PLAY, AUTONOMY AND THE CREATIVE PROCESS

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Abstract: Play has started to be recognised as having an affect upon the creative design process, but mainly in terms of playing with prototypes. In this study we explore play a little further to understand more about the type of play and its affect upon the creative process. We look at physical, imaginary, social and non-related play, in relation to solving a creative problem. Surprisingly, the condition with the highest scoring and fastest completion times was the non-related play condition. This would suggest that there is more going on than just iterative feedback when a person is playing in the creative design process. Relatively new research has started to show that play may also be important because of the intrinsic motivation that is inherently part of the nature of play. This intrinsic motivation and elements of autonomy have also been shown to have an affect upon people's feelings of well-being. This study supports the idea that play may be even more important to the creative process because of the affect it has upon a person's 'state of being'.

Keywords: play, autonomy, creativity

1. Introduction

Brown and Vaughan (2010), Kelley and Littman (2002) and Schrage (1999) contend that play is an important aspect of the creative process. Sutton-Smith (1966, 1992) stresses the role of play in the development of flexibility in problem solving. We are interested in why play is an important aspect of the creative process. In a previous study (Loudon and Deininger, 2011) we explored the role of play and prototyping in creativity. The results of that study raised the following questions:

- Does play support creative problem solving?

- Does play need to be related to the task at hand?

- Does the form of play affect the creative problem solving performance?

The aim of this study is to try and answer these questions. In looking at the question of whether play needs to be related to the task at hand we are actually asking the question of whether the role of play is directly connected to prototyping or whether there is something deeper going on.

1.1. Play as an altered state

Play has often been defined as being a spontaneous activity that is joyful, having the absence of consequences and the removal of constraint (Lieberman, 1977; Gordon, 2008). Brown and Vaughan (2010) describe play as being an altered state, exploring the possible in which joyful emergence occurs. Csikszentmihalyi (1996) describes the concept of 'flow' during the creative process where people have the feeling of things as "almost automatic, effortless, yet highly focused stated of consciousness". Csikszentmihalyi highlights nine elements of flow:

> *There are clear goals every step of the way*; *There is immediate feedback to one's actions*; *There is a balance between challenges and skills*; *Action and awareness are merged*; *Distractions are excluded from consciousness*; *There is no worry of failure*; *Self-consciousness disappears*; *The sense of time becomes distorted*; *The activity becomes autotelic*.

These ideas of play as putting a person into an altered state or as being an aspect of the 'flow' experience suggest that there may be a deeper element to play. In previous studies we have been looking at the affect of 'state of being' upon creativity (Deininger and Loudon, 2011). This study may shed more light on the link between play and creativity in terms of 'state of being'.

2. Methodology

To explore whether play supports creative problem solving and if the form of play is a factor in creative problem solving we chose to use Duncker's candle problem (1945) as the creative problem solving challenge. Duncker's candle problem has been used in a wide variety of psychological studies and is accepted as a good creative problem-solving task. In this task the participants sit at a table next to a corkboard. On that table are a candle, a box of drawing pins and book of matches. The task is to attach the candle to the wall, without wax dripping onto the table when the candle is lit. We modified the task because books of matches are not so easily available and boxes of drawing pins rarely come in cardboard boxes as described by Duncker. Therefore we provided a standard (cardboard) box of matches, a candle and a handful of loose drawing pins. See figure 1 below.
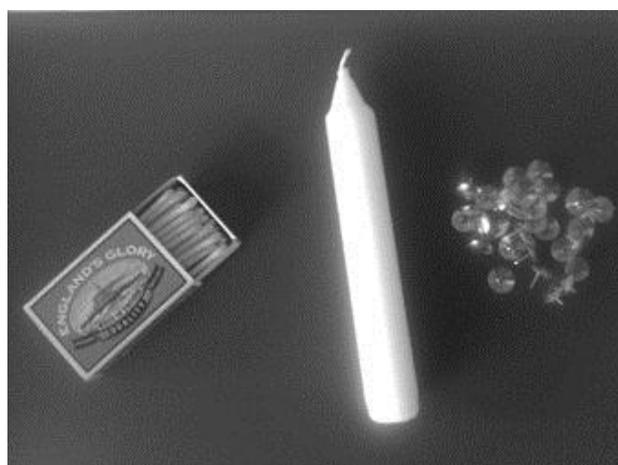
Figure 1. The candle, box of matches and drawing pins used in the task

The task was then presented in written form and participants were allowed to write or draw the solution. Fifty participants were selected from a larger group of undergraduates of the product design and architecture departments. Participants in the study had no previous knowledge of Duncker's candle problem. Participants were randomly assigned to five different conditions to see what effect different forms of play had on solving the problem. Ten participants were in each condition.

