Creative Output in a Market Context

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Abstract

How does copyright affect creativity? Results from an experiment are used to discuss how the existence of economic rights (ER) and attribution rights (AR) affect creativity in a market for creative goods. The results are discussed in the context of arguments regarding the effectiveness of copyright. The number of ideas created was significantly lower for the ER group but not when ER and AR where combined. The overall creativity and overall subjective scores were not significantly different between groups. The per idea creativity and per idea subjective scores were higher for the ER groups and lower for the groups with both AR and ER. Interestingly the sign of the coefficients for attribution and economic rights individually was opposite to the sign for AR and ER combined. This suggests that AR and ER could be substitutes and affect creative performance through different mechanisms.

'Man is least himself when he talks in his own person. Give him a mask, and he will tell you the truth.'
- Oscar Wilde

Contents

1   Introduction

The focus of this paper is not copyright or the optimal copyright term instead the focus is on how economic rights (ER) and attribution rights (AR) motivate creation. The paper reviews the effectiveness of economic rights and attribution rights as motivators for creative production and how these two rights function in a market context. The aim is to be able to contribute empirical evidence regarding the effects of economic and attribution rights on creativity and how these results might contribute to existing theories regarding copyright and innovation in general.

An Economic right is a legal concept which refers to the rights a creator receives. For the purposes of this research economic rights are mimicked by allowing ownership of submission in a market so that the creators monetary reward will depend on the performance of their submissions in the market. Other agents are also strongly discouraged to attempt to gain from copying the idea. An attribution right, in a copyright context, is the right to be named as an author and is designed to protect the reputation of the author. The main purpose of the right, in the experiment, is to name the author of each submission so that it is public knowledge who came up with which idea and when. The main questions of interest for the current research are the following.

Do Economic rights and Attribution rights affect the quantity of creative production?
Do Economic rights and Attribution rights affect the quality of creative production?
The effectiveness of the two rights will be measured by how they promote creativity. Creativity is used as a proxy for overall creative or innovate potential. This is not a new method as creativity has been used as a proxy for innovative potential in wider innovation/creativity literature(Charness and Grieco 2014; Amabile 1983; Runco and Bahleda 1986; Runco et al. 2010; Eisenberger, Haskins, and Gambleton 1999).

The results are discussed in context of existing literature on copyright as an incentive for creative production. The focus is on contrasting arguments presented by prominent authors in the field of copyright, Landes and Posner and Boldrin and Levine. Landes and Posner argue that without copyright there would be inefficient incentive for artists to create (W. M. Landes and R. A. Posner 2003). They also state that the point of copyright is to maximise creation new works while minimising costs of limiting access and so the point of copyright is to balance access and incentive (W. Landes and R. Posner 1989). In contrast to the point brought forward by Landes and Posner, Boldrin and levine argue that copyright increases rent seeking behaviour and that there is no convincing evidence that copyright increasing innovation (Boldrin and Levine 2013). The authors also argue that an incentive to create is best done through prizes or grants and that it would be best to eliminate copyright altogether (Boldrin and Levine 2006). Although this paper discusses the results in the context copyright, the results can be viewed in the wider context of innovation literature. The reputation effects and economic rights which are the core of the discussion of this paper are also widely present in industries reliant on innovation which are outside the sphere of influence of copyright.

1.1   Existing Research on Copyright Incentives

There is a distinct lack of empirical evidence when looking into copyright issues (Atiq 2013; Boldrin and Levine 2013; Howe and Griffiths 2013; Ku, Sun, and Fan 2009; O'Hare 1982) in fact copyright as a whole has been referred to as a faith based system(Patry 2012, p 50). Although there is a gap in research in the area, there are some studies which help to shine light on motivation in context of copyright. Such studies include Buccafusco et al (2014) which focused on the effects of monetary incentives and creativity thresholds on creative performance. The

authors found that monetary incentives are more effective in high threshold conditions or when the creative standards in order to gain a potential pay-out are significantly higher (Buccafusco et al. 2014). The finding suggest monetary incentives are more effective the harder if the creative standards in order to gain economic ownership of an idea were higher.

Authors from (Buccafusco et al. 2014) also analysed the effect of attribution on pricess of art or the willingness to accept of artists. The paper found that it matters if attribution is granted as a default compared to if the author needs to bargain in order to gain attribution when selling their work. The authors found that artists were willing to take a lower price to gain attribution, however if attribution was given as a default the price artists asked for was higher (Sprigman, Buccafusco, and Burns 2013).Taking these findings in the context of copyright markets they suggests that whatever the market was looking for, in terms of style or quality for example, would be delivered with the higher quality the higher the thresholds for success were. In addition there is evidence that attribution does matter to creators and there is some monetary value assigned to it. If we take these results as given the question remains: Do the rights in the market, i.e attribution and economic rights, produce incentives that are in place promoting creativity and socially optimal production? If both attribution and monetary incentives matter to artists how will the two affect artists and creation when they are combined?

Following Batey and Furnham 2006 creativity is defined as 'something new and novel or a new and novel way to solve a problem'. There exist other definitions however for simplicity the given definition will be used. Creation, in contrast to creativity, is the number of new creations produced. It should be noted that the products from the creativity tests mentioned later in the paper will be judged based on a well established criterion of creativity which has been used in previous creativity literature and found to be robust [1].

The core argument for using creativity to study the effectiveness of ER and AR in a market context is that the more creative individuals are the more quality works they are likely to create. Thus the key purpose of the rights in question is to promote creativity to serve their original purpose of promotion of knowledge creation. The purpose is to understand if and how the rights might affect creativity and add empirical contributions to the field of copyright research.

2 Conceptual Framework

The creative marketplace is discussed from the perspective of the creators decision making in the market and what aspects of the market influence this. Market conditions, created by varying the rights environment, are juxtaposed with each other in order to observe how a varying rights environment may affect creator decision making. Finally the concept of creativity will is introduces, defined, and explained in terms of its relevance in copyright research.

2.0.1 The Agent

In the creative marketplace the are agent who aim to maximise their utility based on some individual preferences. If an creator/agent feel that success in the market is important then each agent in the market is concerned with both the quantity and quality of output which dictate the popularity of output. The individuals utility from creation is discussed in terms of two concepts: fame/notoriety and pay/monetary rewards. It can be that one of the two, both, or neither matter to the market participants. That is to say an agent does not have to be concerned with market success but if they are then the quality and quantity of output will

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1. The core of the judging criteria i.e. flexibility, fluency, and originality is taken from Torrance 1962, p 214-216 and found to correlate with creative performance later in life Kim 2006. I also use humour in judging creativity which is suggested in Kim 2006

dictate the agents rewards from notoriety and economic rewards. Naturally there is a trade-off between quantity and quality as there are constraints which limit time and resources. When the quantity produced is higher there i a higher potential to be recognised. However if the quality of the production is poor, even if quantity is high, the chances for market success are low. The area of focus is whether the rights environment influence how agents play strategically in order to maximise utility between creating works and focusing on the quality of those works. Given some exogenous talent which can include cognitive potential and experience along with an endogenous effort decision, how might the agent act in varying market circumstances.

