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Abstract

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Keywords

Teamwork, Cooperative behaviour, Simulation and Gaming, Network-Centric Organisation

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Emergent cooperative activity in distributed team performance in Go*Team

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Abstract: The need to cooperate in self-directed, distributed teams is fundamental to the concepts of Network Centric Warfare (NCW), where collective activity comprises communication and shared understanding, leading to innovative decisions and actions. While technical components have an important role in enabling a NCW configuration, the organisational and behavioural components generate value. Go*Team, a computerised client-server team version of the ancient Chinese strategy game of Go, is designed to help researchers understand this phenomenon and then to be a means of training individuals and teams for cooperative activities. The goal of Go*Team is the development of a micro-world simulation of a NCW environment so that there are a range of differences between Go*Team and standard Go that are driven by the need to incorporate the necessary NCW characteristics. These modifications introduce the imperative for information sharing and integration into the game. In this paper the conduct and outcomes of Go*Team live tests, data collection and analysis, to date, are discussed in terms of emergent findings on co-operative behaviours under different conditions of the Go*Team environment.

1. INTRODUCTION

In an ideal organisational environment, the voluntary transfer of information and knowledge would be the norm, and the resultant understanding would underpin ongoing collective sense-making, leading to appropriate and creative actions for organisational outcomes. Workplaces are full of learning opportunities and in work life, socially based learning is occurring all the time. The need to cooperate in self-directed, distributed teams is fundamental to Network Centric Warfare (NCW), where cooperative activity comprises communication (or conversation) and a decision outcome leading to some action. However, cooperation and sharing of information must be based on common goals, common identity, mutual trust, with doctrine that reflect these values.

Hasan et al [4] describe a network-centric structure as one which enables members of an organisation to create and leverage information to increase competitive advantage through the joint efforts of small, but highly responsive, independent teams. The capability to do this results from developments of ICT. It is however more about people and culture than technology. While the technical component enables, the organisational and behavioural components generate value. Within the concept of a network-centric configuration, workers leverage information through the collaborative efforts of small and agile self-directed teams [7]. The network-centric environment implies new ways of working, with consequences for the organisation's infrastructure, processes, people and culture. One of the most challenging aspects of the network-centric paradigm is the need to change the organisational culture from one determined by a command and control, rule-based hierarchy to one which supports loosely-coupled, self-

managed teams to make cooperative decisions through the sharing of knowledge.

Go*Team is designed to help researchers understand this phenomenon and then to be a means of training individuals and teams for cooperative activities. It allows teams of individuals to play a modified form of the strategy board game Go over a web-based network. Go*Team provides a micro-world simulation that can be used to investigate emergent cooperative activity in distributed teams and its implications for performance. It has been developed to support observations and findings from a NCW research program conducted by researchers from the Defence Scientific and Technical Organisation (DSTO) and academic collaborators from two universities, including the authors of this paper. The project to develop both the software platform and the protocol for Go*Team sessions has taken place over two years from its original inception to its current state where the software application is operational and game sessions have been conducted to reveal its potential for both research and practice.

This team version of the Go game is thus designed to embed its players in an environment that involves:

- conflict (with the other team or teams involved),
- cooperation and coordination, within a competitive environment (i.e. 'co-opetition');
- information sharing (to synthesize, in a dynamic situation, multiple fragmentary and local perspectives into an overall situational picture);
- timely and appropriate decision making (through the need to balance the time taken for adequate situational analysis and the pressure to avoid being overtaken by events). [1]

This reflects the situation in the NCW environment where the transfer of information and knowledge is

used for shared situational awareness and sense-making leading to appropriate decisions and actions.

Central to issues of emergent cooperative activity the opposing sides in Go*Team consist of teams of players, rather than individuals, although each player has their own collection of stones, over which they have complete control. This introduces into the game the need to coordinate and cooperate within groups of individuals. In addition, individual players in a team have only a local view of the overall Go*Team “world” in which they are embedded. This view consists of a board showing the positions of their own stones plus any stones of the opposing team that are closer to their own stones than those of any other player on their team. This modification is to introduce the necessity of information sharing into the game.

