But individual party members may also feel tempted to act selfishly as items and money is strewn across the game world [8]. It is this latter type of problem that is the focal point in the following.

Firstly, the paper will briefly discuss the nature of status of "the problem of other players" followed by a historical account of how game design has experimented with types of player relations. Finally, the paper briefly discusses the use of "rational agent" models in understanding games and what the opportunities are for cross-pollination between game studies and certain social science disciplines.

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IS THERE A PROBLEM?

"Problem" here comes without value judgments. Of course, problems or obstacles are inherent to games. Thus, sharing the game space with other players merely means that one must deal with a certain class of obstacles to one's success. In other words, the in-game problems that other players raise are problems for the players, not for the game designer. On the other hand, analytically *understanding* the nature of such problems – and how small design choices influences game dynamics – may inspire new fruitful design work.

The problem which will interest us most here is nothing less than a basic problem of human co-existence. As mentioned above, we shall devote our attention to those situations where individual interest is at odds with the interest of the collective. Political scientists following the seminal work of Mancur Olson [6] often refer to such situations as "problems of collective action". The literature on this phenomenon is staggeringly impressive and we shall not grapple with it here [see instead 7, 9]. Suffice to say that such situations can easily lead to sub-optimal outcomes as each individual may be tempted to follow his or her own preferences and have others bear a collective burden (like building roads, paying taxes etc.).

While the outcome of a console RPG may be less significant than the fate of major societal undertakings the fact that players do in fact routinely solve such problems is one worthy of attention.

A HISTORY OF IN-GAME CONFLICT

Games are rarely classified according to the ways in which they stage conflict or the ways in which players are meant to interact. Similarly, with exceptions [8], the history of game design is often addressed in the light of increasingly breathtaking audiovisuals or theme-based genres. Here, instead, we shall look at the conflict types visited upon players of multiplayer games. We examine the phenomenon by focusing on the games as closed systems in the tradition of economic game theory [2] . Thus, in the following we are assuming players to be rational score-maximizing entities who care only about their own situation[1]. The pay-off matrixes presented below are meant to be indicative as the exact payoffs may be subject to some debate.

Besides being multiplayer both *Spacewar* (1962) and *Pong* (1972) positioned the participating players as entirely antagonistic opponents. In the language of economic game theory, these games were zero-sum: One player won (fully) and the other player lost (fully). It is a feature of two-player zero-sum games that the players have absolutely no reason to cooperate and in this regard, these early video games mimicked what we usually think of as "classic" board games like chess or backgammon. In these games, the other player was essentially the obstacle but each participant did not have to worry about the true intentions of the other person or about whether promises would be held or not. In such games, to the extent that promises are even made they are sure to be broken. Of course, this ur-conflict continues to entertain as witnessed by games like *Tekken 4 (2002)*, *Gran Turismo 4* (2005) and certain first-person shooters.

A dramatically different approach was attempted with *Fire Truck* (1978), a game which placed

1 Though clearly not an analysis of real-life gameplay this approach can be a useful approximation. In my larger work on multi-player games I examine the relationship between "rational agent" assumptions and actual game play (see www.itu.dk/people/smith).

players in an entirely cooperative relationship as one player steered the fire truck rig while the other managed the trailer (see Figure 1). This relationship was almost organic as the players essentially managed interdependent parts of an organism and had absolutely no reason to do anything *but* cooperate fully. Players could of course verbally coordinate their action and neither would have any reason to distrust the intention of his or her ally (although the ally's abilities might of course be doubted).

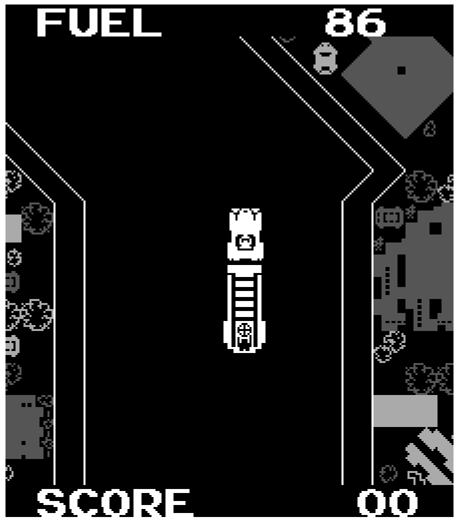

Figure 1: In *Fire Truck* (Atari, 1978) players would be placed in a fully cooperative relationship as one steered the front of the truck while the other steered the trailer.