2.1 Personal versus Market Incentives

The constraints shape the decision making of the agents decision between focusing on quantity and quality and so have effect on the popularity and their market success of their output. Individuals have some costs for creating, which in the context of the experiment are effort costs but for the purposes of a wider analysis can also include costs for materials or even opportunity costs. The factor of interest is how the quality and quantity of the agents creations change in different market conditions. Does it affect overall performance or is there rather evidence of similar effort but a different strategic decision between quantity and quality. Each creator is in a market with n other creators and so it is important to have some expectation about how talented others are or how much effort others exert. Assume there is some creators i and they are taking part in the market for creative goods as a producer along with $n-1$ other producers. Each producer will thus have some beliefs about how talented others are and how much effort others in the market exert. Thus each agent will have some expectations about the probability of their own success based on the beliefs of their relative talent and effort. Based on these beliefs the agent decides their effort level and the quantity an quality which they choose to produce.

3 Experimental Design

3.1 Artists Participating in the Market

The artists in the experiment market will be art students, in total 198, from Glasgow School of Art, The Royal Conservatoire, and the Arts Department at the University of Glasgow. Participants were recruited from art schools in order to recruit a population of participants who would have a high probability to use or be in contact with copyright or in copyright industries in the future. Art students were used in order to maximise external validity of the results when comparing the sampled population with the population of individuals who use or are affected by copyright.

3.2 Lab Setting

The computer labs had dividers constructed from cardboard to fit the specification of the computer lab in use. The participants were isolated into cubicles and their line of sight is obstructed in the front and in the sides to protect the screen of the participant and in order to reduce possible distractions. The computer labs used for the experiments are located in the main campus of the University of Glasgow and data stored and backed up of University servers.

3.3 Structure

The structure of the experiment is as follows: Entry survey, divergent thinking task, figural thinking task, math or effort task, and the exit survey. There will be three stages in each of the two creativity tasks as seen below.

Stage 1 = Creation
Stage 2 = Rights Enforcement
Stage 3 = Popularity Decision & Results

Each participant is informed about the experiment structure before the first task i.e. first creation stage begins. Thus participants are aware that their ideas could be found similar in the rights enforcement stage and so not included in the market stage which dictated the overall popularity of ones ideas. This means that individuals are aware of the risks of creating an idea which is similar to any existing entry which are observable during the creation stage.

3.4 Creation in a Market

To simulate creation in the market there will be two creativity tasks. The first task to be completed will be a divergent thinking task called the 'Unusual Uses Test' or the 'Alternate Uses Test' which is developed by the well-known psychologist J.P. Torrence (Torrance 1962, p 238–240). The task asks participants to come up with as many alternative uses to a given stimuli object. The stimuli object I used was a stapler which they then were instructed to come up with different uses or objects for what the stapler could be. Before participants started the task they were given an example by giving them a stimuli object, in the case of the example it was a coat hanger, and told it could be a back scratcher. The figural thinking task was a 'line Meanings task' developed by Wallach and Kogan in their book *modes of thinking in young children* (Wallach and Kogan 1965, p 34-36). The participants were asked to come up with meanings for the given line, shown below, asked what it reminded them of or what it could be a part of. When the ideas are created if a participant was in a group with attribution then the ideas had the name of the author next to them, otherwise only the title and description were seen by the people in the group.
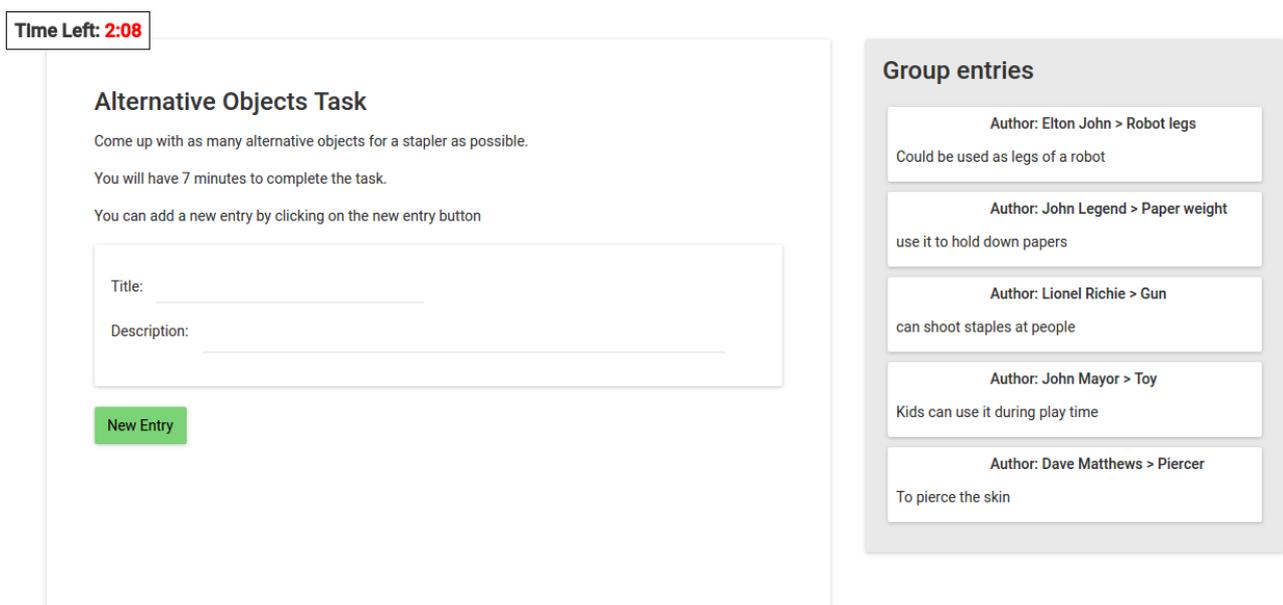

Figure 1: Screen Shot of the Divergent Task with Attribution

The image shows what participants in the 'ER and AR' group saw during the task. N.B. they were given 5 min not 7.

3.5   Rights Environment

After completing the task the ideas generated from all groups of participants are sent to another randomly generated group whose ideas are also sent to a randomly selected group. When all of the groups have received ideas from other groups they are asked to mark ideas which are similar to other already existing ideas within the list given to them. The participants are given instructions how to judge similarity and are be primed into a copyright frame. That is they will be given directions on how to judge similarity using similar wording to copyright in order to mirror how copyright law judges a work to infringe on another. If an idea is judged to be similar to another already existing idea by at least two judges then the idea which was created last will be discarded. Thus if two ideas are judged to be similar the original idea stays while the copy is discarded before moving to the next stage. The similarity judging is completely anonymous and does not affect how each individuals ideas are judged by others. The creators of the ideas do not know which ideas were voted as similar and discarded.