In this paper the conduct and outcomes of Go*Team live tests, data collection and analysis, to date, are discussed in terms of emergent findings on cooperative behaviours under different conditions of the Go*Team environment. While Go*Team was created for the military, such situations also exist in other government, business and community settings. This paper describes Go*Team and discusses ways the playing of Go*Team can lead to a better understanding of the collective processes and behaviour of people in organisations. Of particular interest are human or group related factors that may impede or even prevent the successful achievement of team coordination, cooperation, information sharing and consequently knowledge sharing [2].

1.1. Go*Team

As mentioned above, in Go*Team the opposing sides consist of teams of players rather than individuals as in Go. Although it includes an innovative web-based software application, Go*Team is essentially a socio-technical system where the flexible protocols for conducting sessions, collecting and analysing data, briefing and de-briefing participants are just as important as the software. Each individual player in a team has their own collection of stones, over which they have complete control regarding whether, when and where they are to be placed on the board. This gives each individual in a team, autonomy in terms of what decision and actions happen in regard to their stones. However, there can only be one stone placed per team, at each move. It is envisaged that team members (who will normally be physically distributed) will have access to standard electronic communication technologies such as email, chatroom, video-conferencing, or group support systems like NetMeeting, Lotus Notes [5].

Another important part of Go*Team is that individual players in a team have only a local view of the overall Go*Team “world” in which they are embedded. This view consists of a board showing the positions of their own stones plus any stones of the opposing team that are closer to their own stones, than those of any other player on their team. This modification is to introduce the problem of information sharing and integration into the game so that it is necessary that they share what

they can see with other team members in order to develop an integrated overall picture of the state of the board. Each player has the ability to place various types of ‘markers’ on their local view of the Go*Team board. They can use these markers to record where they know, or think they know, stones belonging to the other members of their own team as well as those of the opposition, are located. Even if they can accurately achieve this in the time available, they then have to decide not only what is the best next move, but also who makes it.

Unlike standard Go, in which the players take turns to place their stones, teams playing Go*Team no longer have to take turns; a team’s next turn can be taken after a ‘relaxation time’ regardless of whether or not the opposing team has done anything in the interim. While a team may take as long as they like, over and above the relaxation time to analyse their situation before making a move, they thereby increase the risk that the other team will gain an advantage by making further moves while they are still working out what to do next.

Go*Team is being used to study how teams behave and perform when composed of different types of individuals and set up with different structures. There is no preset leadership structure built into the Go*Team game. That is, as far as the game software is concerned all team members are peers; there is no ‘team leader’, or similar, with more power or capabilities than other team members. The only overt difference between team members lies in how many stones they have initially allocated to them [1].

The Go*Team software and protocols are now developed to a stage of readiness for practical application. Based on NCW principles, a range of protocols for running Go*Team sessions are currently being designed and tested. These include appropriate settings of systems parameters, such as timing and communications media, as well as the identification and standardisation of constructs to measure suitable attributes of the players as individuals and as teams [7]. The intention, in the future, is to direct players that the overall winner of the Go*Team game is the individual player whose team wins, and who has a greater proportion of his or her own collection of stones remaining on the board than any other player in their team [1]. In the games played to date, however, the objective of players has been for teams to capture territory and opposition stones.

2. EXPERIMENTAL DESIGN AND PROCESS

Go*Team can be used for both training and profiling. It can be used to identify people with, and train them to further develop, those attributes that will enable them to perform effectively in the network-centric environment. Go*Team has the capability to be used for training in strategic team-based decision making under various forms of stress, including time pressures and conditions where information is distributed among disparate team members. Through observation and measurement of individual performance in Go*Team sessions, it also has a potential use in profiling an

individual's capacity to work as a team-player in a network-centric configuration.