The most significant break with these "pure" types of player relationship came with *Joust* (1982) where two players could partake in a bizarre jousting tournament on flying birds of various species (see Figure 3). From the perspective of the *Joust* player, the gamespace holds two types of dangers. One is the AI-controlled enemies and the other is the other player. The other player is dangerous because players cause as much damage to each other as to the enemies. Now, this would be bad enough in itself since unplanned collisions are quite frequent in the highly limited wraparound gamespace but the other player also has an *incentive* to come after you as killing the other player yields 2000 points which is actually more than the reward for finishing off an AI knight[2]. But clearly the other player also represents an opportunity for maximizing one's score as teaming up against the bird-mounted opposition means having to deal with one less enemy at a time (and likely one much more dangerous than the behaviorally unsubtle AI opponents). Of course, if you fear that the other player is not cooperating fully you may be better off trying to finish him before he finishes you. Thus, in *Joust* there is a trust issue and the combined score of the players depend on how they choose to play (the game is non-zero sum)[3]. Although a player may of course choose a variety of mixed strategies, the above description can be tentatively modeled as shown below (Figure 2).

2 The game cannot be said to feature "friendly fire" as there really is only limited indication that the players are "friends" (as would be the case, say, for a *BattleField 1942* team). The description above only concerns the standard game; various game rounds have different scoring conditions.

3 Of course, the combined score also depends on what the players are *capable* of doing (i.e. their skill).

		Player 2	
		Cooperate	**Defect**
Player 1	**Cooperate**	Great	Bad
	Defect	Good	Mediocre

Figure 2: Tentative model of the prospective *Joust* pay-offs (showing Player 1's pay-offs).

For the sake of argument we are here assuming that each player may choose to be a team player or not (choose one of the strategies termed "cooperate" and "defect" here). If Player 1 believes that Player 2 is defecting then she will do best to also defect. But if we retain the assumption that teaming up is generally more profitable (as human opponents are more dangerous than computer-controlled ones) mutual cooperation is most likely to ensue since that state is preferable to both players.

Figure 3: *Joust* (Williams, 1982) pitted players against buzzard-mounted enemies but also established tension between the players themselves.

Though there is tension between the interests of the players *Joust* does not constitute a problem of collective action since it does not present each player with any real temptation to act contrary to the collective interest.

A year later, *Mario Bros* (1983) arrived. It differed from *Joust* in the sense that players could not directly harm one another. Nevertheless, coexisting in the same limited gamespace meant that players did compete for resources and were able to indirectly hurt one another by recklessly attracting enemies to the other player's position. These design choices mean that there was far less risk of mis-implementing one's strategy than in *Joust* where the imprecise controls meant that colliding with the other player by accident was quite likely. Since the other *Mario Bros* player does not constitute a scoring opportunity it also maximizes the attractiveness of the cooperate-cooperate condition although the relative ranking of the game outcomes (Figure 2) are the same in the two games.

A new design paradigm was introduced with *Gauntlet* (1985) which effectively introduced the problem of collective action to arcade games. In *Gauntlet* up to four players cooperate, having chosen one of four character classes with different abilities. The issue facing each player is this: To advance in the game the team must cooperate, particularly since the specializations (the special abilities) of the characters create a non-zero-sum situation. But the gamespace is also littered with resources which will help you gain more health or points. Thus, the all-important "resource" of game advancement is only procured by cooperation but each player will prefer to have the others play nicely (cooperatively) while he or she gobbles up resources. If we limit ourselves to considering a two-player version, we can model the relationship as Figure 4.

		Wizard Cooperate	Defect
Valkyrie	Cooperate	Valkyrie = 2 Wizard = 2	Valkyrie = 0 Wizard = 3
	Defect	Valkyrie = 3 Wizard = 0	Valkyrie = 1 Wizard = 1

Figure 4: The *Gauntlet* pay-offs. Numbers indicate (hypothetical) points earned.

Taken by itself this design is a recipe for non-cooperation. From the perspective of Valkyrie any choice made by Wizard should be met with defection, thus the game degenerates into a defect-defect situation. Of course, there are a number of good reasons why this doesn't (always) happen when real people play *Gauntlet*. First of all, the game played is a repeated one played out multiple times over brief amounts of play time. Thus, one's choice has future consequences and this may lead to quite a different logic even for our fully rational hypothetical players [1]. Real-life players of course also have to share a future (presumably they are often friends) and may of course partly or fully disregard the idea that the bare game *score* is their criterion of success. Nevertheless, *Gauntlet* players are arguably placed within a structure that specifies a collective action problem and the fact that they manage to solve it merely means that something interesting is going on. The *Gauntlet* interaction structure is very closely mimicked by more recent console RPGs like *Baldur's Gate: Dark Alliance* (2001) and *Champions of Norrath* (2004).

Although later games like *Double Dragon* introduced noteworthy variations on the cooperation theme let us turn to more recent and popular game types. While early first-person shooters like *Quake* were mostly fully competitive, this changed with the growing proliferation of team-based shooters following *Delta Force* (1998) and its contemporaries. In most of these games the game's own pay-off structure is actually somewhat ambiguous. *Battlefield 1942* (2002) emphasizes the victorious team but also highlights individual achievement as number of kills, deaths etc. are prominently displayed after each game round. This makes it quite possible to interpret *Battlefield 1942* as rewarding individuals but the game is generally presented as a struggle between two teams. The ambiguousness, of course, may also be seen as the very staple of collective action problems: Though team performance is crucial to success, each team member faces some temptation to play selfishly.

