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## Serious games: The importance of play in network-centric organisations

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### Abstract

The psychology of play recognises that there are benefits of incorporating play and games at work. In this paper we report the results of an investigation into the use of gaming to develop the cooperative human aspects of team behaviour in organisations that want to increase their social network-centric capability. We show how online team gaming sessions can enhance people's awareness and mastery of collective processes underlying teamwork and cooperation in the context of the workplace. The conduct of such a session is described and the analysis of both quantitative and qualitative data is presented. Lessons were learnt from use of this engaging but "serious" game for building cooperation in modern network-centric organisations through play. This contributes not only to our understanding of the use of play and gaming in the workplace but also to the methods for practice and research on this important topic.

### Keywords

importance, organisations, centric, play, serious, games, network

### Disciplines

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# Serious Games: The Importance of Play in Network-Centric Organisations

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## ABSTRACT

The psychology of play recognises that there are benefits of incorporating play and games at work. In this paper we report the results of an investigation into the use of gaming to develop the cooperative human aspects of team behaviour in organisations that want to increase their social network-centric capability. We show how online team gaming sessions can enhance people's awareness and mastery of collective processes underlying teamwork and cooperation in the context of the workplace. The conduct of such a session is described and the analysis of both quantitative and qualitative data is presented. Lessons were learnt from use of this engaging but 'serious' game for building cooperation in modern network-centric organisations through play. This contributes not only to our understanding of the use of play and gaming in the workplace but also to the methods for practice and research on this important topic.

## Keywords

**serious games, computer play, workplace learning, network-centric organisation.**

## INTRODUCTION

Emerging research attention being paid to 'serious games' and to the role of play in improving the emotional climate and collaborative performance of the network-centric workplace (Leigh & Kinder 1999). The increasing use of computer games throughout our society motivates the use of games and game technology for more serious purposes including education, training and research. A recent call for papers for a Serious Games conference defines them as "games that engage users in their pursuit, and contribute to the achievement of a defined purpose other than pure entertainment (whether or not the user is consciously aware of it)"<sup>1</sup>.

The psychology of play recognises that there are benefits of incorporating play and games at work. There appear to be under appreciated advantages in using play and games for staff development in work organisations. Researchers and managers are reluctant to use terms such as 'play' in the work context because traditionally it is seen as an activity which is opposite to work. However, there is a growing interest in what they call 'serious games' and 'simulation' to improve morale, cognitive and social learning and cooperative behaviours in organisations.

The authors of this paper and other colleagues have investigated the use of gaming to study the human aspects of networked teams and developing a means of increasing social network-centric capability in the context of Australia military (see Hasan & Warne, 2008). An online team version of the traditional board game Go was built and protocols of its use developed for research. The game, Go\*Team, embeds teams of players in an environment where they compete to win the game in the exploratory and non-threatening manner of 'play'. In addition, they must also learn to cooperate by collective decision-making under variable conditions. Thus play is combined with learning toward a more cooperative network-centric culture.

This paper reports on a study of how Go\*Team sessions can enhance people's awareness and mastery of collective processes underlying teamwork and cooperation in the context of a university workplace. It presents lessons from use of this engaging but 'serious' game for building cooperation in modern organisations through play. The research described addresses this complex issue, taking a cross-disciplinary approach that spans the disciplines of psychology, education, organisational behaviour and information systems. The engagement and fun aspect of team learning that emerged in the trials of Go\*Team in the workplace are explored.

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<sup>1</sup> <http://oss2009.org/index.php?id=Seriousgames.htm>

## LITERATURE REVIEW

This literature review aims to synthesise concepts of computer supported games, simulation and play, for development and learning in network-centric work environments. Game-based learning leverages the power of computer games to captivate and engage users to develop new knowledge and skills. Participants are enticed into training with an appealing simulated environment and a challenging but fun activity that would otherwise be costly, risky or impossible (Corti 2006).

Although usually associated with the young, play is an engaging, fun and safe means to explore and experiment with the unknown for people of all ages (Mainemelis & Ronson 2006; Leigh & Kinder 1999). The use of play and gaming in the corporate world exploits their potential to allow cooperative knowledge workers to emerge in real and complex business environments though bounded social interaction and communication. Thus organisational learning and development occurs through purposeful collective action in a non-threatening space.