A Go*Team game can be set up for multiple teams each of many players playing on several boards. Multiple mode of play are available, (eg independent, turn-based, paced, forced delay) together with choice of communication schemes. Games can be set up with different team configurations (structured or unstructured, homogeneous or heterogeneous) and so on.

While there are many elements of the Network-Centric Environment in Go*Team that can be adopted as the specific variables to be investigated [4], the current study concentrates on a subset of those. In order for members of a team to effect the cooperation and coordination they need to successfully play the Go*Team game, the research elements treated as dependent variables in this study are:

- emergent leadership;
- emergent cooperative behaviour; and
- effective decision-making.

Possible independent variables are:

- stress;
- uncertainty of information;
- trust between team-members;
- training and learning;
- team size, structure and organisation; and
- communication mode.

Other critical variables, (in particular, situation awareness) are dealt with in a separate paper. The variables listed above have all been associated with knowledge sharing and collaborative behaviours. It is highly likely, therefore, that a well guided session of Go*Team, with suitable debriefings, may embed positive perceptions of information and knowledge sharing. The game environment makes a shift to this fundamental orientation clearly beneficial and provides an opportunity for players, while embedded in a fun environment, to explore new tactical strategies associated with working in teams [7].

2.1. Game network set up

The Go*Team sessions reported in this paper were conducted in a Usability Laboratory set up in a 6-room cottage on a University campus. The configuration for the Go*Team session uses the computer set up in one central room for usability testing as the server. This provides several options for recording data during game sessions, principally screen and audio capture by the Camtasia © program. Eight other computers are set up as isolated clients in other rooms in ways such that teams can communicate either via Chat or verbally.

The screen on the server, showing both the Server view of the Go*Team board in play and all team Chat windows is recorded for each game as a video. At the end of the game, the Chat of each team for that session is saved into a text file and the final board set up on each of the client screens is recorded as a screen dump. This enables researchers to determine which stone is played by which player as well as providing a record of

their set of markers. The researchers replay video and enter into a spread sheet all stone play communication messages and marker placements for each player. These are summed and averaged for the whole game.

2.2. General Game Session Protocols

To date several sessions have taken place on one board between two teams of three or four each. Selected groups of players are invited to participate and assigned to teams in accord with the objective of the session or of a series of sessions. Demographic details of players are collected and players are given tests for personality traits and team role tendencies. A distinct benefit of Go is that the basic rules are easily understood so that players quickly become quite competent at playing although becoming a master is extremely difficult. These means that after one game, players have similar Go skills for subsequent sessions.

Data on player moves, player markers, player communication, stone captures and levels of confusion is collected as the game unfolds. Confusion level is prompted for, as a value between 1 and 10, from each player every 5 minutes during the game. Before and after each session, players are asked questions pertaining to the constructs of interest. Before sessions, teams are given ten minutes to discuss team tactics. After sessions, all players are debriefed and this is recorded and analysed. Where the same players participate in a series of sessions, as is the case in the study presented here, their learning is observed both as to their performance, as well as their ability to cooperate.

3. SESSIONS OF THIS STUDY

Table 1 Dates and Settings of 5 Go*Team Sessions					
Game	Aug-24	Aug-31	Sep-07	Sep-14	Sep-21
Board Size	15	15	15	19	19
Relax Time	50	50	40	30	40
Table 2 The Players					
B-1	Black Player 1 all games	Male – PG student			
B-2	Black Player 2 all games	Male – staff - oldest			
B-3	Black Player 3 all games	Male– PG student			
W-1	White Player 1 all games	Male – PG student			
W-2	White Player 2 all games	Female- PG student			
W-3	White Player 3 games 1& 5	Male- PG student			
W-4	White Player 3 games 2-5	Male- PG student			

To investigate the issues mentioned above, a series of 5 Go*Team game sessions were played with essentially the same two teams of university staff and students. The black team had the same three players for all games, while the white team had four players, although only game 5 had all 4 players. As these sessions were aimed at exploring the potential of Go*Team. Players were chosen on availability rather than representing any particular cohort. Sessions were conducted a week apart to give the researchers time to collect all data from each session and analyse it to determine the settings for each subsequent session. All in-game communication was by web-based chat for each team. The dates and settings for each game are listed in Table