3.6   Mechanism of Deciding Popularity

The pay structure for the ER group is shown below and is created in order to simulate the winner-takes-all pay structure in creative industries, such as, music and book publishing (Abbing 2011; Kretschmer and Hardwick 2007; Kretschmer 2012, p 113). It should be mentioned that the above structure is more equally divided compared to the winner-takes-all pay structure found in the book or music industries. The pay structure does not include a guaranteed £3 for participating in the experiment or food served after the experiment. The below is the pay structure for each separate task, meaning that the maximum earnings are £5.55x3+£3 =£19.65 and the minimum earnings are £3.

1. £5.55
2. £2.1
3. £1
4. £0.5
5. £0

The amount of stars an individual receives for their ideas is their popularity in the market. For exmaple, if a participant received the most stars they would receive £5.55 for the task. The pay groups are all 5 person groups and the above shows the distribution of pay based on rank which is judged by how popular the individual's ideas are compared to other individuals in their group. Participants in the non-economic rights groups were all paid a flat fee of £8.49 which included the guaranteed £3 for participation.

There is a final task, math task, where participants are asked to solve as many addition problems as they can in the 5 minutes given. The problems were simple addition problems which had 4 numbers which range from 1-15 and the participants simply added them up. Each correct answer gave the participant a point and the participant that got the most points or a certain number of points the fastest was judged to have performed the best. The point of this task is to judge differences in effort between treatment groups.

Treatment Groups in the Experiment

The creative goods in a copyright industry are simulated by the ideas created in the two creativity tasks. These ideas can then be given economic rights, be attributed to a participant, both, or none of the two. This creates 4 treatment groups shown below.

Control Group:

Participants are not granted economic rights or attribution rights for their creations in the experiment. They are not named as the creator and their pay will not depend on their performance.

Attribution Rights:

Participants are granted only attribution rights but not economic rights. They are not named as the creator of their own ideas but their pay will not depend on their performance.

Economic Rights:

Participants are granted only economic rights but not attribution rights. This means they will not be named as the creator of their ideas but will receive pay based on the popularity of their ideas.

Economic and Attribution Rights:

Participants are granted both economic rights and attribution rights for their creations in the experiment. They will be named as the creator and paid based on the popularity of their creation.

All treatment groups see other participant's ideas yet only treatment groups with attribution rights will see the names of the creator of each idea in real time and in the results at the end. When results are shown, in the treatment groups with attribution, everyone in the group will be named and ranked from 1st to 5th based on their performance i.e. the number of favourites each participant received. Thus everyone will know how well they performed relative to everyone else in their group. If a participant in a group without attribution then the participant would only see their own performance and how much they made if they were in a group with economic rights. No name will be seen at any point in time and each person will only know their own rank and how much they themselves are making while given no information about the rank or earning of others.

3.7 Survey

The survey given to participants of the experiment are split into two surveys, one before the experiment and one after. This allows for unbiased answers to questions involving factors, such as, creative efficacy (Bandura 2006) in the experiment can be elicited before the experiment. The surveys main aim is to elicit information about exogenous variables which could affect a participant's creativity and thus these variables can be controlled for when analysing results. The more exogenous variables can be controlled for the clearer any effects from the data will be and so the survey is a tool to decrease noise from the data and so to help confirm if parameters have been identified correctly.

Self-efficacy (Bandura 1977, 2006; Tierney and Farmer 2011, 2002) measures the confidence a person has regarding a skill, in this case, creativity efficacy questions are in the pre-experiment

survey. This will be used to predict the effect of monetary incentives on performance on the individual level (Malik, Butt, and Choi 2015) and separate effects due to individual differences and due to differences in treatment group. Risk attitudes will also elicited from participants as risk taking behaviour has been found to correlate with preferred pay structure (Niederle and Vesterlund 2007; Dohmen and Falk 2011) , which is important in the context of creative industries as they have an unequal tournament type pay structure (Kretschmer 2012; Kretschmer and Hardwick 2007). Variables which have a more ambiguous relation to creative performance are also included to strengthen the reliability of results. These variables include brain lateralisation or handedness, (Badzakova-Trajkov, Häberling, and Corballis 2011; Mihov, Denzler, and Förster 2010; Preti and Vellante 2007) gender, (Croson and Gneezy 2009) and schooling which will be a proxy for environment (Oksanen and Ståhle 2013).

3.8   Measuring Creativity

The criterion used to judge creativity for both the figural and the divergent thinking task are fluency, flexibility, originality, and humour. Fluency represents the number of ideas or responses the participant has come up with. Flexibility is the ability to generate ideas from different categories and from different points of view. Originality is the ability to generate ideas away from the obvious and common place. Lastly humour is simply a score given for any idea which was judged to be humorous according to a given definition[2]. The author has used a subjective measure of novelty compared to a more commonly used statistical rarity measure to measure originality [3]. The first three criterions are shown to have a significant link with creative performance (Torrance 1962, p 214-216) as well as creative performance later in life (Kim 2006).Similar methods for measuring creativity to the ones detailed above is used in a wide range of studies on creativity (Fink et al. 2007; Runco et al. 2010; Runco 1986; Charness and Grieco 2014; Moore et al. 2009) Humour, fourth variable, was added in order to capture a the use of humour which is a technique or tool often used in the creative industries. The measure has also been mentioned as a measure of creativity in a paper exploring expansions to the traditional TTCT criterion (Kim 2006).

The score given by the judges is the creativity score given to the ideas. With the creativity score individuals and treatment groups can be compared between each other in terms of creativity. The judgment criterion will be similar for both tasks and so it will be possible to compare the overall scores between tasks. The only difference between the scoring criterion will be the categories used in the flexibility score, for both tasks there will be 7 categories however these categories will be different and so not directly comparable. All other categories will have the exact same wording and criterion which can be directly compared between each other. Judges were also asked to submit a subjective judgments of all the ideas from both tasks by giving them anywhere from 5 to 0 stars. subjective judgments have been forwarded as an alternative to creativity measures (Silvia et al. 2008) and so one has been added to complement the more formal creativity score. 0 stars are given if an individual does not like the idea and anywhere from 1-5 starts were given if they liked the idea. The more stars an idea was given the more the judges liked that idea. They were told to leave at least half of the ideas blank or with 0 stars.

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2. Definition found in the appendix section "Creativity Instructions"
3. The specific instructions can be found in the appendices added at the end of the paper

4   Results

The core of the arguments made in this paper revolves around ideation and creativity, ideation being the number of ideas created by each participant in each task. Creativity is slightly more complicated of a concept as it has many different definitions depending on context. What the definition of creativity is and how it will be measured are discussed further later in the results section. I will be using an OLS regression in order to judge the effects of independent variables on ideation, market/subjective performance, and creativity. There will be three steps of regressions analysed, ideation, creativity, and subjective scores. Creativity will be taken into account and then parallels can be drawn between how markets valued ideas and how creative the ideas were and using this juxtaposition it will be possible to comment on how markets might value creation. This will also be relevant in the discussion about how effective economic rights and attribution might be in incentivising creativity and better market performance.

