A Study of Team Cohesion and Player Satisfaction in two Face-to-Face Games

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ABSTRACT
In this paper we investigate the link between game rules, team cohesion and players' satisfaction with their teams within face-to-face team-based games. To measure team cohesion, rules from two games were analysed from the perspective of Social Identity Theory in order to form a hypothesis as to which game would be more likely to lead to more cohesive teams, where team cohesion is measured by the extent to which each player identifies with their team. Player satisfaction was measured by looking at three factors: communication within the team, player outcome versus team outcome, and fairness. Significant differences were found in the team cohesion measure suggesting that, as predicted by Social Identity Theory, team cohesion can be fostered by game rules. Team cohesion also correlated positively with player satisfaction. Taken together, this suggests that for games in which team cohesion is an important part, game designers can incorporate game rules in such as a way as to increase the likelihood of both team cohesion and player satisfaction.

Keywords
Game design, teamwork, social interaction

INTRODUCTION
The great majority of face-to-face games, whether board games, simulations or other types, are multiplayer, and many also require players to play in teams. The way that a team bonds will clearly affect the players' experience of the game: for most players lots of infighting will not be much fun. Many multiplayer games seem to try to form strong teams by making a game physically impossible to complete alone (e.g. things that need to be done on opposite sides of a room) or making individual players too weak to complete the game without assistance (e.g. the class system) (Knizia 2004).

The longevity and stability of the teams formed using these mechanisms is questionable. Research on the guilds formed in online games suggests that many do not survive for long – often less than a month (Ducheneaut et al 2006, Williams 2006). A variety of possible causes have been suggested for this fragility, including a lack of alignment between the player's individual objectives and the guild's objectives (Williams, 2006), and poor leadership (Williams et al 2006, Ducheneaut et al 2007). Ducheneaut et al (2007) also identified some structural elements that contribute to a guild's longevity, such

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as size, the spread of levels represented, class balance, the number of connections between guild members and the size of the subgroups within the guild.

Rather than simply *requiring* teamwork, can the rules of a game be formulated in such a way as to *promote* teamwork? If so, will this lead to an increase in team cohesion and, in turn, an increase in the satisfaction a player feels with their teams?

We recently conducted a study to investigate these questions using two face-to-face games: *The Green Revolution Game* (*GRG*) (Chapman, Dowler 1982) and *Africulture* (Chapman et al, 1993). Both are educational table-top games designed to simulate subsistence-level farming in rural economies. The aim of both games is provide students and policy makers with more insight into the complex decision-making processes of small-scale farmers. In both games players are exposed to the difficulties these farmers face in making decisions, often with uncertain and incomplete information, that literally have life or death consequences for their families. The games are played by between 15-35 players in small teams of two or more. Each team represents a "family" of varying size in a village community. Families must decide what crops to grow and how best to employ their family members and manage their resources in order to keep the family alive. The games are run by a game manager, who presents the rules of the game to the players, and oversees gameplay throughout. The game manager's handbook for both games stresses that although basic rules of behaviour can be provided at the outset, others will arise spontaneously as the game unfolds Comparisons between families and players are made only at the end of the game, in a post-game debriefing whose purpose is to reflect on the strategies used by each family and, more broadly, to consider the impact of societal, cultural and political factors on subsistence farming in uncertain conditions. The two games are very similar in purpose and execution in that both are team games, where players share resources and make joint decisions. However, there are marked differences between the two games in terms of the way that the team and player goals are managed.

In *GRG*, the teams are formed on arrival, often before players have formed a clear idea of how the game is played, and certainly before the assets (fields and family sizes) have been distributed. Players form teams of two or three farmers who do not take on a particular role in the family. The family initially consists of a combination of adults and children and may go on to include babies as the game progresses. Once the teams are formed there is no mechanism for changing teams during the game. The team as a whole is judged on the success of their family. The measure of success may be more specifically chosen by the game manager but the game manual does suggest producing final figures for the total wealth of the family as a starting point for comparison.

In *Africulture*, players are given roles of man, woman or child (unrelated to their actual gender or age) and allocated associated assets before being asked to form teams. Those playing men require women to provide their food, and women and children are advised to find men to augment their assets and provide access to land. Although female-headed households are possible, they are at a distinct disadvantage. Throughout the game players can negotiate to change households and this happens quite often. The goals of the game are different for the different roles: men are judged by the amount of wealth they generate and women and children are judged on their success in keeping children alive and providing them with an education. However, the over-arching family goal is to keep the family members alive. As with *GRG*, the differences in the relative success of the players are only made explicit at the end of the game.