1. The players' characteristics are summarised in Table 2 with a selection of personality attributes in Table 3.

	B-1	B-2	B-3	W-1	W-2	W-3	W-4
EXTRAVERSION	12	52	36	47	60	31	61
Assertiveness	44	40	33	55	37	73	25
Excitement-Seeking	10	51	77	54	22	26	46
AGREEABLENESS	38	75	58	20	6	60	73
Trust	70	83	47	47	76	70	92
Cooperation	54	53	66	10	9	63	44
CONSCIENTIOUSNESS	61	57	6	43	48	20	38
Achievement-Striving	4	78	5	59	48	35	48
NEUROTICISM	37	34	48	63	43	71	35
OPENNESS TO EXPERIENCE	37	75	60	45	40	29	80
Intellect	48	56	71	54	67	18	59

3.1. Quantitative Results Recorded

The recorded quantitative data from the series of five games is summarised in Table 4. This shows the total number of chat messages sent and total number of stones played by each team and player. Confusion levels averaged over each game are also shown. This data were collected every 5 minutes during the game as a rating between 1 and 10 by each player. The game performance measures are in the shaded section at the bottom of the table. This is shown as both a winning team points' score (rated by the software as territory captured) and the number of stones captured by each team. This summary will be used as a background to the analysis of the qualitative data.

3.2. Sample Qualitative Data

Qualitative data, relevant to the topic of cooperation in emergent cooperative activity, was extracted from records of team chat sessions during play and debriefings of both teams together after each session. Some sample records are shown in the Appendix from each of the series of 5 sessions. These are used in the analysis presented in the following section of the paper.

4. ANALYSIS OF RESULTS

The analysis begins with the game performance as shown in the shaded section of Table 4. In games 1 and 4 team performances were substantially even, while games 2, 3 and 5 were clear wins to the Black team both on territory and relative stones captured. The trend across the series of 5 games was as follows:

Game 1: Both teams had 3 players, all Go novices. There was a lengthy 50 second relax time on a 15x15 board. Players were on a learning curve, chat of both teams was about the mechanics and aim of the game, giving neither team a distinct advantage, although player B3 was starting to give direction to his team.

Game 2 had the same players and settings as Game 1, except that W4 replaced W3 on the White team. The Black team had more efficient chat and were more

task-oriented during play. The emergence of B3 as leader was apparent (see chat in the Appendix).

Game		1	2	3	4	5
White chat (number of messages)	All	223	143	176	162	345
	W1	80	88	85	44	80
	W2	52	53	47	66	49
	W3		2	45	52	91
	W 4	92				125
Black chat (number of messages)	All	362	333	332	291	251
	B1	88	100	100	76	64
	B2	70	95	49	88	57
	B3	205	139	184	127	130
White plays (stones played)	All	58	62	78	106	58
	1	20	3	22	17	18
	2	23	33	17	51	10
	3		7	7	18	11
	4	7				18
Black plays (stones played)	All	54	60	75	105	74
	1	16	11	23	18	24
	2	8	20	11	20	14
	3	20	20	32	38	36
White confusion (average) (10 = very confused)		4.77	4.54	4.59	4.743	4.54
	1	5.69	5.39	4.54	3.38	3.31
	2	3.38	2.31	3	4.54	5.31
	3		5.92	6.23	6.31	5.69
	4	5.23				3.85
Black confusion (average) (10 = very confused)		5.15	5.23	3.87	4.95	4.95
	1	5.23	5	2.23	4.23	4
	2	7.38	6.69	7.62	8.15	8.23
	3	2.85	4	1.77	2.46	2.62
Winning Team Points		W 73	B 161	B 119	W 120	B 110
White captured		9	19	23	17	26
Black captured		10	9	5	21	10

Game 3 had the same players as Game 2 but had a reduced (40 second) relaxation time and a larger 19x19 board. The White team lost communication with W3 for a while and this seemed to greatly hamper their efforts becoming the main point in their de-brief. The Black team became more strategic in their chat led, by B 3, and performed well. The White team has a more abbreviated conversational style.