4.1   Ideation

As a part of the experimental design participant success was dependent on the subjective judgment of others. Participants were directly asked to consider the subjective opinion of participants in other groups, however the same trade off between quantity and quality exists for creativity. The time taken on each idea can affect the creativity scores, such as, flexibility or humour. Naturally the more time is taken on an idea the more creative it has the potential to be. Thus there is a dilemma between quantity and quality which each participant must optimise according to their evaluation of what the market tastes are.

A figure for the average number of ideas in each treatment group and for each task can be seen below. The figure also includes a representations of the means according to the estimates of the OLS taking into account session dummies and controls. Observing the actual means the first of the two tasks, the divergent thinking task, the treatment group has the largest number of ideas on average, while in the figural task it has the least. This suggests that there was an adjustment to the market by individuals in the treatment groups between tasks, which is most noticeable in the two groups with ER. This could be due to three main reasons: Learning effects, due to the task being different in nature, or due to a reaction to the signal from the market, i.e. results, received by participants between the two creativity tasks. there will be more discussion regarding the issue in the discussion section.
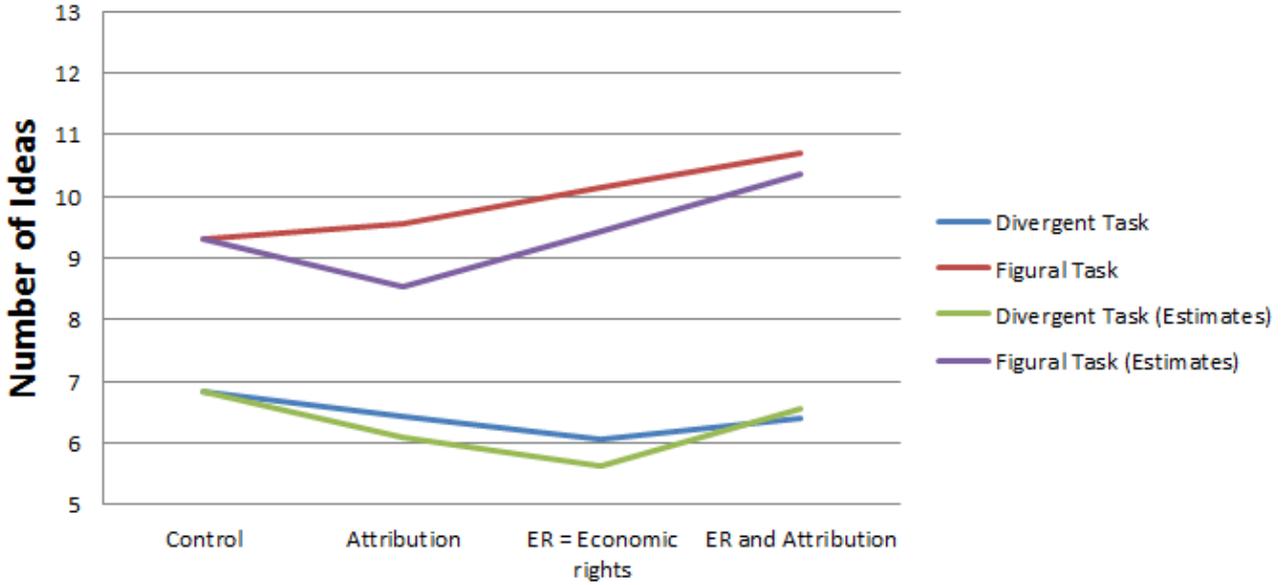
Figure 2: Number of ideas in both Tasks

In Figure 2 we see the difference between the control group, the attribution right group, the ER group, and the ER and AR rights group. For both tasks there was an increase in the number of ideas created from the number of ER to the ER and attribution group, although the effect was weaker and non-significant for the figural task when controls and or session dummies were taken into account[4].

The number of ideas[5] were regressed against the treatment groups, controls, and session dummies. The regression results for ideation[6] for the both tasks can be seen in Table 1.The regression below with the same vector of controls being used for all regressions shown in the paper. X is the vector of treatment variables i.e. AR etc., C is the vector of treatment groups, and D is the set of session dummies. The same formula will be used to measure the impact of the treatments on ideation, creativity, and subjective judgments.

$$y = \alpha + \beta_1 X + \beta_2 C + \beta_3 D + \varepsilon$$

Expanding the matrix of treatment variables the equation transforms to the following.

$$y = \alpha + \beta_{AR}AR + \beta_{ER}ER + \beta_{AR\&ER}AR\&ER + \beta_4 C + \beta_4 D + \varepsilon$$

The treatment variables i.e. AR, ER, and $AR\&ER$ are all dummies and so the coefficients of interest are β_{AR}, β_{ER}, and $\beta_{AR\&ER}$. If the treatment group is either only AR or only ER then the only betas of interest are β_{AR} and β_{ER} respectively. If there is only attribution rights (AR) only β_{AR} could be a non-zero coefficient while ER and $AR\&ER$ are zero. The treatment

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4. There was a glitch in the code written for the program which caused signals to be given based only on some of the favorite scores and not all. This caused participants to receive different signals compared to the ones originally intended. Thus there is a statistical comparison between participants who received the correct signal and the incorrect signal. This analysis did not show evidence of individuals acting significantly differently based on the signal they received. This means that people trusted the signal they received. The full analysis can be seen in the appendix.

5. Ideas simply means the number of different entries entered by each participant. In copyright there is a difference between expression and idea and so in this case each idea is a separate expression.

6. Ideation is simply a word used to express the capacity to create new ideas

group with attribution and economic rights ($AR\&ER$) all betas are of interest with the total effect being $\beta_{AR} + \beta_{ER} + \beta_{AR\&ER}$. Thus there are different potential ways the effects from attribution and economic rights would interact. Listed below are some examples of potential coefficients of the treatment group variables and their interpretations.

Let us assume the following: both β_{AR} and β_{ER} are positive in explaining the dependent variable, for example, the number of ideas created. The following analysis can also work with opposite signs of the effects.

I. $\beta_{AR} > 0$ and $\beta_{ER} > 0$ such that $\beta_{AR} + \beta_{ER} + \beta_{AR\&ER} = \beta_{AR} + \beta_{ER}$ there is no inter-action i.e. $\beta_{AR\&ER} = 0$. The results would mean that there is no marginal decreases as one motivator is added with the other and that AR and ER are perfectly additive in their effect on the dependent variable.

II. $\beta_{AR} > 0$ and $\beta_{ER} > 0$ so that $\beta_{AR} + \beta_{ER} + \beta_{AR\&ER} > \beta_{AR} + \beta_{ER}$ there is a positive interaction affect i.e. $\beta_{AR\&ER} > 0$. This would mean that AR and ER are compliments to each other in the way they influence the dependent variable.

III. $\beta_{AR} > 0$ and $\beta_{ER} > 0$ and $\beta_{AR} + \beta_{ER} > \beta_{AR} + \beta_{ER} + \beta_{AR\&ER} < \beta_{AR}$ or β_{ER} there is a negative interaction affect. The interaction affect is negative but the combined affect of ER and AR on the dependent variable are larger than an individual affect of AR or ER and so the negative interaction affect is likely due to a decrease in the marginal effectiveness of AR and ER as a motivator.