An increased complexity of a modern organisation demands an advanced ability to work in numerous teams where people and groups have to communicate, cooperate and share information to achieve organisational goals. In a technologically enhanced organisation, more often than not, daily routine communication of the teams is conducted in a computer mediated environment, both on-line and off-line. This requires all the members of the team to be able to communicate in an efficient and productive manner. Current literature emphasises a “science of human relationships” (Goleman 2006) which implies adequate training for the staff in an organisation. One way of effective learning, which is stress free and enjoyable, is that of play. Play is widely known as a powerful medium of the development of imagination and socialisation over the life span (Vygotsky 1967; Sutton-Smith 1997; Csikszentmihalyi 1990). Theories of play have identified many ways in which traditional play may advance children’s cognitive, social and emotional development (as summarised in Verenikina & Herrington 2006).

In the time of rapid development of new technological learning media, researchers suggest that we reconsider the role of “serious play” in workplace (Reiber 1996). “Given the range of open-ended explorable environments that can be constructed with computers, the time has come to revisit the almost alarmingly simple, yet powerful construct of play” (Reiber 1996, p. 43). Described by Salenius-Pasternak and Gelfond (2005, p. 6.) as ‘the first qualitatively different form of play that has been introduced in at least several hundred years,’ computer play has a potential in further exploration of its affordances in the development and support of the ability of metacognitive reflection and higher order thinking in collaborative work. Stephenson in studying play recognized the importance of play and the range of behaviour that play can involve, including not only games but also subjective play, “play that reaches into myth and fantasy, [play that] takes complicated forms of its own”. (Stephenson 1967). However, Stephenson took the view that play has little value for the player except in self-enhancement.

Mainemelis and Ronson (2006) have recently identified the role that play can take in organizations. The first is play as a form of engagement with work: when employees turn their core work into play, which in turn facilitates the cognitive, affective, and motivational processes that creativity requires. Examples of this can be seen when employees are able to form groups and take responsibly for tasks in creative ways. The second is play as a form of diversion from work, which is much more than water cooler gossiping. Play as a diversion fosters creativity by creating a social climate that is conducive to inventiveness; this also can promote greater engagement among individuals but will be more remote from the direct work practices. Lessons that can be learnt through play concerning teamwork and cooperation are particularly valuable as organisations become less hierarchical and more networked in configuration. The benefits of a networked organisational configuration in the commercial world were recognised in research reported in the early 2000s (Huang et al 2000; Sambamurthy et al. 2003). In some of the early literature, the term ‘network-centric’ only referred to the connectivity achieved through technological networks, in particular the Internet and Web enabled applications. However, the connotation of network-centrism continues to expand as ICT networks and applications are transforming the ways in which people gather, share, and process information and knowledge and, consequently, on the ways they make decisions to act. It is now accepted that effective network-centricity is essentially about knowledge, people and communities rather than the technology itself. While the technical component enables, the organisational and behavioural components generate added value (Pascoe & Ali 2006; Warne 2006).

The network-centric paradigm allows organisations to change their culture from one determined solely by a command and control, rule-based hierarchy to one which supports more dispersed decision-making through the sharing of information and knowledge (Friel 2002, Crawford et al 2008). Go\*Team was developed within the network-centric paradigm where innovative working is encouraged in self-directed teams. This requires human attributes of diversity, cooperation, loyalty, trust, sharing information and knowledge collective decision-making and action, common goals and the support of social technologies. Internet based social networking has become widespread in society, particularly among the young, and the

social technologies that support networking are gradually finding a place in work organisations. Preparing workers for this new less formal and democratic workplace is a challenge that can be met through play.