Game 4 had the same players as Game 3 but play was reduced to a 30 second relaxation time on a 19x19 board. Several players reported an increase in stress and reduced quality of communication. This produced a more level playing field but more aggression and frustration of players as seen in the chat.

In Game 5 the White team had all 4 players and the relaxation time went back to 40 seconds on a 19x19 board, which players liked. The Black team communicated well and co-ordinated with confidence, while White players commented that the extra team-members reduced the effectiveness of communication.

Over the series of 5 games, the more stable Black team exhibited the most learning and development, while the

White team did not develop to the same extent and did not perform as well. The White team suffered from technical breakdown in communication in Games 2 and 3 of which they were not always aware and did not correct. They also had a change of player between games 1 and 2 and all 4 players in game 4. Despite this they did function cooperatively, doing best in comparison with the other team when under time pressure in game 4.

In reference to the dependent variables mentioned previously, the results show:

- emergent leadership in the Black Team: B3 the youngest player, had personality attributes in Table 2 that were highly adventurous and cooperative and the highest intellect. Both B1 and B2 had personalities with high levels of trust which may have supported B3's emergence as leader, even though B2 was older.
- emergent cooperative behaviour: Although the de-brief showed that the teams became more competitive as they became more experienced players, cooperative behaviour was observed in both teams but suffered under stress in Game 4.
- effective decision-making, indicated by game performance, was evident under stable conditions although this deteriorated under adverse conditions – in the stable Black team under time pressure in game 4 and in the White team in games 2, 3 and 5.

It was clear that Go*Team could manipulate the independent variables mentioned previously:

- stress: was simulated through timing changes;
- uncertainty of information: serendipitous breakdowns in communication provided this;
- trust: the personality tests indicated high levels of trust inherent in all players;
- training and learning about playing Go*Team came about by having the same teams play a series of games and reflecting after each one;
- team size, structure and organisation;
- communication mode: the difficulties of the 3 or 4 way chat can be seen in the chat excerpts presented - particularly when asking questions.

5. PROPOSED FUTURE RESEARCH

The work presented in this paper supports the premise that Go*Team can be used to study emergent cooperative activity in NCW teams. This work also points to the need to encourage, support and recognise the importance of cooperative teams in a variety of organisational contexts. Future versions of the game will include more communications schemes and team member replacements.

In order to speed up data collection in Go*Team research, future versions of the software are being enhanced to log as much as possible of the quantitative data. Data logged will include sent messages, stone moves and marker placements, by time, during the game for each player, as well as a continuous assessment of the state of the game. This would enable 1 or 2 games a day rather than 1 a week. Also, more meaningful assessment of player communication is

planned. The data already gathered is being assessed for its relationship to a number of social constructs such as level of engagement, situation awareness, cooperativeness, leadership and so on. The considerable potential of Go*Team for both research and practice in NCW is thus being realised.