IV. $\beta_{AR} > 0$ and $\beta_{ER} > 0$ and $\beta_{AR} + \beta_{ER} > \beta_{AR}$ or $\beta_{ER} > \beta_{AR} + \beta_{ER} + \beta_{AR\&ER}$ there is a negative interaction affect which causes the combination of AR and ER to have a smaller affect on the dependent variable than each individually. This suggests that AR and ER crowd each other out and that the two could be substitutes in the way they influence the dependent variable.

The above examples had a positive effect for ER and ER, however the same reasoning can be used for negative individual affects. The important take-away is to closely observe the interaction affect in relation to the individual effects of AR and ER as shown above.

The controls[7] are selected based on theories and intuition on what affects creativity and creative output. For example, risk preferences and potentially earning more money in creative fields are all theorised as possible reasons for individuals to become artists by Hans Abbing (Abbing 2011, p 115,119). Creative efficacy was theorised to affect creativity (Chong and Ma 2010; Sangsuk and Siriparp 2015; Tierney and Farmer 2002), along with handedness (Mihov et al., 2010). Measure for ambiguous risk are added in order to observe if ambiguous risk preferences affect the creative performance as the probability success in the market is unknown. Creative family members, institution, and preferring to be famous rather than rich because of one's art are variables which are intuitively like they could affect creativity of an individual. The controls are added based on existing theories but also intuitive speculation about what is likely affect creativity.

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7. full list found in the appendix along with the relevant references

Table 1: Number of Ideas Created in the Divergent and Figural Task

| | Divergent Task | | | Figural Task | | |
	(1)	(2)	(3)	(1)	(2)	(3)
Pay	-1.327**	-1.192	-1.211*	0.062	0.087	0.124
	(0.67)	(0.73)	(0.71)	(0.76)	(0.8)	(0.79)
Attribution	-0.818	-0.574	-0.74	-0.869	-0.687	-0.767
	(0.65)	(0.68)	(0.7)	(0.74)	(0.68)	(0.7)
Pay and Attribution	1.787*	1.756*	1.679*	1.818*	1.78	1.682
	-0.94	-0.96	-0.94	(1.06)	(1.14)	(1.11)
Controls	no	yes	yes	no	yes	yes
Session Dummies	no	no	yes	no	no	yes
r2	0.022	0.144	0.206	0.032	0.133	0.169
Mean	6.44	6.44	6.44	9.9	9.9	9.9
N	198	198	198	198	198	198

Notes: $*p < 0.1, **p < 0.05, ***p < 0.01$. Heteroskedastic Robust standard errors in parenthesis.

Table 1 shows the results for regressions for the number of ideas in divergent thinking and figural thinking tasks with and without taking into account the control variables and session dummies. When controls are not included the existence of economic rights i.e pay decreased the number of ideas created in the divergent thinking task at 5% significance. When controls and session dummies were taken into account the coefficient is negative[8] the significant level decreased to 10%, ceteris paribus. The exception is when only controls are added in which case pay is significant at 11%. The interaction effect between pay and attribution was positive and significant at 10% for all cases in the divergent task but only when no controls were added for the figural task. It should be mentioned however that the significance level remains under 12% for all cases in the figural task. Overall there is evidence that the interaction affect between ER and attribution combined increases the number of ideas created compared to only ER or attribution and that the individual effect of ER is to decreases the number of ideas created in the divergent task. The Attribution alone was insignificant in both tasks and only significantly impacted results when coupled with ER.

Using the results from the regression of the the number of ideas created in the divergent task taking into account session dummies and controls it is possible to calculate the difference between individual effects and the interaction effect. In this case the interaction affect is positive with a 1.679/6.44 or 30% increase in the number of ideas compared to the mean. However the total impact with taking into account the individual effects of ER and attribution the model predicts a decrease of $-1.192 - 0.574 + 1.756 = .1$ idea or a 1.5% decrease in the number of ideas in the divergent task. This is similar to scenario IV detailed above where the individual effects of AR and ER is almost completely negated by a large interaction effect with an opposite sign. Thus in the divergent task there is some evidence which suggests ER and AR are substitutes in the way they motivate[9].

In the divergent task there is some evidence of a what is called a "cross effect" where there might be no difference in means between treatments but there is evidence of the effects of the treatments changing when the treatments are both present. This causes the graphs of the

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8. -1.211 or a 18.8% decrease compared to the mean.

9. It should also be noted that the interpretation of an interaction affect is different dependent on if the individual effects are significant or not.

means to cross or almost cross when the treatments are segmented as seen in figure 1[10]. The lines converge for the treatment group AR and ER showing that AR has an opposite effect on creativity depending on whether ER is present or not. Observing the number of ideas created there is evidence that ER decreases number of ideas created and of a cross effect since the interaction affect of AR and ER increase the number of ideas created in the divergent thinking task. In the figural task there is no evidence of a cross effect but there is some indication that there is a positive interaction effect present. That is to say that in the treatment group with both AR and ER there is some weak evidence that the overall number of ideas is higher[11] compared to when there was only AR or only ER.

4.2   Creativity

Creativity of the ideas will be analysed using 4 measures, The number of ideas i.e. fluency, novelty/originality of the ideas, flexibility of the ideas i.e. how many different categories do the ideas belong to, such as, tools, decorations etc. and lastly humour [12]. The score from all of the measures is then added together and compiled into a creativity score. Table 2 shows the total creativity for both tasks. For the per idea score fluency, flexibility, and humour scores were added together and divided by fluency.

Table 2: Overall Creativity in Each Task

	Divergent Task			Figural Task		
	(1)	(2)	(3)	(1)	(2)	(3)
Pay	-1.820	-1.421	-1.616	-0.842	-0.309	-0.496
	(1.29)	(1.32)	(1.40)	(1.27)	(1.33)	(1.37)
Attribution	-1.535	-1.021	-1.092	-1.424	-0.701	-0.812
	(1.25)	(1.27)	(1.33)	(1.24)	(1.28)	(1.30)
Pay and Attribution	3.550*	3.298*	3.020*	3.432*	2.858	2.762
	(1.81)	(1.83)	(1.82)	(1.78)	(1.84)	(1.88)
Controls	no	yes	yes	no	yes	yes
Session Dummies	no	no	yes	no	no	yes
r2	0.020	0.121	0.192	0.024	0.09	0.113
Means	14.3	14.3	14.3	21.0	21.0	21.0
N	198	198	198	198	198	198

Notes: $*p < 0.1, **p < 0.05, ***p < 0.01$. Heteroskedastic Robust standard errors in parenthesis.

