Facilitating Creativity without Restrictions: A Pilot Implementation of an Idea Generation Game

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ABSTRACT
In this paper the design, pilot implementation and results from an idea generation game are discussed. The *Neo-Darwinian* and *Neo-Lamarckian* models of creativity provided by Johnson-Laird are used to discuss differences between this game and other idea generation games. The emphasis of the study is on the facilitation of emergence in idea generation games. Results of the pilot were inconclusive, but offer an insight into the kinds of issues which could be faced should this study be carried out in full.

Categories and Subject Descriptors
H1.1 [**Systems and Information Theory**].

General Terms
Design, Experimentation, Human Factors.

Keywords
Creativity, Emergence, Idea Generation, Games.

1. INTRODUCTION
The aim of this study was to design, implement and discuss an idea generation game which facilitates emergence [see section 3] in order to promote the generation of surprising or novel ideas. Two different models of creativity will be used to explain how this game differs from existing idea generation games and how it provides a more effective environment for emergence.

Idea generation games are those which are designed to facilitate creativity among design groups. Fundamental to these games is the belief that being inside the magic circle of play creates the relaxed and playful atmosphere required for creativity to flow [1]. Idea generation games belong in the category of serious games in that they are played for reasons other than entertainment. Other serious games include those played for health, education or rehabilitation benefits.

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2. TWO MODELS OF CREATIVITY
The two models of creativity proposed by Johnson-Laird (cited in [2]) are the *Neo-Darwinian* model and the *Neo-Lamarckian* model. *Neo-Darwinian* (ND) creativity is characterised by the unrestricted combination of ideas to produce potential new ideas, which are then subject to a screening process based on predefined constraints in order to filter out the ideas which are non-viable. Conversely, *Neo-Lamarckian* (NL) creativity involves imposing the constraints from the beginning in order to generate only viable ideas.

Essentially, an 'appropriateness filter' is being used in both cases to grade ideas. For NL creativity the filter is applied as the idea is formed, and for ND creativity the filter is applied at the end of the process. However, it would seem that for idea generation exercises, no particular method promotes creativity which is completely ND or NL. For example, the process of brainstorming might seem like the most unrestricted method of idea generation – all ideas are considered equally valid until the end of the exercise when they are evaluated. While brainstorming appears to entirely promote ND creativity, there are still some NL restrictions in place. For example, a participant would probably not consider ideas which solved problems other than the ones which were being addressed by the exercise, and would not submit ideas outside of the allotted time for the exercise. In both of these examples an additional filter is applied by the participant, which adds some NL elements to the supposedly ND technique.

According to Furnham and Yazdanpanahi (cited in [1]) brainstorming sessions can result in fear of evaluation, social loafing and production blocking, all of which can hinder the idea generation process. The inclusion of the magic circle of play by turning the exercise into a game can alleviate these problems, but the necessary rules of the game add NL elements to the exercise, as players must submit suggestions which first conform to the gameplay requirements in order for them to be valid.

For example, in the game *GameSeekers* [1] players must wait their turn to act on the current idea and their behaviour is channelled by the information on the cards in their (and their opponents') hand.

It would therefore seem that rather than being viewed as a binary attribute, the type of creativity promoted by a particular technique should be placed on a scale somewhere between ND and NL. Such a scale is shown in Figure 1.

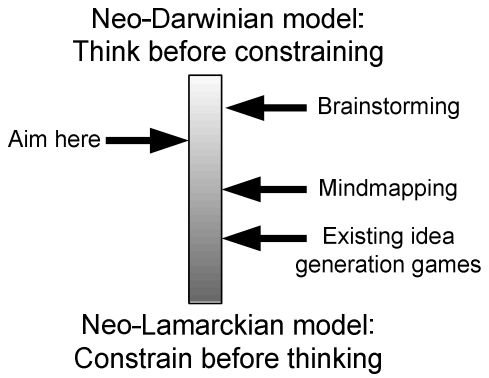

Figure 1: Position of different ideation techniques with regard to ND and NL models of creativity.

The initial filtering of ideas in the *Neo-Larmarckian* model might lead to the assumption that non-viable ideas are somehow worthless, and over a single iteration of the creative process this might be so. However, over several iterations of the process – or in the later stages of a longer single iteration – it could be that the non-viable ideas could be just as important as the viable ideas, as there is no condition within the ND model which requires the building blocks of viable ideas to themselves be viable too. Therefore recording the non-viable ideas is important – a practice which is advocated in exercises such as brainstorming. It would seem that if a greater number of conceptual building blocks are available there would be an increased chance of a stronger structure being built. If this structure is greater in value or complexity than the sum of the building blocks, emergent behaviour can observed.