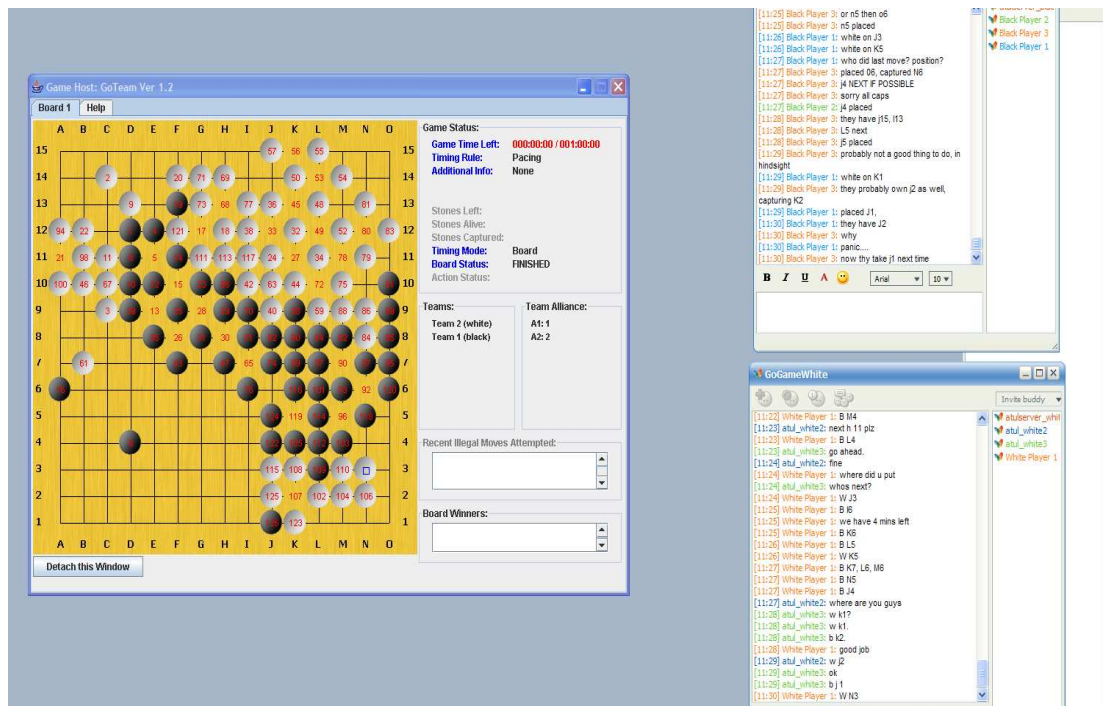


Figure 1 A still of the server screen video captured showing the whole board and the Chat of the two teams during a trial game.

## METHODOLOGY

The Go\*Team software application (see Figure 1) is a purpose built online team version of the ancient Chinese board game, “Go”, which has been popular as a strategy game for centuries and so has stood the test of time as to its popularity and enduring challenge to players. Its suitability for research lies in this appeal, while at the same time, the basic rules are quite simple to learn. To perform well in Go\*Team players need to cooperate and coordinate their effort, as well as share information for timely and appropriate decision making. On the other hand, they need to engage in competition which provides challenge and motivation. This makes the team-building activity engaging and fun for participants.

The project described here involved a game-based team-building session conducted in the work-place with administrative staff at a university and is the first time Go\*Team was formally used for work-place training. For the project, the team-leader of the administration staff was concerned to improve inter-department collaboration among her staff and was particularly enthusiastic to trial the ‘serious game’, Go\*Team, which had been set up for research use at the university. She thus acted as a real client and the Go\*Team session was planned with her to choose teams from among her staff that included ten participants (five on each team) from different departments. At her request, a report was produced that included profiles of the performance and de-briefing comments for each player. These have been produced and were shown to her at a review meeting. Her response gave a valuable indication of Go\*Team as a mechanism for both training and profiling participants.

Participants in this training session were told that Go\*Team would allow them to explore, in a playful way, how they function in the team environment and, afterward, reflect on the techniques that are more successful and the barriers that inhibit them from operating effectively as a team. In this session, with five players on each of two teams, the maximum board-size 19x19 was used. Each player had their own computer on the network and could not see each other’s screen. In Go\*Team players can only see the stones they play themselves and those of the opposition team near these (see Figure 2). Players must therefore communicate their screen view to other team members who can use markers to record the position of

stones that they cannot see. Communication is thus vital to all players in order to have a correct view of the state of play. Computer CHAT was used for this communication to enable the participants exchanging the messages with each other.. Players were all given a relaxation time of forty seconds between plays for communication at which time one player from each team could place a stone.



**Figure 2.** The boards of two players on the White team (the same game as the server screen seen in Figure 1) showing different sets of stones visible to each player and positions of non-visible stones marked (the small letters are the markers) from information sent by other team members.