An OLS regression was also used to observe the impact of the treatment groups on overall creativity in table 2. Individually the treatments are insignificant in explaining the differences in the overall creativity in both tasks when taking into account controls and session dummies. There is a significant and positive interaction affect significant at 10% which has an opposite sign and overall larger coefficient compared to the combination of the individual treatments[13] which are non-significant. However, this effect fades for the figural task when controls and session dummies are added. This suggests that the economic rights and attribution rights do not have

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10. It is important to keep in mind that control variables were taken into account in the regressions and so the results might not coincide fully with what is observed in the figure showing the number of ideas created

11. This effect is only consistently below 12% significance and so is not strong.

12. Details found in the section 'Measureing Creativity'

13. This means AR and ER groups without taking into account the interaction

an effect on overall creativity, except for the divergent task in the ER and attribution treatment group. The positive interaction affect but insignificant individual effects are interpreted as the two treatments AR and ER having no impact on creativity individually other than combined.
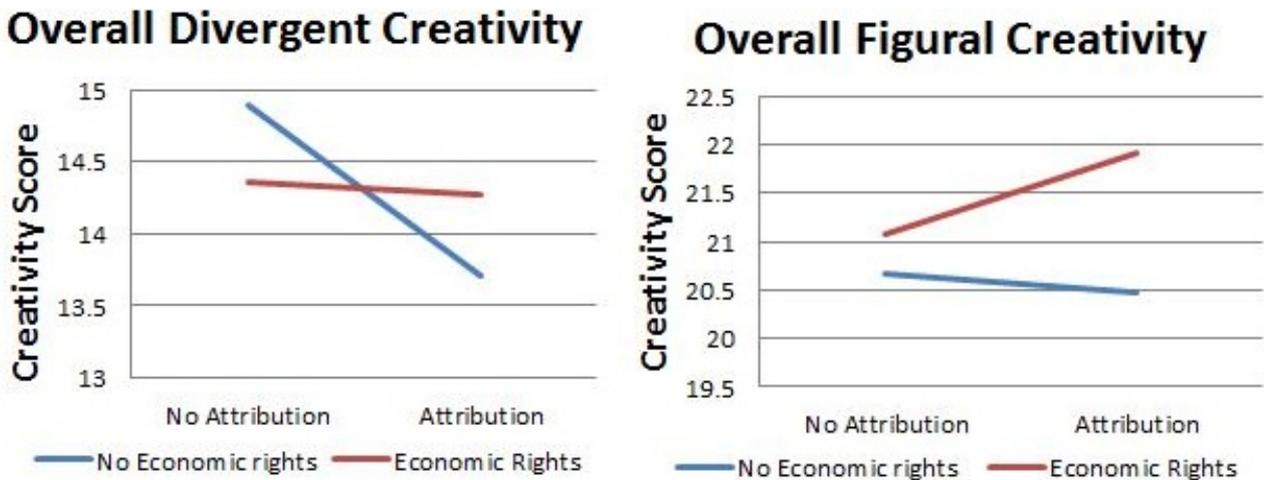
Figure 3: Means of Overall Creativity Scores

In the divergent task there is some evidence of a what is called a cross effect here the graphs of the means cross when the treatments are segmented as seen in figure 3. The cross effect is not strong but there is evidence of it as the lines for "ER" and "no ER" cross on the right hand side of the graph.

In the figural task there is no evidence of a cross effect but there is some indication that there is a positive interaction present. This indication however is weak and no conclusions can be drawn from it since the interaction affect is only significant with no session dummies or controls. Observing per idea creativity should shed some light on creativity might have been affected by the quantity versus quality decisions made by the participants.

Observing the results for creativity per idea, shown in Table 3, for the divergent task the coefficient for ER are positive and significant at 10% in all cases. The size of the coefficients were around .2 or an approximate increase of creativity per idea of 15% in all cases. Taking into account that in the ER group individuals had significantly fewer ideas, this result suggests that in the ER group participants opted for quality over quantity of ideas in the divergent task. The overall affect is positive, small and shows more evidence that the two incentives could be substitutes. For the figural task the interaction term was negative and significant at 10% when controls were added but session dummies were not. This effect decreases in significance and overall effect once session dummies are added. Overall there is little statistical significance for overall creativity and creativity per idea. There is some evidence that the strategy of quality over quantity of the ER group fades when the task switches to the more straight forward figural task.

Table 3: Creativity Per Idea for Each Task

| | Divergent Task | | | Figural Task | | |
	(1)	(2)	(3)	(1)	(2)	(3)
Pay	0.154*	0.170*	0.159*	-0.014	0.020	0.011
	(0.9)	(0.9)	(0.8)	(0.06)	(0.07)	(0.07)
Attribution	0.034	0.023	0.080	0.065	0.085	0.062
	(0.09)	(0.09)	(0.07)	(0.06)	(0.06)	(0.06)
Pay and Attribution	-0.021	-0.035	-0.049	-0.123	-0.161*	-0.140
	(0.13)	(0.13)	(0.13)	(0.9)	(0.9)	(0.9)
Controls	no	yes	yes	no	yes	yes
Session Dummies	no	no	yes	no	no	yes
r2	0.027	0.109	0.259	0.024	0.106	0.163
Mean	1.33	1.33	1.33	1.40	1.40	1.40
N	198	198	198	198	198	198

Notes: $*p < 0.1, **p < 0.05, ***p < 0.01$. Heteroskedasticity Robust standard errors in parenthesis.

4.3 Subjective Judgments

In addition to the creativity judgments based on creativity literature, the judges were asked to pick their favourite ideas from the list of all the ideas created in the experiment from both tasks. They were given the same criterion as the participants in the experiments i.e. name your favourite ideas and give them anywhere from 1 to 5 stars if they liked them and 0 if they didn't. A correlation between the scores given by participants in the experiment and the scores given by the judges, in table 4. The subjective judgments between the judges and participants correlate positively. The correlation coefficients for the subjective judgments, as shown in Table 4, are .4962 between the average score given by the judges and participants in the divergent thinking task and .4008 for the figural task. These correlation coefficients represent a positive and significant at 1% correlation. Taking into account the inherently varied tastes does represent a close correlation. Thus there is, at least relatively strong, consensus between judgments and so the judges score measure has been used as a proxy for the general taste. Using these judgments it is now possible to observe if the popularity of the ideas changes between treatments groups.

Table 4: Correlation Coefficients between the Judges and Participant in Each Task

| | Judges Score | | Participants Score | |
Total Scores	Divergent	Figural	Divergent	Figural
Divergent, Judges Score	1			
Figural, Judges Score	0.4844*	1		
Divergent, Participant Score	0.4962*	0.3737*	1	
Figural, Participant Score	0.3699*	0.4008*	0.4197*	1

When observing the total subjective scores, seen in Table 5, in the divergent task the personal judgments are not significant in any case. This suggests that there is no significant difference between the overall performance, subjectively speaking, between any of the treatment groups. There can however be differences in the per idea subjective scores which can give insights about the strategic decision making of the participants in the market.