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7. APPENDIX

Game 1 Chat and De-Brief

<p>Black 3 taking charge [10:32] B 3: B2: where did you go? [10:32] B 1: my turn? [10:32] B 2: ok - tried to place d10 [10:33] B 3: go now [10:32] B 3: placed one E12 [10:32] B 3: too slow B2 [10:33] B 1: I cant' see others, just mine and two white stone [10:34] B 3: thats right, use marker [10:34] B 3: we need to go as soon as its ready</p> <p>B-3 getting tactical [11:14] B 3: we need o7 desperately [11:14] B 2: they have n8 [11:14] B 1: N6 next [11:15] B 3: o7 to stop capture [11:15] B 3: L7 next if possible</p>	<p>White team uncoordinated but getting the idea [10:40] W 3: whos next [10:41] W 1: B A11 [10:41] W 3: w b12 [10:41] W 3: b a11 [10:42] W 1: B G10 [10:42] W 3: will w 13 next round be ok? [10:42] W 1: B F9 [10:43] W 2: w j11i [10:43] W 1: W F8 [10:43] W 1: next time pls put G9 [10:43] W 3: who? [10:43] W 2: b k 11 [10:44] W 1: we got 3 white around B F9</p>
<p>W 1: a bit confused B 2: still learning B 3: First time, so took some time to get the hang of chatting while playing (esp within the time limit) W 3: it was new and confusing, oretty good. B 1: enjoyable teamwork W 2: it was good we did well but need more coordination</p> <p>How competitive did you feel once you got playing? W 1: I myself really wanna win</p>	

B 1: just having fun, but want to win a little of course
 B 2: wanted to win
 B 3: About as competitive as I usually am. Wanting to win, it was the first time I'd played I didn't expect to win.
 W 3: Was pretty confused, but tried to get ahead.
 W 2: i think there was kind of competitive and i tried to win with my team it was fun and goog

How well did your team cooperate and coordinate?
 B 2: we tried and improved but it was difficult
 B 3: Very bad at the start, but got better as the game progressed.
 W 1: I about 40%, but I sure our team will be better next time
 W 3: It seemed like we lost communication bout half way through, but we werer still abl to coordinate a couple gf good moves.
 W 2: sometimes we lost but we need more good communication in the future
 B 1: a mass at the beginning, but wehn the standard communication language get out, things got better, I score it 6 at 1 ~10 level for whole game

Game 2 Chat and De Brief

Black coordinatng well with B3 as leader	White working better- more supportive language
[10:27] B 1: they are trying eat E5	[10:22] W 2: ok
[10:27] B 3: look after it	[10:22] W 2: dont worry
[10:27] B 3: b2 play stone	[10:22] W 1: COOL
[10:27] B 1: E4, white	[10:23] W 1: white 2, go now
[10:27] B 3: their stones?	[10:23] W 1: & the tell us what pos?
[10:27] B 1: E4, white	[10:25] W 1: white 2: what pos?
[10:27] B 2: I played i13	[10:25] W 2: bh12 wf5
[10:27] B 2: played h14	[10:26] W 1: good job
[10:28] B 3: is that whitew h14	[10:26] W 1: what pos?
	[10:26] W 2: wh14 bc5
	[10:29] W 1: what pos? Wht2
	[10:31] W 1: so u shoud pick e6
	[10:31] W 1: to kill be5

B 2: enjoyed it more this time
 W 1: betterunderstabding
 W 2: it is more enjoyable than last time
 W 3: it was a little bit confusing
 B 1: better than last time, improving skills
 B 1: It was a bit better this time, as we co-ordinated better.
 B 2: it was easier than last time
 W 1: better understanding than last time

How competitive did you feel once you got playing?

B 2: I was more competitive as I felt we were going well
 B 1: very, I thought we are gonna lose this time during the first half of game.

W 2: we had more competitive than last time
 B 3: Not as competitive as last week. I took more time to study the board and locations, allowing the other players to play more often than myself.

W 1: cound not see the clearly how my teqam compare r
 W 3: very competitive, but i was not able to do anything since i was not ablt to tell others

How well did your team cooperate and coordinate?

B 2: we were much better than last time.
 W 2: we missed chat whit player number3 so it was difficult as long as the game was simple it was a good idea to lead by one person, but at the end it was not working
 W 3: there are still some confusions in the middle of the game, somehow we get through it at the end. . the start is better than the last time.
 B 1: We co-ordinated our efforts a lot better this week. We organised most of our moves ahead of time (or at lewast a lot of them).
 B 3: We co-ordinated our efforts a lot better this week. We organised most of our moves ahead of time (or at lewast a lot of them).
 W 1: don't know what going on, though I can announcew the position og the dots more quickly than last time

