

Game on
Individual emergence in informal learning environments

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ABSTRACT

Rudyard Kipling wrote ‘the game is more than the player of the game, and the ship is more than the crew’. The purpose of this paper is to take issue – in part – with Kipling, and to argue that games are unusual insofar as they confer new properties on players. These properties, in turn, it will be claimed, make the sum of the parts greater than the whole. To illustrate the argument, examples will be taken from several games developed by the author and his teams during the course of the past five years.

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INTRODUCTION

For many years I have been concerned with problems of emergence in complex systems – particularly in museums, science centres, and other institutions of informal learning. Since I first spoke at this gathering in 1989 about a ‘third generation’ of science centre, my thinking has been inspired and in part shaped by Gerard de Zeeuw, to whom I owe an enormous debt of gratitude which I would like to publicly acknowledge here today.

In the paper I gave in 1989, I argued that ‘Third generation science [centres] ... attempt to unhook the cart of absolute truth from the horse of enquiry, so visitors can leave not saying “I know”, but rather “I know *how* to know”... The third generation of science centres is about a “colour-your-own” world, in which the commitment is to a science of processes to be engaged in ... processes that can involve adults, children, scientists and lay people alike in an ongoing discovery of the wonder of the world and our making of it.’¹. Since that time, I had the good fortune to be able to actively experiment in several countries and in diverse settings, and by the time I next presented to this conference, in 1997, I was months from completing a built example of a ‘third generation’ science centre here in Amsterdam – newMetropolis, recently re-baptised NEMO.

Over the course of the years, it became clear that of the several goals of informal education, the desire to support emergent properties in the individual was amongst the most important. At first, we described this goal crudely in terms of learning new skills, as opposed to ‘merely’ acquiring new information.

We started by looking at the challenge of support in an informal setting by examining the tension between variety and coherence. This tension can be described in several ways. Fundamentally it is a tension born of the desire to support the greatest number of coherent experiences for the greatest variety of users. However, traditionally coherence has been purchased at the price of a loss of variety - the scientist's taxonomy, the curator's schema, the designer's storyline all mitigate against the user's freedom to shape the experience of the museum himself according to his own needs. Conversely, variety often comes with a corresponding loss of coherence - the user is left to his own devices to create an infinite variety of confusing and incoherent experiences. When we hear the science centre is under attack, and watch its attendance drop sharply, we can see the consequence of delivering neither the variety nor the coherence demanded by the user.

At the exhibit level, the tension can be seen by looking at two exhibits. One has the visitor construct a catenary arch out of carefully shaped blocks that illustrate the principle perfectly - but in only one way. The other is an open-ended play area where the visitor can use a variety of blocks to make a variety of bridges that all stand - but why? Neither exhibit is sufficient to create the conditions for self-structuring, self-sustaining activity. Neither exhibit fully supports its user. What kind of activity

would we look for in an effective support to informal learning, a support that maximised both variety and coherence at the same time? Two ready-to-hand examples allow us to describe such supports - language, and games. Both are self-sustaining, and tend towards maximum variety at the same time as maximum coherence. Both constrain the user, but at the same time unlock an infinite variety of structured activity. Both can be used as models for the design of successful exhibits.

At that time we were strongly influenced by the work of the American psychologist of creativity, Mihaly Csikszentmihalyi, who described in 1990 what he called the 'flow' experience, which he argued characterises most intrinsically rewarding human activities from sport, to music, to art appreciation. Activities that manifest flow are self-initiated, self-sustaining, and often self-structuring. Csikszentmihalyi's calls this a 'flow' experience. Csikszentmihalyi defines flow as 'a subjective state that people report when they are completely involved in something to the point of *losing track of time and of being unaware of fatigue and of everything else but the activity itself.*' [italics in original] The experience should ensure that the opportunities for action are more or less matched by the visitor's ability to act at any given time. In order for this experience to be self-sustaining, it must also create the possibility for increasing complexity, 'to differentiate new challenges in the environment, to integrate new abilities into our repertoire of skills.' In order to continue the flow experience, the visitor should want to return, to try the exhibit again, to do it better a second, third, or fourth time.