Table 5: Overall Judges Subjective Score

| | Divergent Task | | | Figural Task | | |
	(1)	(2)	(3)	(1)	(2)	(3)
Pay	-0.453	0.565	0.216	2.979	3.698	3.054
	(1.77)	(1.79)	(1.89)	(2.32)	(2.36)	(2.41)
Attribution	-0.275	0.895	0.838	-0.572	0.548	-0.668
	(1.73)	(1.85)	(1.98)	(2.22)	(2.21)	(2.29)
Pay and Attribution	2.093	0.587	0.384	-0.459	-1.971	-1.77
	(2.54)	(2.68)	(2.7)	(3)	(3.09)	(3.09)
Controls	no	yes	yes	no	yes	yes
Session Dummies	no	no	yes	no	no	no
r2	0.006	0.081	0.132	0.018	0.071	0.139
Mean	14.2	14.2	14.2	23.2	23.2	23.2
N	198	198	198	198	198	198

Notes: $*p < 0.1, **p < 0.05, ***p < 0.01$. Heteroskedastic Robust standard errors in parenthesis.

In table 6 for the divergent task only the interaction term between ER and attribution was significant at 10% when controls and session dummies were taken into account and close to 10% significant when only controls were included in the regression. Thus per idea scores were largely similar between treatment groups in the divergent task. It is interesting to note that the individual effects have an opposite sign to the interaction term with the interaction term coefficient essentially negating the individual effects from attribution (AR) and economic rights (ER). How this would be interpreted as is that there evidence of a cross effect similar to ones observed earlier. The lines in the figure cross and so it is possible to observe that AR nor ER on their own are not significantly different from the mean there is evidence of a negative interaction effect of AR and ER. Thus the subjective performance per idea for the group with both AR and ER are significantly and consistently lower that for groups with only AR or ER.

Subjective judgment scores per idea in the Figural task ER and the interaction effect between ER and AR were both significant in the figural task at 5% when controls and dummies were taken into account. Attribution was significant at 10% in the situation when controls but not dummies were taken into account. It is interesting to observe that attribution and ER had a positive sign while the interaction term had a negative sign and the coefficient of the term was larger than the individual effects of ER or Attribution. The overall size of the effect is such that the individual effects (.365 & .243) are completely cannibalised by the interaction term with an opposite coefficient of -.664 leaving an overall effect of -0.056 or a 2.4% decrease. This suggests crowding out of incentives to produce ideas which are valued by the market. Thus the incentives could be substitutes for each other in a market place.

Total Divergent Subjective Scores

Total Figural Subjective Scores
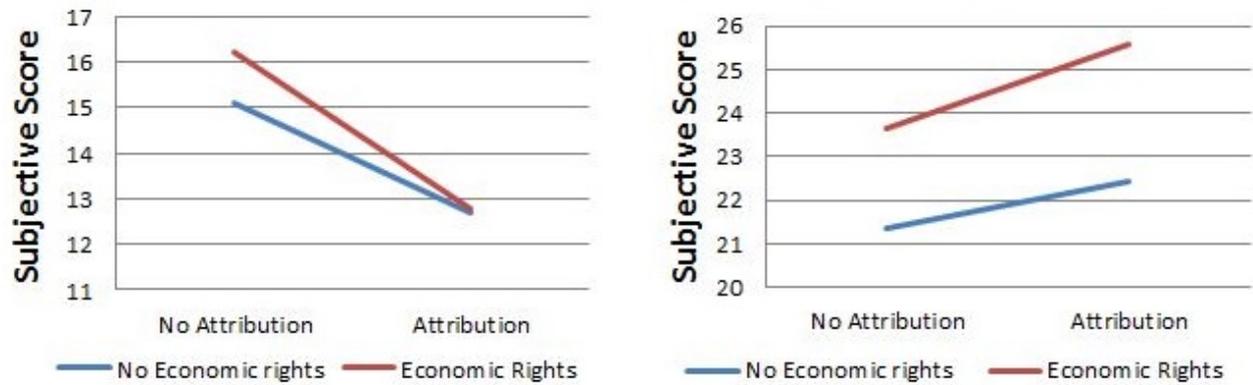
Figure 4: Means of Overall Subjective Scores

ER was significant at 10% with no controls or session dummies and at 5% with session dummies, number of ideas in the figural task and session dummies taken into account. The interaction term was significant at, at least 5%, with and without the different variables being controlled for, while attribution was significant at 10% when only the controls were added to the base regression of regression (1)[14]. Observing the graph of plotted means in Figure 4 does not tell the whole story as there is a case of Simpsons paradox[15]. The graph of means does not take into account session dummies or the assignment of individuals to each group and so the higher mean of subjective judgments could be due to individual differences and differences in the performance of individuals in different groups. For example individuals the AR and ER groups could have performed better in groups with overall higher subjective scores but worse in other groups. This would inflate the means and not tell the whole story of how individuals in the treatment groups performed in all sessions overall.

It is interesting to note the difference between the sign and size of the coefficients of the individual effects and the interaction effect. This implies that when there are significant effects present the individual effects are, at least partly, crowded out[16]. Each individual has a strategic decision to make on how much to focus on quality per idea which increases the probability it will be popular and the number of ideas to create which increases the chance to be overall more popular. This strategic decision will be discussed in the next section.

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14. Admittedly attribution has a weaker effect in the experiment, however taking into account that attribution is also harder to mimic in an experiment it is still in the air if attribution would have a larger effect outside the lab. It is also important to note that outside the lab there could be reputation affects which could be monetised in the future by other authors.

15. The paradox illustrates how the size of an effect and the size of a treatment group both matter when comparing means and regression results. Illustrative examples of the paradox can be found at: https://en.wikipedia.org/wiki/Simpson%27s_paradox

16. Further discussion in the results section.

Table 6: Per Idea Judges Subjective Score

| | Divergent Task | | | Figural Task | | |
	(1)	(2)	(3)	(1)	(2)	(3)
Pay	0.284	0.405	0.376	0.357*	0.426**	0.365**
	(0.24)	(0.26)	(0.27)	(0.19)	(0.19)	(0.18)
Attribution	0.322	0.392	0.447	0.274	0.331*	0.243
	(0.27)	(0.27)	(0.27)	(0.19)	(0.2)	(0.19)
Pay and Attribution	-0.459	-0.632	-0.652*	-0.558**	-0.685**	-0.664***
	(0.37)	(0.39)	(0.38)	(0.26)	(0.26)	(0.25)
Controls	no	yes	yes	no	yes	yes
Session Dummies	no	no	yes	no	no	yes
r2	0.01	0.057	0.147	0.025	0.117	0.225
Mean	2.31	2.31	2.31	2.41	2.41	2.41
N	198	198	198	198	198	198

Notes: $*p < 0.1, **p < 0.05, ***p < 0.01$. Heteroskedastic Robust standard errors in parenthesis.

4.4 Math/Effort Task

There is further evidence that AR and ER are substituted based on data from the math/effort task. Neither AR or ER were significant in increasing the total number of answered correctly or the total number of questions answered. These two dependent variables were regressed taking into account math efficacy, controls listed earlier, and session dummies. There were 4 regressions run for each dependent variable. The first with only session dummies and controls similarly previous regressions. The second took into account maths efficacy or confidence in ones mathematical skills. The third was run on only the individuals who answered fewer than 25 questions and the fourth and final took into account only the individuals who answered fewer than 30 questions.