A FORMAL APPROACH TO CONFLICT

Although some games present far clearer cases than do others (and some games feature different game modes), from a formal perspective we can divide multiplayer games in to one of three categories based on the relationship between the players.

Type	Player interests	Challenge	Sum type	Examples
Cooperative	Exactly aligned	Game environment or other team	Any	*Fire Truck* (1978), co-op mode in *Halo* (2001)
Semi-cooperative	Collective goal shared but individual goals differ somewhat.	Game environment or other team and to a lesser extent the allied player(s.	Non-zero-sum game with allies, any type against game environment or other team	*Joust* (1982), *Gauntlet* (1985)
Competitive	Directly opposed. Competitive two-player games will never inspire in-game cooperative behavior while games with more players may inspire temporary coalitions between players.	The other player(s)	Zero-sum	*Pong* (1972), *Tekken 4* (2002)

GAMES AS COLLECTIVE ACTION

The game forms mentioned above all have their attractions and their followers. But in an important sense semi-cooperative games introduce a myriad of links between game design (and game play) and other phenomena. In essence, what players of such games face (and continuously solve) is a theoretical conundrum pondered by none less that the greatest of political philosophers: How (under what conditions) do selfish individuals manage to work together for the greater good? Consequently, game designers engaged with semi-cooperative games can be seen as practically oriented, though somewhat spiteful, political philosophers. That latter profession is usually concerned with how to build structures inside which somewhat selfish individuals will find themselves in a desirable equilibrium situation (generally one where even the selfish "cooperate"). Game designers toy with these momentous questions not by suggesting constitutional constraints or the elaborate balancing of powers but by creating systems in which the tension is just strong enough to create excitement.

CONCLUSIONS AND PERSPECTIVES FOR FUTURE RESEARCH

In the above I have discussed a small number of games in the perspective of economic game theory, the formal study of conflict. It was observed that games are rarely classified or discussed in the perspective of the way they stage conflict or cooperation and it was argued that multiplayer games (disregarding variations and multi-mode games) fall in one of three conflict categories.

Video games, by staging continuous experiments with the relationship between structure and agency and between design and human cooperation do not only provide analogies to fundamental discussions in economics and political science, they provide a steady stream of experimental data pertinent to these discussions. And in equal measure these other fields provide analytical toolsets for the game designer, or as Grek Costikyan has put it: "… *if I had my way, a solid grounding in economics would be required of anyone seeking to learn about game design*." [4]. In this light, the fact that game studies to date still looks more often for inspiration in aesthetic traditions seems like a curious choice.

The analysis offered of how exactly game form shapes player behavior has been a formal one. It has relied on the assumption that players are score-maximizing creatures in the tradition of the "rational agent" of classical economics. Importantly, I have not meant to suggest that such an analysis is a full picture of how the games mentioned are actually played. But on the other hand I agree with Costikyan [4] and Salen and Zimmerman [8] that such assumptions is often a useful approximation, that on average players do conform to the game incentives and do attempt to succeed.

While such assumptions may be justified we would also do well to acknowledge the recent ascendance of experimental approaches to economics in the form of *experimental* or *behavioral* economics/game theory [3, 5]. Here, the relationship between rules, incentive structure and actual human behavior is studied with both surprising and illuminating results. One challenge for video game studies, which has so far been largely neglected, is the examination of the relationship between game design and actual player behavior. A systematic understanding of this issue will be interesting in itself but will also help accentuate fruitful links between game studies and other fields.

REFERENCES

1. Axelrod, R. *The Evolution of Co-operation*. Penguin Books, London, 1984.

2. Binmore, K. *Fun and Games: A Text on Game Theory*. D.C. Heath, Lexington-Toronto, 1991.

3. Camerer, C.F. *Behavioral Game Theory: Experiments in Strategic Interaction*. Princeton University Press, Princeton, 2003.

4. Costikyan, G., I Have No Words & I Must Design: Toward a Critical Vocabulary for Games. in *Computer Games and Digital Cultures Conference Proceedings*, (Tampere, 2002), Tampere University Press.

5. Kagel, J.H. and Roth, A.E. (eds.). *The Handbook of Experimental Economics*. Princeton University Press, Princeton, 1995.

6. Olson, M. *The Logic of Collective Action - Public Goods and the Theory of Groups*. Harvard University Press, London, 1971.

7. Ostrom, E. *Governing the Commons – The Evolution of Institutions for Collective Action*. Cambridge University Press, New York, 1990.

8. Salen, K. and Zimmerman, E. *Rules of Play - Game Design Fundamentals*. MIT Press, London, 2004.

9. Smith, J.H. Tragedies of the Ludic Commons. *In review (contact author for manuscript draft)*.