How could we maximise the variety brought to the experience by the user, while at the same time retaining the coherence necessary for effective learning? How could we create informal learning environments that became self-structuring and self-sustaining? How could we support the conditions for what Csikszentmihalyi called the 'flow' experience? How could we shift the focus from the exhibit as an end-in-itself, to the exhibit as a support for human activity - discussion, dialogue, debate? Finally, how could we develop exhibits that genuinely changed as a consequence of the user's activity and intentions?

Shortly after giving my first paper to the 'Mutual Uses of Science and Cybernetics' conference in 1989 (when I also had the good fortune to meet Gerard), I became convinced that we needed a tool to allow us to speak more precisely about the properties conferred on the visitor in a museum setting, and in turn, a way to look at the properties the visitor herself conferred on the museum exhibit. The two related

concepts I employed are familiar to you all – that of a support system, and that of a user-language.

‘THE GAME’S THE THING’

Let me begin by briefly defining the terms ‘support system’ and ‘user-language’.

By definition, a support system is open to any individual without any form of prior constraint other than the desire to use the system to maintain or increase their competence. A support system suggests to users a specific form of use, and possible extensions to these uses, where a flow of information will provide the user with the additional resources needed, and be available to other users. A support system supports the activities of the user, which stem from the user's own interests, experience and existing competence. A support system does not impose a model of the user, nor a model for the activities on the variation brought by the user. A support system is immediate, and supports the user throughout her activity, although certain support systems may have further extensions over time. A support system operates in such a way as to maximise variety among the users, and to maximise the continued use of the support system in such a way that this activity, and other activities, is augmented and encouraged. In this way, the support system can be said to serve as a means of recognising, responding to and enhancing the user's competences, without leading to conflicts with other users.

As defined by De Zeeuw, a user-language is the 'collection of constraints that helps shape the variation generated by an actor into patterned behaviour.²⁾

In the museum setting, user-languages can be ordered in terms of the ways in which they support variety generated by actors - from the user-language of authority at one end of the scale, to the user-language of infinite games at the other. In the user-language of authority, effectively the label has only one dimension - that of the voice of somebody else as an authority. In the user-language of ‘observation’, the user is addressed as an observer and hence conferred the property of being her own authority. The user-language of ‘variables’, an extension of the user-language of ‘observation’, marks the emergence of the modern museum, as it confers the ability to see not only

the visible, but also invisible relationships among things. The user-language of ‘problems’ confers actorship on the user, while the user-language of ‘games’ makes this actorship an indispensable condition of the experience, and confers the additional property of other players - with only one player, there is no game.

The user-languages of textual authority, observation, and variables confer properties which could be said to correspond to ‘traditional’ learning. The user becomes more knowledgeable, and to organise observations into meaningful patterns. The user-languages of problems and games, on the other hand, correspond more closely to the goal of enhancing the acquisition of new skills – an explicit goal of the ‘third generation’ science centre, and I would argue, for all institutions of informal learning in a rapidly-changing society such as our own.

As implemented by a museum label, the user-language of ‘problems’ confers the property of agency to the user, a highly desirable outcome. What more can we expect from an effective label? In the user-language of ‘problems’, the agency remains isolated, individual, located in the user who has internalised the problem as her problem (even when part of a group or family visit). The user-language of ‘games’ takes advantage of the user-language of ‘problems’ and the agency it confers, but creates an additional property - other players. Labels that employ the user-language of ‘games’ displace, for the first time in the museum setting, the emphasis from the content of the experience to the experience itself - the relationship with the variety that others can bring into the space of the museum. Other actors are *always* able to introduce more variety than that which can be found in nature (even though the latter appears inexhaustible) – as they appear to be able to ‘step out’ of any variety-limiting framework³.

A game structures play and provides users with the space to identify personal goals and closure rules. Most importantly, a game provides a measure of improvement, and is both open to and structures the infinite variation on behalf of the players, who voluntarily sustain the play. In most games, such as football, hockey, tennis, cricket, called finite games by Carse, there must be a way to win. In other games, far fewer in number (but not rare), such as tag, the goal is not to win, but to sustain play. These

games Carse calls infinite games. In a finite game the rules must stay fixed by conventional and inviolable by the players in order that closure is achieved. In an infinite game, the rules can be plastic in order that the players can sustain play as long as they desire.