The general procedure for the session was:

- Pre-brief open discussion: descriptive data was collected on experiences of participants as members of teams and attitudes to working in teams
- An Introduction to Go\*Team play, selection of teams and a short trial game
- A five to ten minute face-to-face team meeting where players can talk strategies and tactics
- Play Go\*Team for 1 hour collecting data on individual and team plays, communications and situation awareness. This data includes, against game time, the stones played by each players, the messages sent by each player to their teammate, and the correctness of the markers that have used to represent stones not visible on their screen but are on those of other team members. In addition players are asked to subjectively rate their level of confusion on a scale of 1 (not confused) to 10 very confused, every five minutes of the game.
- De-brief focus group: descriptive data collected from a reflection on challenges faced on enjoyment, sharing information, team cooperation and lessons learnt.

While the quantitative data analysis process followed that used previously for research (see Hasan 2007a,b), descriptive data was also collected from the pre-brief and debrief as well as a follow up meeting with the client to the new. This was particularly relevant to the use of Go\*Team as a corporate team training tool.

## RESULTS

The extensive and rich data, both quantitative and qualitative, was collected from the play process, communication records (message exchange) and the pre-brief and de-brief of the session.

For research purposes, a number of variables related to these factors were determined, set, changed and/or measured when playing Go\*Team. Some of these were set before or during the course of the game (e.g. the size of the board, team composition, relaxation time). Some variables (e.g. stones played and captured, situation awareness, messages sent etc) were recorded and the results analysed and interpreted.

Qualitative data was provided by observations, recording of CHAT messages and an extensive de-brief with players, which was conducted with participants at the conclusion of each game session.

Research to date (Hart et al 2006; Hasan et al 2006, 2007a,b; Jagiello et al 2006, 2007; Warne et al 2006) has explored innovative team attributes such as self-direction teams; situational awareness; distributed leadership and power; conflict,

cooperation and competition; shared understanding in communication; trust, collaboration and information sharing; performing under stress; an uncertain and unpredictable environment; local strategic decision-making; tempo in decision-making; and the role and consequence of ICT. The Go\*team software allowed the collection of data on these many team and individual factors.

Each type of data was analysed appropriately, as is described below, and the presentation of results includes the element of play as a core construct.

The quantitative data from the actual play of the game is presented in Table 1 and Figures 3 and 4 in the Appendix. Table 1 shows the number of stones played by each player, the number of CHAT messages sent, and the number of correctly marked stones as an indication of the quality of their situation awareness. This table contains more information on comparing team and individual performances than can be discussed in this paper but can be explored further. For example the white team played more stones than the black team but sent far less messages (more action, less talk). White 2 dominated the conversation in her team with 81 messages and, from their content was obviously highly motivated to win. Black 2 and White 1 were the most confused players on their respective teams. Figures 3 and 4 are graphs of this data spread out over game time as the horizontal axis. From the top, the graphs show a band of the five sets of messages sent (ie players 1-5), the correctness of markers, the confusion levels and the plays at the bottom. The triangles represent stone captures. This shows for example in Figure 3, the constant stream of message from White 2 (second bottom line in band 4 – 5) and the low number of correct markers from White 1 (bottom line in band 2-3). In Figure 4 we see that Black 1 played a whole lot of stones at 11 am with not much communication resulting in very few markers being placed by teammates. Showing these to the client made her comment that she could see elements of different personalities in the patterns of play. Some were consistent, others sporadic, some quiet, some lost interest etc.

Some lessons learnt from the qualitative data from the content of the CHAT messages, pre-brief and de-brief discussions are:

- In the pre-brief, participants approached the session as part of their job and it was taken by them much more seriously than by the participants of some other sessions, undertaken for research. They needed to have a work-related purpose for the sessions explained to them at the outset and they were not comfortable engaging in play as such where they could explore options and take risks. They wanted to know how they would be assessed and to perform well at a specific task.
- The gap that exists between the typical 'ordered' work-place culture and that of the network-centric paradigm was evident in the team meeting before the game where some players made comments such as "we needed to discuss the team strategy prior to playing and assign team roles" reflecting a traditional work culture.
- The participants did, however, admit, that there was a need to improve cooperative behaviour in their workplace and they were enthusiastic about the potential of games such as Go\*Team for this purpose.
- People enjoyed both the game itself, evident through much of the content of the CHATs and the light-hearted exchange between players on both teams during the de-brief session. Some social capital was generated among the group as a whole.
- Reflecting in the de-brief on what happened during the game participants made observation on their own behaviour and that of others, saying that they learnt something about themselves as much as about their teammates and the opposition.
- Some comments in the de-brief indicated that the session had positive learning outcomes, eg "winning is fun, but winning as a team is MORE FUN", "we didn't really have a leader but a couple of members were definitely more dominant and we won anyway", "it was nice to be able to have a laugh with people away from the normal work environment".
- Neither the players nor the client (the team-leader of the administration staff) felt that spending a couple of hours having fun at work was a waste of time when it ended in harmony and strengthening of interpersonal relationships.

One thing we learnt from this session was the difficulty of collaborating effectively online through chat under stress when there were five people per team. In previous research the most we had used were teams of four.

## DISCUSSION

The Go\*Team session with university administrative staff, described in this paper, illustrates the value of leveraging concepts of play to prepare workers for complex activities in self-directed cooperative teams as required in the network-centric environment. In particular, computer games are increasingly used for entertainment throughout our society with people playing on the bus, at home and at work. Computer games thus affect larger and larger number of people and areas in the society of today. This trend motivates the use of games and game technology for additional more serious purposes, e.g. education, training, profiling or organisational change management.



Organisational functions such as knowledge management (KM) and human resource management (HRM) have much to gain from play as they deal more directly with issues that arise out of human activity and collaborative work practices. Play provides opportunities for activities that are valued in HRM in particular, change management, collaborative work practices and education and training. Play can both be used to explore the multiple forces that motivate the behaviour in employees and in particular in change agents. Where employees need to constantly adapting to new practices their activities, if motivated, can allow them to find better ways to do things. Play provide mechanism where change can be achieved at lower risk to the individual and where the “driving forces” can selected for the purpose of the play and thus may also be “external” shaped by circumstances outside the agent's control, such as the state of society or the seasons— or internal—from a conscious desire to make specific changes.

The outcomes of this project are both practical and theoretical. The theoretical implications of the project are that it establishes a ways that ‘serious play’ can be used to enhance social innovation in organisations and increase our understanding of the benefits in establishing a new approach to organisational learning based on play.

In practical terms, the cultural shift needed for a traditional organisation to be more network-centric is rarely achieved easily and gaming sessions, such as the one with Go\*Team, may have a role to play. Even if it is recognised that an organisation and its people needs to change, managers are often at a loss as to what to do. The potential of Go\*Team as a work-place, team-building mechanism, is demonstrated in the project reported here and would be relatively easy and inexpensive to implement.

The way each member of an organisation behave in Go\*Team sessions may also provide a means of classifying how prepared they are to operate in an uncertain network-centric environment where decision-making is decentralised in self-directed teams and critical actions must be undertaken with partial information under time pressures.

In the next phase of this research lesson learnt from this innovative use of the game will be use to build a multidisciplinary theoretical framework that can be tested with further Go\*Team sessions.

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## White Team June 3 2008 Faculty of Commerce Admin