3. EMERGENCE

Emergence is the evolution of an output which is greater in value or complexity than the sum of the elements which were input. A classic example given by Johnson [3] is that of an ant colony: individual ants exhibit relatively simple behaviour but when many ants are together a much more complex behaviour emerges. Ants can be observed walking in an organised manner and the colony can even overcome simple mathematical problems (see [3], p.32). In games, emergence can be observed when the system exhibits behaviour that the designer did not directly specify. This behaviour can add novelty or surprise to a game [4] and therefore lead to richer game play: an example of this would be bluffing strategies found in poker. In alternate reality games, individual players would find the puzzles presented extremely difficult or laborious, but because the players work together progress is made in incredibly short periods of time [5].

Sometimes emergent behaviour can be undesirable, harming the potential for fun, fairness or aesthetics. For example, in multiplayer online games the ability to plant virtual flowers anywhere on a virtual field could lead to offensive words being spelled out in flowers. In general, game designers try to limit this 'bad' emergence while trying to facilitate the 'good' emergence. However, this distinction is purely subjective and what is useful or novel to one person might be unhelpful, obvious or uninteresting to another. Furthermore, emergence only exists if it can be perceived, so if the designer believes that a certain outcome was not directly specified then emergence is present. It is this 'ideal' stance that will be taken in this paper.

4. FACILITATING CREATIVITY AND EMERGENCE

4.1 Brainstorming

According to Johnson [3], "emergent systems can grow unwieldy when their component parts become excessively complicated. Better to build a densely interconnected system with simple elements and let the more sophisticated behaviour trickle up". In a brainstorming session the elements of the system include the ideas submitted by the participants. Because the creativity involved in brainstorming is situated at the *Neo-Darwinian* end of the scale, submitted ideas only need to conform to a few basic rules; the evaluation of those ideas happens later on. Thus, the simple interactions recommended by Johnson are provided. The densely interconnected system that Johnson also recommends is provided when existing suggestions are left on display as a record of events and to inspire further ideas. In theory, using Johnson's recommendations this system seems to be an ideal environment for emergence, and therefore (according to Salen and Zimmerman [4]) novel or surprising outcomes – in the case of brainstorming, novel or surprising *ideas*.

4.2 Potential Problems

The problems of social loafing and production blocking can hinder idea generation during some exercises, so Kultima et al [1] suggested using the magic circle of play to provide an environment in which these problems can be reduced. However, rather than turning the exercise into a game which required creativity from the ND end of the scale (as in brainstorming), some of the suggested gameplay mechanics imposed by Kultima et al placed restrictions on the nature of the generated ideas, such that most ideas required pre-evaluation for suitability, and therefore a more NL style of creativity. From Johnson's recommendations it would seem that this could reduce the amount of potential emergence in the system.

It would also seem that there could be other problems with idea generation games. In games which contain rules governing the nature of an 'acceptable' idea, the inherent biases brought to the design, and therefore the rules, could affect the overall quality or format of the generated ideas. This is difficult to avoid because even the simplest rules are created using an axiology, and therefore the best scenario is to try to limit the rules as much as possible and be aware of potential biases. Another potential problem lies in the evaluation of the generated ideas for their suitability, for the same reasons. Again, an awareness of potential biases might help, but it could be more effective to organise a group evaluation system such as a ballot in order to minimise individual biases.

4.3 Aim

The aim of this paper is therefore to investigate the possibility of creating a brainstorming-style idea generation exercise, which due to its promotion of *Neo-Darwinian* creativity provides a suitable environment for emergence (and therefore surprising ideas), but does not break down in the way that brainstorming sometimes does via problems such as the social loafing described earlier. By making this exercise into a game a relaxed environment is facilitated, but care must be taken not to impose a *Neo-Lamarckian* requirement on the players via too many gameplay mechanics and rules.

The game will function in a brainstorming style in order to maintain a densely interconnected system of ideas, and the rules will be as non-restrictive as possible in order to facilitate simple interactions. To overcome the problem of subjective experiences of viability, players will be asked to vote for ideas which they think are viable, in order to obtain a general consensus on whether or not a particularly viable idea is present.

5. SIMPLIFICATION OF THE RULES

In order to simplify the rules of the proposed game, one must first have an understanding of the elements which make up a rule. Rules generally govern valid game interactions by restricting player behaviour. Without these restrictions the players would be free to do whatever they wanted. In idea generation games the rules define (among other things) the ways in which ideas are considered valid. It is suggested that most rules follow a social / behavioural / spatial / temporal pattern, thus:

> PLAYERS(a) must perform ACTIONS(b) in SPACES(c) during TIMES(d), where (a),(b),(c) and (d) might be 'none', 'a particular set of', or 'all'.