I would like to give a few examples of games I have developed with my colleagues over the course of the past several years to illustrate the ways in which individual emergence is encouraged and supported by the user-language of games.

PLAYING AROUND

Mine Games 1992 - 1994

In the autumn of 1992, the author and his partner Drew Ann Wake were asked to consider designing a new permanent exhibition, provisionally entitled 'The Living Planet' at Science World in Vancouver, Canada⁴. The project was originally intended to treat the future of science and technology in the province of British Columbia.

Mining is the most important industry in the Western Canadian province of British Columbia, and in recent years the issues surrounding land use have been sources of intense conflict between industry, the environmental movement, government and native peoples. Science museums and science centres, however, are normally reticent to play an active role in the debates that surround the uses of science and technology, often contend that science is a neutral activity, and that the role of the science centre is solely to teach visitors the 'facts' about science.

After lengthy discussion, Science World chose the earth sciences as the theme for the first exhibition, on the assumption that the earth sciences were fundamental to understanding the importance of mining in British Columbia. At the same time, several recent studies conducted by the author and others had already established that public interest in the earth sciences was particularly low⁵, and that the public's interest in the earth sciences was only piqued by an interest in natural catastrophes such as volcanoes and earthquakes, and then rarely.

In terms of approach, there were two clear alternatives to treating the subject. On the one hand, the earth sciences could be treated as they have been in traditional science centres.

Visitors would learn about geological time, the development of rocks, faulting and continental drift. Following the example of other science centres desiring to put the earth sciences 'in context', we would link geological themes to the newsworthy geological events that captured the public's interest - volcanoes and earthquakes⁶. By treating the earth sciences as a subset of geophysics, we would follow the traditional path: separating scientific fact from social issues. We would treat the earth sciences as unsullied by concerns about survival.

The alternative was clearly more challenging. Thus instead of an exhibition on the earth sciences, the designers, Drew Ann Wake and the author, proposed to look at how the geological sciences are constructed in a political and economic context: in short, an exhibition on mining. The exhibition, eventually to be entitled 'Mine Games', would deal with the issues surrounding the mining industry in the province of British Columbia, issues that had been increasingly the subject of heated debate in the press, on television, in parliament, and in the streets. Based on the conviction that visitors are better prepared to engage with science learning tasks when there is sufficient context and motivation to do so, the designers re-focused the exhibition, not on geophysics, but on the social issues that surround resource exploitation in the province of British Columbia.

This single change - from earth science to mining - entailed a complete re-examination of the way in which the exhibition would be planned and designed. With a mining exhibition, it was possible to initiate a debate about the future of the province, teaching visitors to evaluate scientific positions arrayed in support of any number of competing positions. An exhibition on mining would call into question the role the science centre should play in the life of the community, suggesting that the role of the science centre is to prepare visitors to participate in the social and political life of their community.

This paper suggests that while the user-languages of 'problems' and 'games' both confer the property of actorship on the user, only the user-language of 'games' confers the property of other players. If the challenge is to find new ways to support emergent properties in the individual – to recognise her competence and to encourage her participation – in order that she can regain control, in some measure, of the information she is being asked to absorb, the user-language of games seemed to hold out some promise of success. This conviction was at the heart of the strategy to use games throughout, with an interactive theatre as the culminating experience of the 'Mine Games' exhibition.

An exhibition based on games, which included an interactive theatre, gave us the opportunity to create a forum for the discussion of scientific and technological issues in a public

institution – a forum where the activity and agency was conferred on all players – and was acknowledged. In creating an interactive theatre, we tried to create a setting where visitors generated – in a non-trivial way – real ideas, answers, and opinions about the ways in which complex issues can be resolved. As the issues that faced the mining industry in British Columbia were at once scientific, social, economic and political, the interactive theatre seemed to us the ideal vehicle for meeting the challenge of making the science centre a forum for debate⁷.

The user-language of ‘games’ was implemented at every level of the exhibition. The entire exhibition was presented as a game, the objective of which was to advise a community on its best future. Each cluster with the exhibition was also a game, providing new information to fuel the discussion about the broader question. Within each cluster were hands-on exhibits, which allowed the visitor to discover critical information with which to play the cluster's computer game.