In both games the player is part of a team that is effectively a family. As such, the expectation is that they will work together for the collective good of the family. The differences between games that have been outlined above would appear, on the face of it, to be relatively minor. However, it may be that despite the centrality of the family unit, the rules engender different social models. Is it possible, in turn, that these differences affect the strength or cohesion of the teams within the games? In order to investigate this in more detail, the rules of each game were analysed from the perspective of Social Identity Theory (SIT).

Social Identity Theory

SIT is a theory which considers the relationship between individual self-concept and group membership, positing that our perceived group memberships affect our personal identity, and in turn change the way we interact with others. The social psychologist Henri Tajfel initially developed SIT as a result of his interest in prejudice, discrimination and inter-group conflict (Hogg 2006).

According to SIT, every individual has multiple perceived group memberships e.g. female, researcher, European, programmer, etc., and different situations will alter the significance and importance of these group memberships. Experiments suggest that one group membership will be most salient at any time, and this allows people to judge how to behave (Oakes 1987). Which group membership is salient alters the way other people are treated, depending on whether they are perceived as part of the same social group (e.g. a fellow programmer) or a different social group (e.g. an American rather than European). Early experiments have shown that people favour fellow in-group members over the out-group (Tajfel and Turner, 1979). The more a person identifies with the in-group, the stronger their commitment to that group will be and the higher the group cohesion will be. Much of the further development of SIT has focused on the way that the group situation affects the strength of in-group identification.

SIT has been shown to explain in-group identification both in naturally forming groups (e.g. Tajfel and Turner 1979, Spears et al 1999) but also in situations where group formation is both arbitrary and transient (e.g. early minimal group experiments by Tajfel and Turner (1979) where participants were assigned to a group by a coin toss). Similarly, in game situations where group assignment was random, subconscious in-group favoritism was observed when compared to a control game (Kirman, 2013). Games provide an ideal opportunity in which to study in-group identification, as the game designer has the potential to manipulate the group situation or social model through the rules of the game. In online games in particular these rules can be tightly binding (Lessig, 2006) – the player cannot choose to ignore a rule when the computer is the enforcer. A developer or designer has full control over the rules of the game and what the players are or are not able to do, but no control over who plays their game or the teams that may form. As such, games allow us to examine factors influencing group identity and team cohesion in a more controlled manner.

Work on Social Identity and Deindividuation (Reicher et al 1995) suggests that group membership can be made salient by subtle cues, such as referring to a person in terms of a specific group in task instructions rather than as an individual. *GRG*, with its focus on team performance, reinforces the identity of team member, whereas *Africulture's* emphasis on individual performance should make individual identity more salient. Emphasizing individual performance should increase the view of the rest of the team as

competition, and reduce in-group identification. This leads to the hypothesis that team cohesion in *GRG* will be higher than in Africulture.

It is generally assumed that people look to associate with positive social identities where possible; choosing to belong to successful groups or teams. If a person finds themselves in a group that is not successful, they may chose to distance themselves from that group in preparation for changing to a more successful group, leading to a lower level of identification with their current group (Ellemers 1993). However, it is not always possible to change groups. For example, in South Africa in the apartheid era it would have been impossible to change from black to white. The inability to change groups reduces the impact of a group's low status on in-group identification. Instead of moving on, group members often either redefine their measures of success to make their group look more positive, or try to improve the lot for the group as a whole. *GRG* does not allow for changing teams, unlike *Africulture*; on average it is therefore hypothesized that *GRG* players should show a greater level of cohesion, even in unsuccessful teams.

The group formation stage also has an effect on the lowest performing groups. Allowing players to select their group membership rather than being automatically allocated has been shown to increase the commitment to the group when the group performs badly (Ellemers et al 1999). If the group does well, the group selection mechanism has no effect. In these games, both have an element of self-selection. Although the teams in *GRG* are formed without full knowledge of the game the players still choose the group that they wish to sit with, rather than being randomly allocated to teams. However, in *Africulture* players have better information about the potential strengths and weaknesses of the team when they form it. This may lead to an increase in the team cohesion in *Africulture*, but it may be a weak effect as the differences between the games is less than it could be (e.g. if the teams were randomly assigned in *GRG*) and will be countered by the ability to change groups explored above.

In summation, this analysis leads to a prediction that teams in *GRG* will show higher cohesion levels than teams in *Africulture*.

Team Member Satisfaction

A further component of this study investigates the players' satisfaction with the decisions and strategies used by their team[1]. Although common sense might suggest that team cohesion would be strongly correlated with player satisfaction, this may not be the case. Even when individuals are shown to strongly identify with a negatively evaluated group (such as a low-ranked team in a league) they are not unaware of the social position of the group (Spears et al 1999) and may be dissatisfied.