Game 3 Chat and D-Brief

Black cooperation strategies	White confusion
[10:30] B 3: place E15	[10:42] W 1: I am white1
[10:31] B 1: don't place E15, suiside	[10:42] W 2: hhh
[10:31] B 3: can anyone see white stone around E15?	[10:43] W 1: kalud is there
	[10:43] W 1: white 3? r u kalud?
	[10:43] W 3: no, i'm mohammad

[10:31] B 2: placed e 15	[10:43] W 3: ok, go
[10:31] B 1: G15, white	[10:44] W 1: White?? r u kalud?
[10:31] B 3: do we own F14	[10:45] W 1: white??? who r u?
[10:31] B 1: H14, wihte	[10:46] W 3: ok, who's first?
[10:31] B 1: F14 is black	[10:46] W 1: Whoi1
[10:31] B 3: placed F11	[10:46] W 3: i did! w c 14
[10:32] B 3: G11 next	[10:46] W 1: what have u chose?

Game 4 Chat and De Brief

Black much shorter messages:	White still has time to chat and recover from a break of communication
[10:25] B 1: black K12	[10:43] W 1: hi
[10:26] B 3: white at l11	[10:43] W 2: w q12
[10:26] B 2: placed r16	[10:43] W 3: hi, were have you been?
[10:26] B 3: and J12 and H12	[10:43] W 2: we get 2
[10:26] B 1: go P17	[10:43] W 3: good
[10:26] B 3: placed P17	[10:43] W 1: WE die 4
[10:26] B 3: we also need Q17	[10:44] W 1: Man, we lack of communication
[10:27] B 1: go for it	[10:44] W 2: b m9
[10:27] B 2: placed r17	[10:45] W 3: you were not here! we didn't get any message from you! come on, play
	[10:45] W 1: we lost f14, g14, e13,f13,e12

How competitive did you feel once you got playing?

W 1: much more competitive then before
 B 2: similar to last time
 B 1: opponent become more fierce than last time
 W 3: less then last time, but i had more control over myself this time
 B 3: Probably a little more competitive as I was getting frustrated at the lack of communication regarding stones placed.
 W 2: really it was the most competitive that i hd felt in all games

How well did your team cooperate and coordinate?

B 2: not as well as last week - less advic was given
 W 1: not very good, not as good as last time
 W 3: it was really hard to talk in this short time
 W 2: it is harder to communicate well with the short time
 B 1: I feel the effeciency of communication is bad, and a lot of misunderstanding
 B 3: Not as well as last time. It felt like the last move wasn't communicated qicly enough and that led to stoned being placed without the info required.

Game 5 Chat and De-Brief

Black team working together	White confused
[11:21] B 3: if we get the L column, we get lots of stones	[11:21] W 1: b c1
[11:21] B 3: white B2	[11:21] W 4: b1 next?
[11:21] B 1: go L3, L2 L1, we will get 4 white	[11:21] W 4: w b2
[11:22] B 2: black m3	[11:22] W 4: is there somethingon b1? i couldt' get it
[11:22] B 3: black L2	[11:22] W 4: who played?
[11:22] B 3: white B1	[11:22] W 3: black l2
[11:22] B 3: they're doing some really stupid shit (the white team that is)	[11:22] W 3: black m 3
[11:23] B 3: black L4	[11:23] W 3: i didn't
[11:23] B 3: white M2	[11:23] W 2: w m2 bl2
[11:23] B 3: L1 next!!!	[11:23] W 3: anything on k2?
[11:23] B 1: should go L1	[11:23] W 2: no

How well did your team cooperate and coordinate?

W 2: never
 W 1: not very goofd, cos new commer
 W 4: WE started well. But then it came undone towards the end. Especially after we started to lose stones
 B 2: fairly well for information on placing but little planning or advice
 B 1: very good this time. best one of all the previous games
 B 3: I think we did better than the other team as they had four players and seemed to be struggling near the end.
 W 3: There was good coordination in thios game, as everyone was communicating their intentions and any changes on the board.