For instance, the game ‘High Stakes’ (the first exhibition cluster) is based on the premise that the visitor is the exploration manager of a small mining firm. First, visitors visit eight hands-on exhibit stations to examine the rock and core samples. Each of the stations provides the visitor with one clue as to the location of the mineral deposit. The visitors record their clues on a map and a cross-section of the claims. If the clues are recorded carefully, the visitor's map will define the target areas where the two major deposits may be found.

Next, visitors play a computer game that challenges them to run a drilling programme that will delineate an ore body. The game begins when the visitor raises money for the drilling programme. The player always runs the risk of running out of money before the heart of the ore body is discovered. The player may also incur fines for running afoul of the environmental regulations for the region. Any one of these problems may force the player out of the game - at least temporarily. The underlying tension of the game lies in the fact that the visitor must run the drilling programme as efficiently as possible, while respecting the environment and the concerns of the local community and the native band.

Very early in the development and prototyping of the game we noticed that despite our attempts to make challenges difficult, if the difficulty was in the nature of the question itself the proximity of the computers meant that neighbouring players quickly aided newcomers – ‘choose ‘C’ – an older player would whisper. We didn’t want to isolate the computers from one another (an easy fix), as we observed that the computer games were often played by as many as three at a time – a player, and two ‘coaches’. Moreover, largely as a consequence of this multi-user play, the age threshold for the games was dramatically lowered as older

players coached younger ones. This phenomenon we dubbed 'cheating as tutorial', and soon explicitly adopted as a guiding principle of game design. This meant that rather than trying to hinder group play, we assumed it, and adapted the nature of the challenges to exploit the advantages of discussion between players. The 'trick question' no longer sufficed – we had to base the games on complex challenges of trade-offs and compromises, for which there were rarely easy 'right' answers.

Once the exhibition opened, it was clear that the visitors quickly understood the excitement of the game structure, and used the clipboards provided at the entrance to record their progress. A comparatively large percentage of visitors stayed in the exhibition for extended periods of time, and many returned regularly to test new ideas and debate different options. A high level of discussion was seen, and a high level of involvement. The computer games were highly successful in attracting and engaging teenage users, while the hands-on exhibits and demonstrations kept other user groups involved. The 'Hotseat!' theatre gave visitors a real say in the issues surrounding resource development in the province, and continued to be a forum for debate about the issue over four years after the exhibition opened – two years after the exhibition was scheduled originally to close.

Specifically, what can we conclude about the use of an interactive theatre as a means to create a social forum? Do we see any signs of individual emergence? Provisionally I believe the answer is yes.

We had originally written the script to allow the greatest number of possible trajectories through the material, in order to encourage the greatest amount of exploration by the audience. However, we wanted the audience to realise that intransigence could mean failure - the collapse of the negotiations altogether, and thus built in several occasions where successive refusal to consider alternatives by the audience lead to the winding up of the show by the host, as noted on the storyline diagram and the following script. Even if the audience successfully avoided ending the show prematurely, there were four possible endings, of which only one allowed a final compromise that would guarantee the support of all four community leaders for the mining company plan - the 'happy ending'. The challenge of Hotseat! was to give the audience enough information to allow them to make intelligent proposals about how to modify the mining company's plans (shown on a map) in order meet the different concerns of the community, and to encourage them to debate various positions in order to find a solution.

In the first test, both classes opted for one of the two either/or solutions right away (predictably for an urban 'green' audience, the 'no mine at all solution'), and were dismayed to find that this resulted in stern disapproval from the entire community - clearly their 'right' answer was the wrong answer for Grizzly. Then, as a consequence, they opted for the opposite solution (the 'pro-mining' option) apparently following the logic that if the first solution didn't succeed, its opposite would. Once again they were faced with an unhappy community. As the original strategy ended the game if the audience was unwilling to explore alternatives, we thanked the classes for their participation and suggested they return to class. Unanimously (and perhaps not surprisingly) they asked - or more correctly, they demanded - to be allowed to have another chance to explore the possibilities. As a consequence of this test we revised the Hotseat! structure to allow exploring new alternatives without ending the game entirely, and noted that the audience would need to be better prepared to understand the nature of the experience as a negotiation to reach consensus, not a win/lose game or right/wrong problem.