There is a lack of consensus in the literature over what satisfaction means to group members. Rubin (1984) considers member satisfaction to consist of participation in the decision-making process and belief in the fairness of the decision. Keyton (1991) carried out a review of research on group member satisfaction and found three strands of research each producing different constructions for satisfaction. The first strand identified variables such as status consensus (e.g. agreement on who leads the group), perceived progress toward group goal and freedom to contribute as factors in group member satisfaction. The second strand, from an interpersonal communication view, links satisfaction to communication behaviour, but focuses on dyads rather than larger groups. In the final strand, aimed squarely at the group context, variables such as perceived amount of conflict, perceived inequality, and quality of outcome were identified. She

concludes that no single understanding of group satisfaction has been developed, and indeed, given its situational element, a single measure may not be appropriate.

Keyton (1991) attempts to generate a more situational understanding of satisfiers and dissatisfiers for group members. In her research, the group situation was varied by altering the history of the group (long or short) and the potential for future interaction (long-term or none). From this it was found that there were some global satisfiers (the group's perceived progress on the group goal, and the contribution of team members) and dissatisfiers (poor in-group communication). No situational satisfiers were found, and the dissatisfiers focused on the need for different group processes (for processes such as decision-making, information sharing, and goal-choosing) in the different situations. Olaniran (1996) takes these satisfaction measures and reduces them to three common factors: status consensus (relative intragroup positions), progress towards the group goal, and participation, and also adds the ease of use of the communication media to this set.

Drawing on common themes in the cited research, for this study group member satisfaction will be broken down into three factors: fairness of participation, alignment between team goal and personal goal, and the ease of communication. These factors are particularly appropriate for this study as both games rely heavily on intra-team communication, as decisions must be made at every stage about how to best use the limited resources of labour and assets. It is a crucial part of the game. Equally, fairness in participation (does each team member feel their views were heard and treated fairly?) will be an important part of the intra-team negotiation process.

The relative status of the group members is not being included, as the participants start the game at the same level and although roles are assigned in *Africulture* the relative status of the individuals within the group is not important in either game. The group situation will not be taken into account, as all of the teams within the game are considered to be of the same sort – they all have no history, and no potential for future interaction.

The largest departure from previous research is in the measurement of conflicts between personal and group goals, as opposed to simply measuring progress towards the group goal. This is appropriate in this study, partly due to the difficulty in measuring any progress towards a group goal during play, but equally due to the lack of firm team goal in the two games. Indeed, whilst both games have an unstated presumption of keeping all family members alive as a team goal, only *Africulture* presents more concrete individual goals based on the role of the player. In *Africulture* it may therefore be more difficult to balance the player goals with an overarching team goal. It is therefore suggested that a reduction in perceived conflict between the group and the personal will be a better measure of satisfaction with the team in this study.

With group member satisfaction decomposed into communication, mixed-motive and fairness, we will measure the difference in these between the two games. Due to the lack of consensus with respect to the relationship between group member satisfaction and team cohesion no prediction is made about the direction of the differences between the two games. In the following sections, we describe a study that aims to investigate the relationship between game rules and team cohesion and, in turn, the relationship between team cohesion and team member satisfaction.

METHOD

Two groups of participants each played one of the games for three hours. The games were played to the rules laid out in the handbook. Each participant was then asked to complete a questionnaire to gauge the degree to which they identified with the rest of their team and how satisfied they were with the team as a whole. This questionnaire was completed individually at the end of the play session before the participants had an opportunity to reflect on their experience or get feedback on the game.

Participants

In total, 36 participants took part in the two game sessions: 24 female and 12 male. The participants in both games were students of International Development and form part of the target audience for these games. Prior to starting the game, the participants were given an information sheet providing details of the study and explaining that if they elected to participate in the study they would be asked to complete a questionnaire at the end of the game. The information sheet also made it clear that a player would be able to play the game without taking part in the study.

GRG was offered as an extra-curricular event as part of a summer school. Sixteen players signed up (ten female, six male). Twenty students from the School of International Development at a university in the South of England played *Africulture* (fourteen female, six male). The game session was an optional activity with no impact on their course marks.