These conditions were:

- Social Play: In this condition participants were allowed to communicate with each other via a Facebook application on their mobile phones. They were instructed not to talk to each other during the task.

- Imaginary Play: In this condition the participants were given the task in the form of an imaginary story. The imaginary story was:

  Once upon a time you went into an enchanted forest. You went there because you had heard that there was a magic castle on the other side of this forest. You had decided that today was the day you would go to that castle. As you entered the enchanted forest you saw bushes filled with lovely berries to eat. You felt hungry but decided not to stop and pick the berries. You came across lovely patches of soft green grass but you did not lie down on them, as you were determined to get to the castle. You even saw playful pixies trying to tease you into chasing them. But you kept going through the forest.

  Eventually you came out the other side of the forest and before you stood a rather grand but rather strange looking castle. It was not round but not square either. It was quite tricky to find the entrance but being rather clever, you ended up finding how to enter the castle. After you entered you found yourself standing in front of a magnificent spiral staircase. You decided to climb the staircase. At the top of the staircase was a cosy little room. Feeling rather tired by now you went into the room to see if there was somewhere to sit.

  Standing in the room was a wise old wizard, and he said, "Ah, I have been waiting for you." He continued, "You have shown that you are perhaps worthy to be my apprentice. You have passed through the enchanted forest without being distracted or tempted to stay. You have found the entrance to the castle and you were brave enough to climb the spiral staircase and enter this room. Now you have just one more task to complete which will show me that you are meant to be one of my apprentices. And of course you answered "What must I do, oh great and wise master?" The wizard points to a table. On this table you have a candle, a box of matches and some drawing pins. You need to attach the candle to a wall (cork board) so that it does not drip onto the table below.
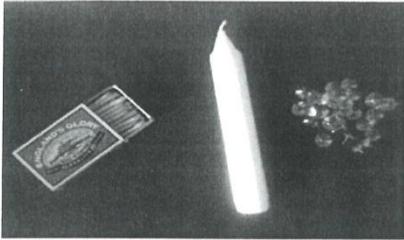
- Non-Related Play: In this condition, before being told of the task, participants were asked to take part in a game that was not related to the challenge. The game used was the 'Human Knot'. In the 'Human Knot' game all of the ten participants were asked to stand in a circle. Then, each person was asked to place their hand in the middle of the circle and to grasp another person's hand – then they do the same with their other hand, ensuring that they take the hand of a different person. The group then tries to unravel the 'Human Knot' by unthreading their bodies without letting go of each other's hands.

- Physical Play: In this condition the participants were given the actual materials (the candle, the box of matches and the drawing pins) to manipulate in order to help them solve the problem.

- No Play: In this control condition, participants were just given the written instructions and asked to solve the problem.

All participants were given a maximum of five minutes to complete the task. All participants attempted the task and recorded their solution independently. The time taken for each person to complete the task was recorded. If the solution was not completed within the assigned time, it was recorded as a time of 5 minutes.

3. Results

Figure 2 below shows an example of one participant's correct solution. Figure 3 shows an example of another participant's incorrect solution.

Figure 2. An example of a correct solution to the problem
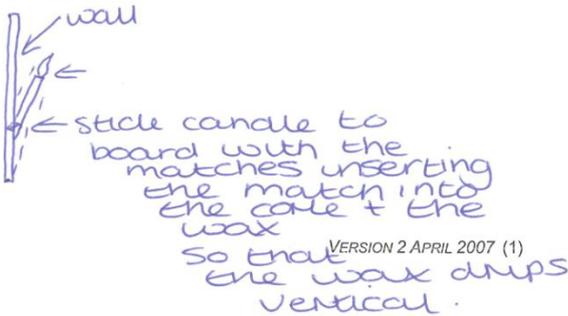
Figure 3. An example of an incorrect solution to the problem

In terms of the 'Social Play' condition only a limited amount of conversation took place on the Facebook application. See Figure 4 below. Some ideas were shared on how to solve the problem. It was observed that participants were also using the Facebook application for their own personal use. It was reported by some participants that there was not enough time to use the Facebook application effectively.