Research into attendance to the exhibition after it had opened showed that almost 20% of the visitors were 'enthusiastic' - they stayed long periods of time in the exhibition and returned often. This represents a significant improvement over exhibitions with similar themes. Research into the interactive theatre experience highlighted the fact that information may be a necessary condition for debate, but it is not sufficient - visitors need to learn negotiating skills. In this respect, 'Mine Games' did not adequately prepare the visitor for the theatre experience, something noted by many of the students who participated in the tests. One student wrote 'I didn't find that we were well prepared enough to make decisions [sic].' This opinion was seconded by a classmate who wrote 'There was not enough details [sic] about the whole presentation before everyone started to vote, which made the audience difficult to choose a decision.' Many students charitably looked to the exhibition to fill in the gaps, 'I'm sure that will be better when the games part of the program is complete.'

Comments by older students consistently emphasised their frustration with the limited field for discussion, and their desire to engage with a full range of options for the future of the Grizzly Valley. This frustration found voice in nearly every student's comment. 'The show really had me thinking about a solution to the dilemma. However, solutions that were not options... were not quite useful. Maybe the program should add more options to the decisions.' Another wrote 'I thought the presentation should have involved more complicated answers and votes, instead of just voting yes and no'. This frustration, however, must be seen as a positive signal that the

participants wanted to discuss the issues in depth, and to arrive at a fair 'solution' to the challenge posed by the exhibition – suggesting that the individual players have been conferred new properties.

newMetropolis 1994 – 1997

By the time I began work at newMetropolis in 1994, I was ready to put these concepts into play. As Head of Design at newMetropolis, I attempted to systematically implement specific user-languages in the design of all the institution's exhibits. My final example, therefore, is of a game in newMetropolis, in which we chose to allow for visitor variety, rather than try to model the user and their playing style in advance. By taking this approach, players are not expected to fit a pre-existing mould, but are free to adapt the game to their own style of play.

The game is called Get Connected, and was developed by Mike Murtaugh, a former member of the MIT Media Lab, in conjunction with the Media Lab in Schellinghout. Get Connected is a network of computer stations, each equipped with its own video camera and microphone which allows players to communicate with each other. The central feature of this area is an interactive game based on 'Quartet' (the English equivalent is 'Fish'), in which players negotiate with each other to exchange 'cards' to complete different sets, using a dynamic interface which responds to their choices and prompts new ones. The cards were originally images that corresponded to sets such as flags, wild cats, towers, and so on. Every card belongs to at least two sets. For instance a flag of Spain could belong to the set 'flags' or the set 'Spanish'. A Picasso painting could belong to the set 'art' or the set 'Spanish.' If there are fewer than ten players in the ring, the empty places are played by intelligent agents - phantom players.

In many significant ways, Get Connected is among the closest newMetropolis came to creating an environment in which the activity - and its content - is completely user-driven. Get Connected registers every player's activity, and makes this activity available to other users. At the same time, the user decides for himself among an unlimited number of strategies for game play - the players are free to shape the game in any way the wish, regardless of the original assumptions of the designers. This open-ended, endlessly modifiable game structure, which is continued as long as there are players to play it, we hoped to get close to what Carse calls an 'infinite game.'

Our experience with the first 15,000 visitors again showed us the importance of the user understanding, and more importantly, appropriating, the intention of the activity. When the game was first put on the floor, the emphasis was on the process of exchange. An introductory sequence explained the 'rules of the game', how to make sets, how to exchange, and established a value for each successful exchange, in one of four languages. After very little time it was clear that the experience was confusing. The user was not prepared to follow the introduction, and was more interested in using the microphone and video link to contact other players than in playing the game. This in itself we took to be a positive signal, and in fact we observed teenagers using the video links to flirt with each other. In one case a teenaged girl covered up the video lens when contacted by an unknown young man – in another case we saw a young couple chatting briefly, an hour later we saw them spooning in a corner. I am not sure this counts as individual emergence, but clearly the exhibit could be called a success – at least in some respects!

We saw that users grasped the idea of making contact, and that they engaged quickly in communicating with each other - contact was sustained. What was missing, however, was a clear and intuitive understanding of the latent possibilities of the exchange, of structuring the nature of the contact. The graphic interface was modified several times to make the exchange process more clear. The cards of the other players were displayed more easily, the cards to be exchanged were highlighted, the length and complexity of the introduction were reduced. None of these modifications seemed to increase the amount of structured activity among users. The game was originally based on the children's game 'Quartet', but at the time it was felt that this was too simple a structure to maintain user interest, hence the decision to create sets of images corresponding to various social and cultural categories.