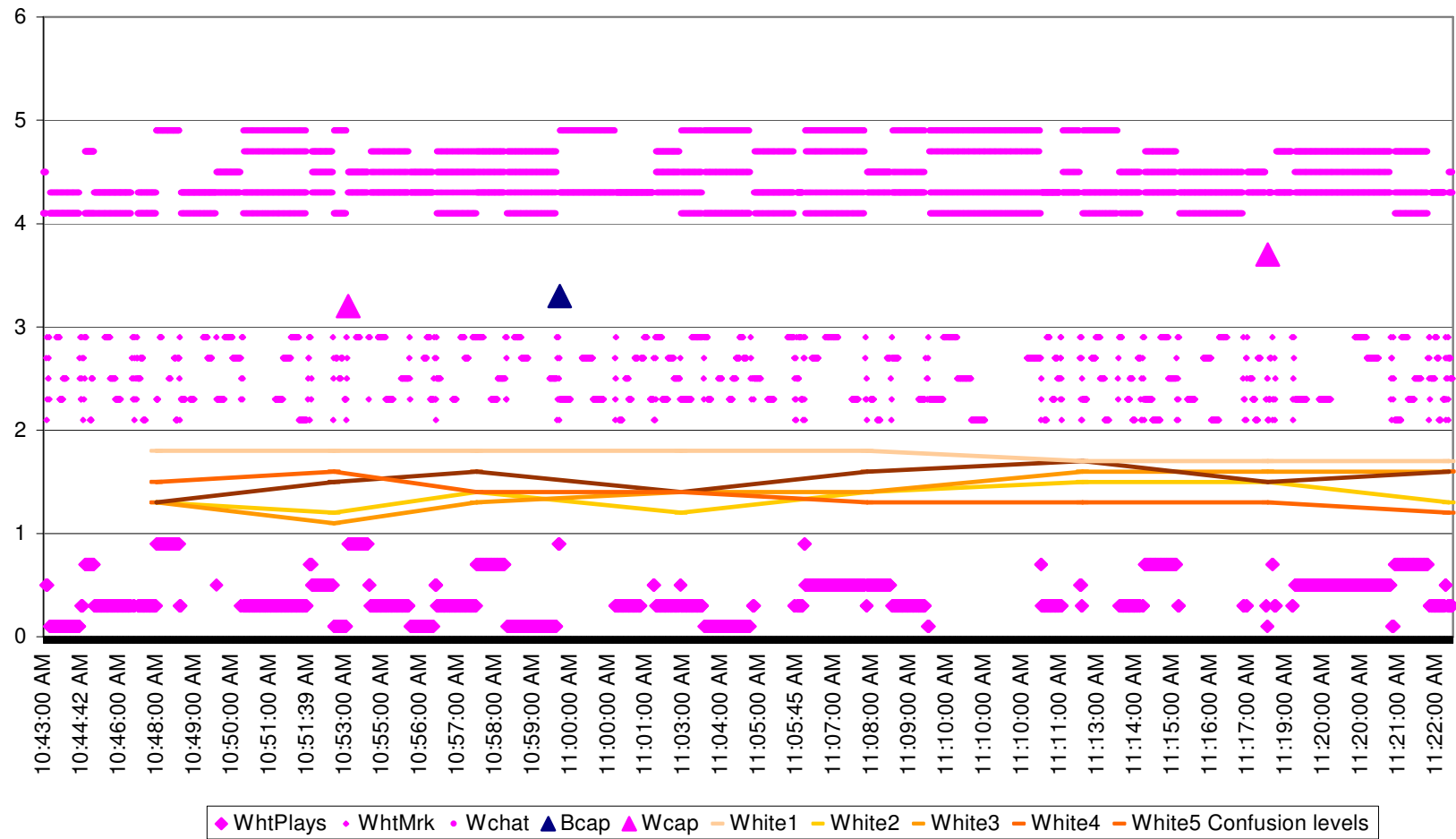


Figure 3. Time series data from the Go\*Team Session White Team-

# Black Team June 3 2008 Faculty of Commerce Admin

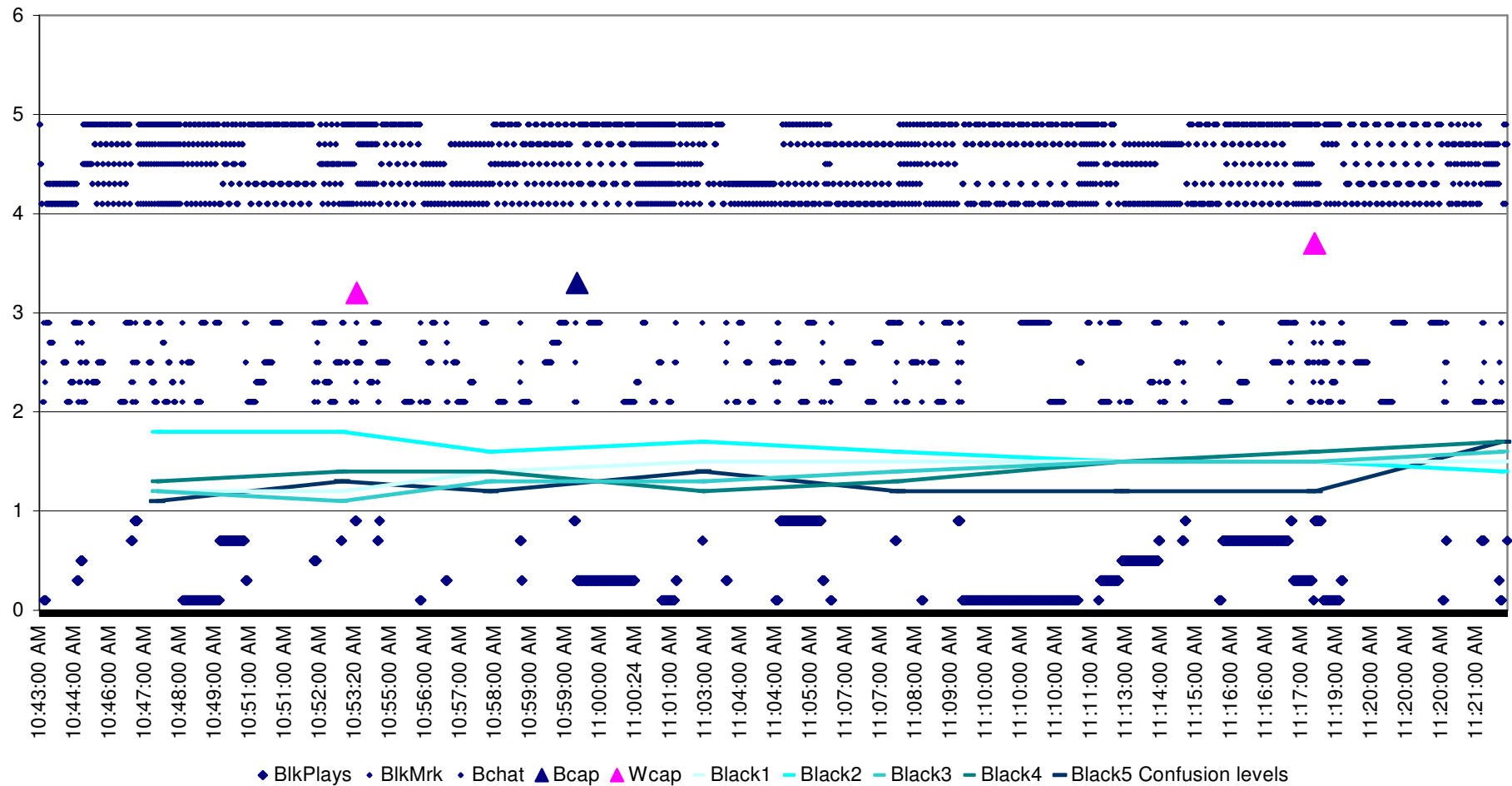


Figure 3. Time series data from the Go\*Team Session Black Team-

	Black1	Black2	Black3	Black4	Black5	All Black	White1	White2	White3	White4	White5	All White
<b>No. of Plays</b>	14	12	3	14	10	53	8	33	12	8	4	65
<b>%</b>	26.42%	22.64%	5.66%	26.42%	18.87%		12.31%	50.77%	18.46%	12.31%	6.15%	
<b>No. of Messages</b>	74	54	54	55	98	335	32	81	33	24	19	189
<b>%</b>	22.09%	16.12%	16.12%	16.42%	29.25%		16.93%	42.86%	17.46%	12.70%	10.05%	
<b>Correct Markers</b>	85	41	67	20	74	287	55	95	75	77	84	386
<b>CM/TSP %</b>	72.65%	35.04%	57.26%	17.09%	63.25%		47.01%	81.20%	64.10%	65.81%	71.79%	
<b>Incorrect Markers</b>	4	3	2	5	4	18	5	11	9	5	6	36
<b>IM/TSP %</b>	3.42%	2.56%	1.71%	4.27%	3.42%		4.27%	9.40%	7.69%	4.27%	5.13%	
<b>Avg. Confusion</b>	3.71875	6.125	3.625	4.25	2.875	4.11875	7.625	3.5	4.125	3.75	5.25	4.85

### Total Stones Played (B+W)

117

CM = Correct Markers

IM = Incorrect Markers

TSP = Total Stones Played

**Table 1. Summary data from the Go\*Team Session**