Figure 4. The Facebook conversation amongst participants in the 'Social Play' condition

Figure 5 below shows the overall number of correct solutions for each condition. The 'Non-Related Play' condition and the 'Social Play' condition had the highest number of correct solutions (6 out of 10). The 'Physical Play' condition had the next highest number of successful solutions (4 out of 10), followed by the 'No Play' control condition (3 out of 10) and then finally the 'Imaginary Play' condition (1 out of 10).
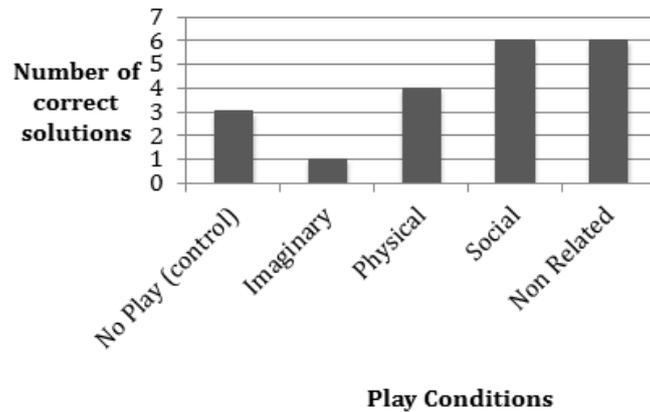
Figure 5. The number of correct solutions for each condition

Figure 6 below shows the average completion times, in seconds, (including 95% confidence intervals) for each condition. The results show that on average, participants in the 'Non-Related Play' condition had shorter completion times ($M = 141$, $SD = 31$) than participants in the 'No Play' condition ($M = 233$, $SD = 74$), the 'Imaginary Play' condition ($M = 270$, $SD = 51$), the 'Physical Play' condition ($M = 252$, $SD = 101$), and the 'Social Play' condition ($M = 252$, $SD = 79$).
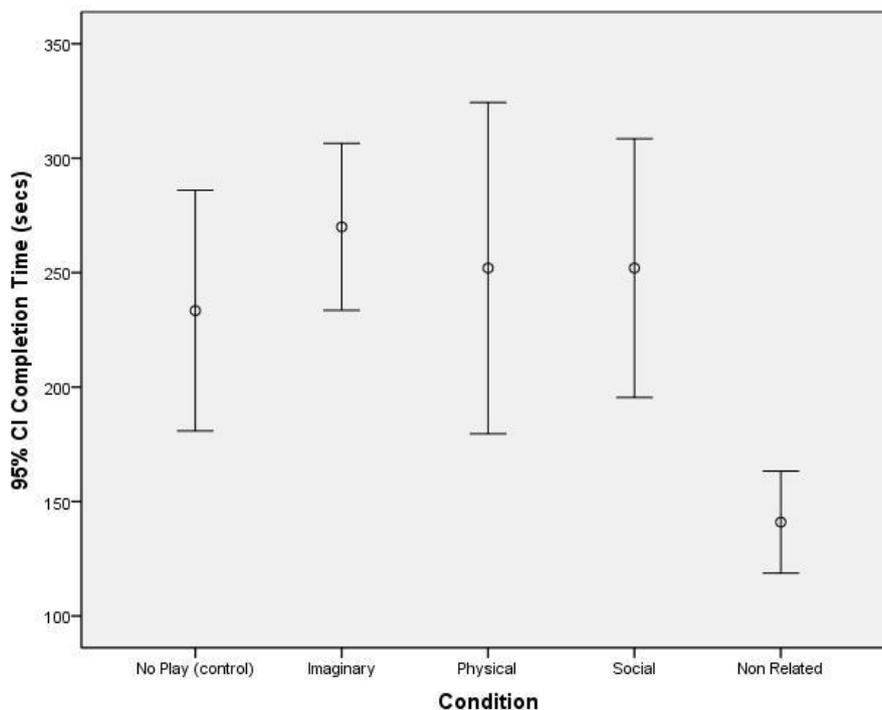
Figure 6. The average completion times for each condition, including 95% confidence intervals

The completion times were analysed using a univariate analysis of variance. There was a significant effect of condition, $F_{(4,45)}=5.17$, $p=0.002$. The completion times were analysed between two conditions at a time. Note that we used an alpha level of 0.05 for all statistical tests. Table 1 shows that there were significant differences between the 'Non-Related Play' condition and all other conditions.