We decided to take a more drastic measure. We replaced the sets of images with real cards - from ace to ten, in the four suits. Almost immediately we noticed an increase in structured and sustained activity. Visitors whose microphone failed could be heard to shout to other visitors 'I'm looking for tens!' Another modification also increased structured activity. This was to replace point reward for making sets with a time reward. The user was given a fixed amount of time in units on a 'phonecard' to start with, and the number of units decreased with time. More units could be added to the card by successfully completing sets. These changes were implemented only a few days ago, but the increase in activity, co-operation, engagement, and concentration is very noticeable. Some players now manage to stay in the ring over twenty minutes,

and we are beginning to notice repeat users (who have already purchased year subscriptions) who come in regularly to play the game.

What conclusions can we draw from this experiment? Most importantly, it seems that in any activity based on the user-language of 'games', further constraints on the activity do not seem to hinder it, in fact, they often seem to unlock activity and increase the quality of the interaction, providing the intent behind the constraints is clearly communicated. Moreover, by making information available to users as they need it, in this case by means of the video link to other players, creates the possibility of sustained play. In all cases, the user-language of 'games', by creating the property of other players and actorship, supports the possibility of sustained, self-directed play⁸.

It is especially instructive to note that the least successful exhibits at newMetropolis (notably the exhibits about the physics of light in the area called 'The Debate') were those which still employed the user-language of 'variables' - exactly as might have been predicted by using the theory. Alternatively, the most successful exhibits (including Get Connected, Superbankers, and the Tankergame) - all employing the user-language of 'games' and conferring actorship in a collective of other players - were rarely quiet. Moreover, after only a month of operation, there were so many repeat users, that they became a problem to hosting staff - users would return every morning of the holidays at opening time to play a particular game. Even given the fact that all computer games at newMetropolis were explicitly designed on the assumption that computer games are played by groups, not individually, (based on our experience with 'Mine Games') the limited number of stations made staff worry about players becoming irritated and disgruntled.

This 'problem' was further compounded with another - visitors were staying too long at the exhibits, thus creating long waits and lowering the overall capacity of the museum. While these issues cannot be ignored on an operational level, the issues of users monopolising games and of lower capacity due to sustained engagement with the exhibits must be addressed. Both point to the effectiveness of the use of proper user-languages when sensitively implemented in particular exhibits to confer specific desirable properties on the user. Perhaps even more importantly, the successes of the user-languages of 'problems' and 'games' suggest exciting possibilities for future development - possibilities we are currently exploring at mak.frankfurt.

FAIR GAME

As I was writing this paper – concerned as it is with the nature of games – I had to confront a related but central concern. What, if any, relationship does the game have to the spectators of the game, as distinct from the players of the game? Does the game confer properties on those who are not actively involved in play? If so, are they similar properties? The same properties? Other properties? Participation in games by passive viewers – ‘couch potatoes’ – or more active enthusiasts – hooligans for example – is certainly widespread, and arguably more widely spread than actual participation in the sports themselves. Can we see issues of individual emergence if the vicarious participation in games?

I cannot go into this issue at any length, or in any depth, as I have not yet conducted any research into the experience of game viewers. What I wish to do instead, however, is to offer a few observations that might suggest possible avenues of investigation. Given the enormous popularity of television sports (and indeed of sport-based computer games) and the diminishing number of ‘grassroots’ players, it is important to take a position on this possible extension.