Design

The study used a between subjects design, with the independent variable being the game played (either *GRG* or *Africulture*). A 24-item questionnaire was constructed to examine team cohesion levels and the three member satisfaction factors (mixed-motive, communication and fairness). Of the 24 items, ten were based on a pre-existing in-group identification scale (c.f. Ellemers 1993) and relate to team cohesion. This included statements such as "I would like to play another game with this team." and "I had a lot in common with the other team members.". Seven items were designed to measure mixed-motive, with a higher score indicating a closer alignment between the outcome for the player and the group. A further five items looked at the communication and two items on fairness. The players were asked to rate how strongly they agreed with each of the 24 statements on a seven-point Likert scale ranging from "Strongly disagree" to "Strongly agree".

Each participant played only one of the games, and contributed four scores – one for each of the factors. These scores were calculated by translating each Likert scale point to a number (one for "Strongly disagree" to seven for "Strongly agree"). The relevant scores for each factor were then summed to create a single score for that factor. The maximum possible scores for each factor were: team cohesion 70, mixed motive 49, communication 35 and fairness 14.

Procedure

Both games were played to the rules contained in the respective manager's handbook. Each game was played for three hours. The paper questionnaire was administered at the end of the playing time, before the post-game discussion could reveal the true positions of the players and teams.

At the start of the *GRG* session players were asked to sit at any of the pre-arranged tables before the initial family and farm sizes had been allocated. They completed five annual cycles of four seasons, where each annual cycle allowed for the full growth cycle of a crop from sowing through to harvesting.

For the Africulture play session the players were again asked to sit at any of the pre-arranged places, with those playing "men" kept separate from those playing "women" (note that gender roles in the game bore no relation to real-life gender). The resources were allocated at this stage, followed by a period of negotiation where players formed teams. They completed three annual cycles of four seasons per cycle.

RESULTS

A single, combined measure for each of the four factors was calculated for each player.

Table 1 shows the median and range for each factor in each game. *GRG* produced a higher average cohesion value across all players (median=61.00, minimum=56.00, maximum=70.00) than *Africulture* (median=58.00, minimum=49.00, maximum=69.00), a difference which was statistically significant using a one-tailed Mann-Whitney test ($U=103.5$, $p<.05$, $r=.32$).

There were significant differences (using a two-tailed Mann-Whitney test) between the two games for the communication rating ($U=91.00$, $p<.05$, $r=.28$) and the fairness rating ($U=57.00$, $p<.05$, $r=.18$), with *GRG* showing higher ratings than *Africulture*. The mixed-motive rating showed a similar but non-significant tendency ($U=102.00$, ns).

DISCUSSION

In summary, the hypothesis concerning the relationship between the team cohesion experienced by a player and the particular rules of the game was upheld. In addition, the players of *GRG* reported that they experienced a greater level of fairness within their group and better communication. Overall, the players of *GRG* experienced a higher level of satisfaction than the players of *Africulture*. The communication rating and fairness rating were both significantly higher for *GRG* than *Africulture*, although the effect size for fairness was small. There was a non-significant tendency for the mixed motive effect

	GRG			**Africulture**		
	Median	**Min.**	**Max.**	**Median**	**Min.**	**Max.**
Cohesion	61.00	56.00	70.00	58.00	49.00	69.00
Mixed motive	41.00	30.00	49.00	36.00	26.00	46.00
Communication	32.50	25.00	35.00	29.00	21.00	35.00
Fairness	13.00	8.00	14.00	9.00	5.00	14.00

Table 1: Factor scores as a function of game played

to be lessened in *GRG* than *Africulture*, suggesting that overall players were more satisfied with their team's processes and decision-making in *GRG*.

These results suggest that SIT can provide useful insight into the effects of game rules on team cohesion. The factors identified by SIT as being likely to boost team cohesion can therefore be explicitly designed into the game rules during the development process. These factors are also likely to have a positive effect on the interactions of team members.

The team cohesion level reported in *GRG* was higher than that reported by players of *Africulture*. This was in line with the predictions made using SIT, and appears to indicate that the social model created by the rules of the game does lead to an increase in team cohesion, even when games appear very similar. This suggests that by carefully aligning all of these factors, a game designer could create a very strong environment for teams to form in, without impacting the main gameplay elements. This can already be seen in practice – for example, in many sports leagues there is a limit to the times of the year that a player may change teams (e.g. twice a season for the Fédération Internationale de Football Association (FIFA 2003)), but that does not change the on-field rules for the sport. In the two games in this study the one factor that is currently out of alignment is the way that the teams are formed, with participants of *GRG* not aware of the relative assets of the team when they start. This would be a small change that would potentially make the teams even stronger.

The communication and fairness of participation rating were both significantly higher in in teams playing *GRG* than *Africulture*. This is in spite of the team situation in both being very similar – both represent a family and communicate face-to-face, with similar numbers of players involved in the intra-household negotiations. The difference in these measures would appear to correlate with the team cohesion rating, suggesting that a stronger team also feels fairer and is perceived as communicating more easily.