Table 1. Significance of differences between completion times of 'Non-Related' Play condition with other conditions

Conditions	F-test Statistic (F values)	Statistical Significance (p values)
No Play	14.00	0.002
Imaginary Play	46.60	0.000
Physical Play	10.99	0.004
Social Play	17.09	0.001

4. Discussion

After analysing the results it is clear that the 'Imaginary Play' condition had the lowest performance both in correct solutions and completion time in relation to the 'No Play' condition. There is no clear indication as to why this may be the case. One possibility could be that the story did not clearly communicate the task. Another reason could be that there was a large amount of text to read, which may have been strenuous for some students.

The 'Physical Play' condition had a higher number of correct solutions and a longer average completion time in relation to the 'No Play' condition. Even though the number of correct solutions was higher than the 'No Play' condition it was only marginal. This condition is closest to a prototyping process therefore it was somewhat surprising that there was only a marginal difference in performance, in relation to the 'No Play' condition. Prototyping is largely regarded as one of the fundamental elements of the design innovation process therefore we would have expected a much higher number of correct solutions (Kelley and Littman, 2002).

The 'Social Play' condition had a higher number of correct solutions and a longer average completion time in relation to the 'No Play' condition. This was not expected, as there was only a limited amount of interaction through the Facebook page. It had also been observed that the participants were distracted by going onto their personal Facebook pages. Perhaps this distraction was also a factor in the creative problem solving performance. Wallas (1926) and more recently Dijksterhuis and Meurs (2006) have established that the element of distraction can have a positive effect upon creativity. It could also then be said that this form of distraction may be another type of non-related play.

A surprising result was that the 'Non-Related Play' condition had a higher number of correct solutions and a much shorter average completion time, in relation to the 'No Play' condition. The question is why? Brown and Vaughan (2010) and Csikszentmihalyi (1996) have touched on the idea that play may be linked to an altered state. From the definition of 'flow' there seem to be three particular aspects that are present in the 'Non-Related Play' condition. These are: there is no worry of failure; self-consciousness disappears; and the activity is enjoyable. What may be emerging is that the non-related play activity was not only enjoyable but was free of performance expectations. Deci and Ryan (1985) suggest "that the concept of flow represents a descriptive dimension that may signify some of the purer instances of intrinsic motivation." To be truly intrinsically motivated a person must also feel free from pressures, such as rewards or contingencies. "The concept of intrinsic motivation is simply

another way of saying that people are interested and enjoy what they are doing" (Cameron, 2006). The controlling nature of extrinsic motivation has been found to be detrimental to creativity (Amabile, 1996). It has also been suggested that intrinsic motivation occurs when action is experienced as autonomous or self-determining (Deci & Ryan, 1985). It would seem that non-related play displayed the characteristics that define an intrinsically motivated activity.

If we look at both the 'Non-Related Play' and the 'Social Play' conditions, both exhibited an element of autonomy because they were not related to the task at hand. This autonomous element has often been related to prototyping exploration (Schrage, 1999). However, researchers have also found a link between autonomy and overall well-being (Pink, 2009). This would suggest that autonomy could also be related to the 'state of being' of the person carrying out the creative task. In previous studies we have found that 'state of being' does play a role in the creative process (Deininger and Loudon, 2011). 'State of being' seems to be more of a factor in the current study than prototyping itself. The findings of this study seem to suggest that a non-causal relationship is having a greater affect upon the creative process than a causal one.

5. Limitations of the study

As only fifty participants were involved in the study, covering five conditions, it is difficult to draw too many strong conclusions from the results. This is especially true with regards to the limitations imposed in the 'Social Play' condition where participants stated that they did not have enough time to use the Facebook application effectively, and therefore the amount of social play involved was limited and the comments became more goal orientated. In the 'Imaginary Play' condition information on the imaginary story was presented in a written form and again could have been presented in a more playful and immersive form. It could be argued that the 'Non-Related Play' condition also had an element of social and physical play. Finally it might have been useful to understand how engaged each participant felt in their play condition after completing the activity.

6. Future Research

This study has highlighted a very interesting, possible link between play, autonomy, state of being and creativity. We plan to explore these possible relationships more deeply at a quantifiable and qualifiable level in future studies.

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