The first observation is that those who indulge in the vicarious appreciation of sports (live, on radio, or on television), are rarely passive. Whatever the sport, fans often know a vast amount of statistical information – about the team, the players, its performance over the past years and often decades. Sports fans have opinions – about players, coaches, and owners – and their participation is often nothing less than ersatz coaching. The sports fan, I would argue, is not passive at all, but instead, active and engaged in the performance of the sport he is watching. It is rare to find a spectator who is completely ignorant or disinterested – the uninterested don’t tend to watch in the first place. Often interest in a sport derives from firsthand experience – cricket, baseball, football, tennis – and some would claim that certain sports cannot be fruitfully watched if one lacks actual experience of the game. Others – Polo, Formula One racing, Fencing – are rarely if ever in the experience of the viewer, but are enjoyed nevertheless. As with many human activities, much of the interest is in the intellectual pleasure of mastering a complex set of conditions. As Gianni Rodari

writes about another looked-down-upon activity – reading comic books – ‘Children want to master the means of reading comics. That’s it. *They read comic books in order to learn how to read comic books*, to grasp their rules and conventions. They enjoy the efforts of their own imaginations more than the adventures of the characters. [italics in the original]⁹’ The same seems true for the television spectator/coach – and is further witnessed by the consistent presence of the multiple ‘coaches’ for the computer games in ‘Mine Games’ and newMetropolis.

The second observation I would like to make suggests that the ways in which the openness to variety, and the coherence ensured by the closure rules of games may turn out to be as satisfying – and perhaps as effective – a means of conferring desirable properties on players and spectators of games alike, at least insofar as spectators can indeed be assumed to be engaged, albeit vicarious players. As CLR James writes about cricket, what is important is ‘the relation between the event ... and design, episode and continuity, diversity in unity, ... the part and the whole. ... The structural enforcement of the fundamental appeals which all dramatic spectacle must have is of incalculable value to the spectator. The glorious uncertainty of the game is not anarchy. It would not be so glorious if it were not anchored in the certainties which attend all successful drama. That is why cricket is perhaps the only game in which the end result (except where local or national pride is at stake) is not of great importance.¹⁰’ If one substitutes the word ‘variety’ for ‘uncertainty’ and ‘game’ for the word ‘drama’, one has a something akin to Carse’s ‘infinite game’ – a game played for the enjoyment of playing it. To a lesser degree, the importance in variety to sustaining the players interest in a cricket match recalls a striking finding of the ‘Get Connected’ game. The game had a very distinct threshold, under which the variety of the game was unable to sustain its play. Fewer than three players at one time, the game was quickly abandoned – more than three, it was played until the number of players fell to three.

The third observation is that sports – experienced both as player and spectator – become vehicles for the support and expression of particular values. Is this not too a form of emergence? Let us take cricket as an example. Thomas Arnold, Headmaster

of Rugby until his death in 1842, proselytised the teaching of cricket as the means of cultivating distinctively 'British' values. As CLR James writes 'The Victorians took Carlyle and Ruskin in their stride. What really interested them was Arnold's moral excellence and character training. His intellectual passion they had no use for. They found ample scope for character training and the inculcation of moral excellence in the two games, football and cricket, and of one of them, cricket, they made the basis of what can only be called a national culture. "A straight bat" and "It isn't cricket" became the watchwords of manners and virtue and the guardians of freedom and power.¹¹' To this day, it is clear that even players of the game disport themselves in ways that earlier would have been considered inappropriate or distasteful, spectators have an acute sense of what is appropriate, and express their distaste for unseemly behaviour. As Flanders and Swann wrote in their send-up of the English 'And all the world over, each nation's the same. They have no idea about playing the game. They argue with umpires, they cheer when they've won – and practise beforehand which ruins the fun.' Clearly the values of a game have an effect that goes far beyond the code of conduct on the pitch itself.

A final observation is that games – more than other kinds of events – come to symbolise political aspiration, and often stand in for issues much more far-reaching than the outcome of a particular sporting event. This can of course be seen in legendary boxing matches, such as that between the black American Joe Louis and the Nazi Schmelling on the eve of World War II. Perhaps more important, however, is the degree to which sports can articulate and mobilise political activity. James attributes to cricket the impetus for the independence movement of the West Indies in the 1950s, and emphasises the role it played in the Islands' identity. 'What do they know of cricket who only cricket know?' he asks. 'West Indians crowding to Tests bring with them the whole past history and future hopes of the islands. English people, for example, have a conception of themselves breathed from birth. Drake and mighty Nelson, Shakespeare, Waterloo, the Charge of the Light Brigade, the few who did so much for so many, the success of parliamentary democracy. Those and such as those constitute a national tradition. [...] We of the West Indies have none at all, none that we know of. To see [the West Indian cricketers] wrecking English batting help to fill a huge gap in their consciousness and in their needs.¹²' James's campaign