It could be argued that items in the ACTIONS category, if studied closely enough, could be broken down into many spatial changes made over time, and therefore the ACTIONS category should not exist. However, rules are designed to be followed by players, so groups of spatial-temporal adjustments which are likely to be already internalised, and therefore automated, by the player (for example, those involved in rolling the dice) will be given as ACTIONS.

A way in which rules could be simplified is by reducing the number of checks an interaction must satisfy in order to conform to a rule. It takes fewer steps to evaluate the terms such as 'no players' or 'at any time' than it does to evaluate more complex terms such as 'less than 10 but greater than 5', or 'the player to the left of the dealer'. This simplification has been implemented wherever possible for the design outlined in this paper. For the proposed game the spatial restrictions have been reduced as much as possible in order to allow the content of ideas to take any form. Ideas do not need to be serious or feasible, and are not restricted to a particular domain. This allows for more 'valid' suggestions, and even if ultimately they are not viable they might still form part of a viable idea in accordance with the ND model of creativity as explained earlier. Social restrictions have also been reduced by allowing all players the same rights and abilities, and players are not split into teams. Temporal restrictions have been reduced by allowing all players to make game interactions simultaneously. No player has to wait for their turn to submit an idea, and can do so as often as they wish.

It was the object of the design to reduce unnecessary restrictions, in order to make the game interactions as simple as possible. However, there are some areas in which this could not be achieved. There need to be some rules in place which govern the spatial dimension, for the sake of ethical practice, to prevent the submission of ideas which could be harmful to others and also to help organise the game. Some temporal rules are also in place: separate periods of idea generation and review are employed in order to assist the tracking of the chronological order of events, and to give participants regular rest breaks.

If it is easier for the player to make valid game interactions, the process of interacting with the game has been simplified. By allowing the players to view the collective pool of ideas the densely interconnected system is simulated. Thus, a more suitable environment for emergence could be facilitated. Furthermore, random participant numbers were used instead of names, and ideas were written down on paper rather than being called out by the participants, in order to minimise the fear of evaluation sometimes associated with brainstorming tasks.

6. THE GAME

The pilot implementation described in this paper was carried out with the assistance of students and graduates of game-related university courses and departments. Therefore it seemed logical to test the design by asking the participants to use the game to help them generate ideas for new games.

The proposed game is played as follows:

All players sit together in a relaxed environment for the duration of the game session, which lasts around 2 hours. There are three iterations of the process during this time, each consisting of a 10-minute idea generation phase, a 10-minute review and discussion phase and a 5-minute rest phase. During the idea generation phase players are required to think of as many game ideas as they can, each consisting of 3-5 key points or rules, writing each idea down on a separate piece of paper. Ideas do not need to be fun, serious or feasible, as long as they are theoretically possible and not illegal, immoral or harmful to others. Players score a point for each submitted idea which conforms to the rules, and after 10-minutes the idea generation phase stops. There is then a 10-minute period where players can review all of the ideas which have just been generated, and can discuss them if they wish. The players then rest for 5 minutes and the process begins again. After the third iteration, players award a vote to any of the ideas that they would actually play if they were real. At the end of the game, two winners are declared: the person(s) who submitted the most ideas and the person(s) whose idea received the most votes. Small prizes were offered to the winners in order to provide an amount of friendly competition and encourage the generation of ideas.

Because emergence can only be facilitated (as opposed to being induced) a negative result is not necessarily an indication of a non-effective idea generation technique. While it might seem appropriate to test the game design against a control group for productivity levels and efficiency, in order to achieve statistically significant result the study would need to be conducted many times, in parallel with control groups who were undertaking a typical idea generation session such as brainstorming. This is beyond the scope of feasibility for this pilot, and so a more open approach is taken with regard to the findings. Contact has been made with universities around the UK who run game-related courses in order to enquire about running some creativity sessions with this technique should the results of the pilot implementation appear to be encouraging.

7. PARTICIPANTS

For the pilot implementation of the game the play session was conducted during a games industry competition in which groups of students were competing to develop the best game. It was

emphasised that participants should possess an interest in making games, in order to encourage willing and relevant participants. A snowball method was also used to recruit extra participants from the existing participants' friends and colleagues. This was based on perceived appropriateness for the exercise, and while there was a risk of these newer participants not meeting the same criteria – and therefore bringing additional variables to the participant pool – this did not actually happen: the extra participants were also students of game-related courses and were taking part in the same competition. In total there were 8 participants, including the researcher.

8. RESULTS

To aid discussion, the term 'iteration' will be used to refer to one cycle of idea generation (10 minutes), review and discussion (10 minutes), and rest (5 minutes). There were three iterations carried out in the game, meaning that the session lasted approximately 2 hours in total, including player voting and final scoring.

