# Social Behaviour in Games

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April 24, 2015

## 1 Introduction

The task of game AI is multifaceted. Originating as a search constrained by hardware capability, proficiency is no longer the only benchmark of non-human player quality, with believability and the ability to make the game more fun also being required. This task is interpreted as the optimal division of responsibility between teammates in order to achieve a common goal; this may mean carrying out complementary tasks, or all adopting a single effective approach (although it is hypothesised the former is better for bots, as it is for most real games for humans). Behaviour oriented design is used to create Unreal 2004 bots which will play capture the flag.

## 2 Approach

The scenario is capture the flag with teams of three. Achieving the primary objective of returning the enemy's flag to your base (whilst yours is safely there) can be attempted with 'brute force'. Rudimentary behaviours involves setting all bots to attack the flag and return it, however there are auxiliary objectives which may make this easier. A rocket launcher is located on the map — a weapon which can give the possessing team the upper hand. Our behaviours and agents must handle these conflicting goals. Furthermore this map has obstacles which can only be overcome by jumping over them; another behaviour requiring intelligence.

My approach is summarised with the following behaviours, from highest to lowest priority:

1. Stop shooting
2. Shoot
3. Jump
4. Find rocket launcher (Note: I didn't have time to implement this)
5. Return flag
6. Capture Flag
7. Defend flag
8. Pursue flag carrier
9. Inch

This plan is deployed on all bots which separately cater to all of the objectives. This is uncoordinated, but a simple way of trying to win.

Whilst no two behaviours have the same priority, not all are mutually exclusive. If I had time, I would split the conflicting tasks of capturing/returning the flag, and defending/pursuing the flag like so:

- **Agent 1: Attacker** Engage in combat if not carrying flag, Capture flag, return flag, pursue flag carrier
- **Agent 2: Defender** Find rocket launcher if flag is safe, Defend flag, Pursue flag carrier
- **Agent 3: Midfielder** Find rocket launcher, pursue flag carrier, return flag

This would ensure that all objectives receive attention, and that both of the vital ones — flag attacking and defending have a dedicated player attending to them.

# 3 Results

The three bots running the monolithic plan detailed above have the ability to jump out of their spawn point, seek and return the flag, and kill enemies which are encountered along the way.

# 4 Discussions and Conclusion

One of the main dilemmas during implementation was symmetric vs asymmetric teamwork. Team sports regularly divide players into positions in order to firstly split responsibility optimally, and secondly use players in positions that benefit from their particular strengths. My solution uses only one plan because all bots have the same attributes and the the task affords a mob-like approach.

Capture the flag has two goals on the surface — defend your flag, capture their flag. However, you can't complete a capture without defending your own. This causes the game to boil down to a sort of tug-of-war, where a concentrated effort (caused by a single unified plan) can lead to reasonable success.

If I had time to spare programming this, using the rocket launcher would add an interesting element. This would give one bot much more killing power, which I would use to defend the flag. When killed, the weapon would land safely in the base for another friendly bot to acquire. A low effort and high reward to winning a game of CTF is "parking the bus" when you are ahead, by leaving all bots at the base and waiting for the timer to run out.