to reinstate Worrell, a black, as the Captain of the West Indian side was critical in Trinidad's struggle for independence. This has a potentially interesting corollary. It would indeed be rare that the eleven players on a cricket or football side themselves be agents of political change – however, it seems as though the properties conferred on the game's spectators have the potential to galvanise action – political change or random violence. The actorship and other players conferred by the game on its players is limited to the pitch – the actorship and other players conferred on the spectators potentially translates into action on the streets. In a lesser key, the emergence of individual values can be seen in the ways in which the 'Mine Games' exhibition in general, and the Hotseat! interactive theatre in particular, appeared to encourage and support activism on the part of its visitors – at least with respect to the issues of resource management in British Columbia.

CONCLUSIONS

As has been noted at length in the exchanges by e-mail prior to the conference, questions of individual emergence are profoundly political, and have to do with concepts of generosity, world citizenship, and ecological stewardship (as well as humaneness [sic], righteousness, morality, virtue). Can different user-languages, implemented as 'labels' in a particular setting, elicit different properties, even desirable properties? What properties are desirable is function of a set of beliefs. A Fascist might find the properties of obedience and passivity desirable, whereas a Democrat might prefer the properties of independence, activity, or spontaneity. Whatever properties are defined as desirable, we take it that a better label will create more desirable properties. If the museum is considered to be a support system, certain properties can be defined to be desirable, such as agency, competence, curiosity, and engagement. A museum with labels that create more of these properties will be considered a better support system, and as a consequence, for the purpose of this study, can be considered a better museum. As argued above, if one favours a world in which individuals can exercise their agency fully, a world where initiative, innovation, and intelligence are valued, a world in which every individual's potential

is supported, then games – and the user-language of games – can teach many interesting lessons.

First of all, by conferring the property first of actorship, and of other players, the user-language of games creates the possibility of emergence – both of the player, and of other players. This by necessity creates a moral dimension of the sort discussed in the lengthy e-mail exchanges we have shared during the past few weeks. Second, it is not clearly established, but seems probable, that properties of actorship and other players may also be conferred upon spectators of games – assuming that the spectators are informed and engaged. This conclusion is supported in part by the observation that contrary to most assumptions, computer games designed for single players are almost invariably played by groups together. This behaviour was so much in evidence in the ‘Mine Games’ exhibition that it necessitated a radical change to the entire design approach. In newMetropolis, it became a design principle that all stand-alone computer games were designed to be played by several players at once. Finally, I would even argue that self organisation – in the broadest political sense, is an instance of what Carse calls an infinite game – a game in which the object is to sustain play, thus suggesting the poetic and Borgesian possibility that life itself – when so conceived – is an elegant game, played to support the self-realisation of its countless players.

¹ Bradburne, J.M Truth-telling and the Doing of Science Mutual Uses of Science and Cybernetics, Thesis: Amsterdam: 1990 pp. 53 - 61

²Op.cit. Co-ordinated co-operation and increasing competence, pp.3, 1990

³ See Carse, R. Games and Infinite Games

⁴This account has appeared in part as Wake, D.A. and Bradburne, J. ‘Mine Games’, La Revue des Arts et Métiers No. 10; Spring 1995

⁵Both the Coopers & Lybrand study, and research done at the Palais de la Découverte by the author in 1993 showed that the public was not highly interested in the earth sciences

⁶ A current example is the new Earth Galleries at the London Natural History Museum, opened 1997

⁷This account is taken largely from Bradburne, J. and Wake, D.A., Hotseat! The Science Centre as Social Forum Conference Proceedings 'Quand la science devient culture', Montréal: 1994

⁸ Additional research also suggests that players also make the connection between the game-like activity of trading cards to broader social issues of new technology, privacy of information, and teleworking, see Hillegers, E. Het thema telecommunicatie in newMetropolis: Een stageverslag. Cultuur- en wetenschapsstudies Universiteit Maastricht; December 1997

⁹ Rodari, Gianni, The Grammar of Fantasy, Teachers & Writers Collaborative; New York 1996 p.97

¹⁰ James, CLR, Beyond a Boundary, Duke University Press; Durham: 1993 p.197

¹¹ op.cit p.165

¹² op.cit p.233