During the game a total of 97 non-disqualified ideas were submitted. There were 8 ideas which were either disqualified or withdrawn. A game idea was declared to be 'good' only if it received votes from at least 50% of the participants. The results are summarised in Table 1.

Table 1: Total vs. 'good' ideas on a per-iteration basis

	Iteration A	Iteration B	Iteration C
Total Ideas	27	35	35
'Good' Ideas	3	0	1

9. DISCUSSION

While it is clear that each iteration in the game yielded minimal 'good' ideas, it is possible that it is normal in the process of designing an outstanding game to produce potentially hundreds of 'bad' ideas, particularly if a ND style of creativity is adopted. In the space of 2 hours there were 4 'good' ideas generated. Depending on the feasibility of these ideas, the session could be seen as a partial success, if only for providing a starting point from which the game designers could work.

For this study the assumption is made that groups of people who are interested in making games would also be suitable panels for critiquing them. Thus, high group approval signifies good quality ideas, although the argument could be made that a more accurate verdict would come from collective experiences of playing the game rather than simply viewing a written summary of the rules and trying to imagine the gameplay. However, the large number of ideas that were expected to be generated in total would have rendered this approach impractical.

It was clear that during the game, motivation among participants was very low. Having just taken part in a three-day exhibition they reported high levels of tiredness but as there was no other available time slot the session was carried out, despite the potential impact this could have on the quality of generated ideas.

During the game, a participant withdrew halfway through iteration B due to sickness, and although their data was removed from the pool it was not possible to remove any inspiration their ideas had given to the other participants. Therefore it is possible that the emergence of a particularly good or bad idea which was derived from the withdrawn participant's ideas might not be noted as such.

A clear example of emergence arose during the game. Many ideas were submitted which broke the rules because they involved immoral or harmful behaviour. However, participants discovered that by turning their 'real-world' game into an idea for a computer game, or by including rules which effectively said 'do not actually play this game', they could submit offensive ideas which qualified as valid game interactions. Some participants admitted to "messing around" more towards the end of the game, especially once they had noticed that other participants were also doing so. This is not necessarily an example of 'bad' emergence, as the participants took the voting seriously enough to deem the ideas not viable.

Also prevalent during the game were instances of metagaming: "…the act of using the game that you are playing for purposes other than the game itself" [6]. Some of the 'adapted' rule-breaking ideas were considered potentially offensive because they involved slapstick violence towards other participants. While this was obviously meant in a jovial way, participants could have been offended and therefore the process would have been unethical. Another instance of metagaming occurred when one particular idea was submitted in which anyone who read the rules had to buy the creator a drink. The ideas produced during this metagaming were not deemed viable (the 'free drink' game only received a vote from the person who created it), but they do illustrate the type of lateral thinking which would be encouraged if it were used for a more viable purpose.

It was also discovered that ideas which had been formed before the session by the participants had sometimes been included in their submissions. There is no rule which states that players must only submit ideas generated during the game, and some participants of the study stated that in iteration A they used preconceived ideas to increase their scores. This practice should not be discouraged for idea generation, because all valid ideas are useful with regard to the ND model of creativity, whether they are viable or not. However, the task of ascertaining whether or not more *new* ideas were generated over successive iterations via emergence has been made more difficult.

10. CONCLUSIONS

From the results and discussion it would seem that there are many factors which could affect the conclusions drawn. While the lack of participant motivation was deemed to be one of these factors, this could be a very real risk when conducting idea generation sessions. One can organise a session in advance but cannot place any guarantees on the state of mind of the participants leading up to and during the session.

It appears as if emergence occurred during the study in the form of metagaming. This was not directly specified in the design and was certainly surprising when it happened. However, the games produced as a result were not particularly viable, which highlights the notion that emergence cannot be controlled. While it might seem that the emergence was 'bad', if the game had not been a 'serious game' the emergence would have been considered 'good', because the participants seemed to enjoy the metagaming process despite initial motivation issues.

This study was intended to be a pilot implementation of an idea generation game which promoted the *Neo-Darwinian* model of creativity whilst trying to avoid the problems sometimes encountered during other ND techniques such as brainstorming. Indications are that on this occasion the success of the technique varied. Some 'good' ideas were generated, but the emergent metagaming (which was deemed non-viable in this instance although it would have been encouraged elsewhere) could have restricted viable idea generation. While the results and observations from the investigation are far from significant, it is useful to present them here in order to record the steps taken so far, and to highlight some of the issues encountered so they can be avoided in future.

11. ACKNOWLEDGEMENTS

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