The experience of conflict between the players' individual goals and their team goals was not significantly different, although there was a tendency for the conflict to be greater in *Africulture*. Given the difference in rules between the two games, with *Africulture* presenting the different roles with different goals within the team and *GRG* not, it is perhaps surprising that this result was not significant. This suggests that the players have personal goals in addition to (or perhaps instead of) the game goals that are not being met by the team performance, and suggests that the influence of game goals is limited. In *GRG*, for example, a player may wish to trial a particular theoretical solution as an experiment. Their team may choose to adopt a different strategy (after well-communicated discussions with full and fair participation), leading to a conflict between the team's actions and the goal of the individual.

Although these results are encouraging, they should nonetheless be treated with some caution. The two games used in this study are similar and are often used in similar teaching contexts, but they are not identical. It was felt that using two existing and proven games was less problematic than modifying an existing game as, firstly, the effort and costs involved in producing a modified version of a commercial game would have been overly onerous, and secondly, changing the rules may have caused unanticipated problems during play.

The different number of annual cycles completed within the playing time hints at the differences between the two games. *Africulture* contains a much more complex set of decisions than *GRG*, and this resulted in each annual cycle taking longer. For this study the decisions was made to keep the playing time constant rather than the number of annual cycles, with 3 annual cycles played in 3 hours of *Africulture* versus 5 annual cycles of *GRG*. This resulted in the players having the same amount of contact with their team members, but it may have been more difficult for the players of *Africulture* to gauge their relative success. This in turn may have had an effect on the results, given that group success is a factor in at least two of the effects identified – the permeability of the group boundaries and the knowledge of the team assets on formation.

Some of the differences in the social model are quite difficult to bring out in the course of the game-play. The game manager's manual in both games instructs the game manager to be as vague as they can be about what the players can and cannot do, in order to encourage the players to find their own solutions. However, no individuals in the *GRG* playing session asked at any point if it was possible to change teams, and it was clear from the discussion at the end of the *Africulture* game that players had assumed they were able to change (one player mentioned selling her "wife" to another household, lamenting that she hadn't sold the children at the same time!). Again, this lack of clarity about the rules is not unlike many online games, where players seldom read the rulebook before starting to play.

A further study is planned using a multi-player, online game that has been specifically designed and built for the project that will differ only in the social model used. *African Farmer* will be similar to *GRG* and *Africulture* in that it will be based on participation in a small subsistence farming community, with a similar number of players, team-sizes, annual cycles etc. The game will be made with two different modes, with the differences in the two modes specifically targeting the changes in social model. This further work should help to confirm whether the effect can be replicated in an online environment. The advantage in designing and building a game is that we will be able to reduce the effects of other differences in the games used. We anticipate that this game will also have a very similar length of annual cycle in each condition.

Design Principles

As a result of this study, a number of design principles can be suggested as a way of increasing team cohesion within a game:

- Be aware of the relationship between team and individual goals. A game in which the goals are solely team based is likely to lead to greater team cohesion. In games which contain both individual and team based goals, the team based goals should be more salient than the individual goals and, at the very least, team based and individual goals should not be in conflict with each other.

- Similarly, overall measures of game success should operate at the team level, rather than at the individual level.

- Allow individuals to form their own teams rather than assigning them to teams.

- In conjunction with the above principle, when individuals form teams, ensure that they have adequate information on which to base team formation decisions, both

in terms of their understanding of overall game play and their role within the game.

- Changing teams should have a relative cost attached to it, such that there is an incentive for players to try out new behaviours within their team rather than move to an apparently more successful team.

CONCLUSION

In this paper we considered two similar face-to-face team simulation games that put players into family teams but, by the nature of seemingly small differences in game rules, lead to a different social model for the players within those teams. By comparing the social constraints to findings from SIT, it was possible to predict which game would cause greater team cohesion for the players. In addition to this, team member satisfaction for the players was shown to increase with the team cohesion.

By analysing game rules in more detail, and uncovering the social model that arises as a result, it is hoped that game designers can more consciously use game rules to bring about the sorts of behaviours that they wish to engender in their games and, in turn, increase player satisfaction. Furthermore, this research has highlighted the potential use of social theories within games, and further work may allow for increased innovation in the social mechanics in future game development.

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ENDNOTES

[1] It is not uncommon to use group and team interchangeably in organizational science or small group work. In this paper, team will be relating to game- or sport-playing, and group will be used in the wider sense.

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