Results show that the interaction affect is largely significant and with an opposite sign to the individual effects of AR and ER which were not significant. This is similar to earlier results regarding the subjective judgments per idea where the interaction affect was negative and opposite to the individual affects from AR and ER. The results in the math task are similar to existing results and so it is possible to conclude that the way AR and ER motivate individuals is not confined to creativity. It is important however to note that the relative size of the interaction affect is larger in the math task and thus points toward a stronger crowding out effect between AR and ER. This could be due to the coefficient for AR being different, and in some cases opposite, for the lower compared to higher performers and so decreases the overall affect of AR. When only taking into account individuals who answered only under 30 or 25 questions it is important to note that this decreases the overall sample size. This largely explains decreases in the significance level of the interaction affect.

Table 7: Number of Questions Answered Overall and Number Answered Correctly

	Total Answered				Total Correct			
	(1)	(2)	(3)	(4)	(1)	(2)	(3)	(4)
Pay	0.161	0.796	0.298	0.792	0.612	1.264	0.814	0.631
	(1.16)	(1.17)	(1.21)	(1.07)	(1.3)	(1.31)	(1.4)	(1.32)
Attribution	-0.226	0.003	-0.461	0.961	0.808	1.044	0.435	1.144
	(1.24)	(1.2)	(1.23)	(1.07)	(1.4)	(1.35)	(1.42)	(1.36)
Pay and Attribution	-2.328	-2.689*	-2.233	-2.124	-3.753**	-4.123**	-3.322*	-2.097
	(1.66)	(1.61)	(1.6)	(1.47)	(1.83)	(1.78)	(1.88)	(1.84)
Under 25 Answered Only	no	no	no	yes	no	no	no	yes
Under 30 Answered Only	no	no	yes	no	no	no	yes	no
Math Efficacy	no	yes	yes	yes	no	yes	yes	yes
Controls	yes	yes	yes	yes	yes	yes	yes	yes
Session Dummies	yes	yes	yes	yes	yes	yes	yes	yes
r2	0.156	0.212	0.225	0.251	0.17	0.22	0.199	0.186
Mean	22.77	22.77	20.32432	18.63	20.03	20.03	17.64	15.88
N	198	198	148	119	198	198	148	119

Notes: $*p < 0.1, **p < 0.05, ***p < 0.01$. Heteroskedastic Robust standard errors in parenthesis.

5 Discussion

Results are discussed referring to literature outside of the existing copyright literature to analyse how the rights granted could affect creativity and why. An intricate part of the discussion will be literature on intrinsic motivation (Deci 1971; Ryan and Deci 2000; Frey and Oberholzer-Gee 1997; Amabile 1983) and extrinsic motivation (Byron and Khazanchi 2012; Chen, Williamson, and Zhou 2015; Eisenberger and Cameron 1996; Eisenberger, Haskins, and Gambleton 1999; Amabile 2012) and how they both effect creativity. Productivity and creativity, in some cases, can work against each other[17] for example when observing quantity and quality of the product. Creativity is a process which requires a heuristic or open-ended approach compared to algorithmic tasks which have a single obvious solution (Amabile 2012) so creativity, when it comes to the cognitive process, is unique. When we the results are discussed they are discussed specifically in context of the external environments affects on creativity.

Performance related pay, with ER can be argued to be, is an important topic for businesses and policy makers who aim to maximise overall productivity. There is vast literature about the effects of performance related pay in general (Deci 1971, 1972; Ryan and Deci 2000; Frey and Oberholzer-Gee 1997) and in a business setting (Amabile 2012, 1997; Suff, Reilly, and Cox 2007; Eriksson and Villeval 2007). Performance related pay (PRP) in business literature will be reviewed in context of how PRP might affect performance in varying contexts. This discussion will then be merged with a general discussion about performance related pay to discuss how economic rights, a form of PRP, and attribution rights, a form of reputation affects, might interact in a market context. The aim of this discussion is to shed light on how the market environment motivates creator behaviour.

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17. This can also be in the form of crowding out where the introduction of an extrinsic motivator like performance pay can actually decrease productivity. The theory suggest that it decreases or crowds out intrinsic motivation.

Attribution[18] can be external in the sense that they want to be superstars (Pitt 2010) or it can be a more personal or internal reason such as being credited as the author and so the work remains the authors own work (Abbing 2011, p 81). There is also the possibility monetise reputation later in an artists career (p 84) as briefly mentioned before in the paper. Intuitively the existance attribution would increase production as the reputation or notoriety/fame of an artist would be protected and disseminated. The artist's work, which can be an extension of self, is also protected from others copying the idea (Mills 2011; Suhl 2001). Based on the results it is hard to say if attribution increases the individual's creative production. There is some evidence it increases subjective quality and stronger evidence that it interacts with economic rights but whether it is derived from the internal or external aspect of the motivator is ambiguous[19].Thus the results seem to suggest that attribution does affect creativity and subjective quality but largely through its interaction with ER which could be due to ER making attribution more salient.

There is agreement in psychology literature that intrinsic motivation is an important part, if not the most important part, of motivating creativity (Amabile 1997; Eisenberger and Cameron 1996; Grant and Berry 2011; Eisenberger, Haskins, and Gambleton 1999; Shalley and Perry-Smith 2001; Lakhani and Wolf 2003; Stanko-Kaczmarek 2012; Morningstar 2012). When individuals contribute to non-profit projects like open source software the most prominent driver is enjoyment-based intrinsic motivation even though 40% of respondents were being paid for their efforts (Lakhani and Wolf 2003). As intrinsic motivation is the main driver in contributing to non-profit projects and pay is thus seen as an insult to the contributor.This is not drastically different from the creative industries where an important reason why artists begin to create might not be the very illusive monetary gains but rather a need for self-expression. This is supported by theory that artists focus more on reputation than monetary gains, especially early in an artist's career (Abbing 2011, p 79,96).

Performance related pay, without considering its potential interaction effects with reputation, has a large literature in business organisation, psychology and economics. The theory of crowgding out is a key concequence of performance related pay heavily discussed in existing literature. Crowding out can occur when extrinsic motivators, such as, minimum performance requirements or performance related pay are used to motivate individuals. These are then said to crowd-out intrinsic motivation which arises from, for example, task enjoyment (Deci 1971).

The way external incentives are administered and understood matters i.e. whether they are pro-social or not. Prosocial extrinsic motivators are motivators which support existing extrinsic motivation (Amabile and Pillemer 2012). The question is how will the individuals perceive attribution and ER, will they be a pro-social motivator? [20]

5.1   Relevant Methodology

Economic rights are largely an external motivator, they give the author the right over any reproduction of a work and also the right to sell their work onwards while also making it illegal to copy the authors work (*Copyright, Designs and Patents Act 1988* 1988). However this is not purely an extrinsic motivator as the author is guaranteed a right to "own" their own work which can be valuable to the author even if they are not named as the author or paid based on

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18. However it is hard to add to experimental contexts so that it would matter to the participants in the same way as pay. Pay is often more salient in experimental contexts.

19. There is a discussion about how to strengthen attributin in future research in the 'improvements to the method' section

20. This might not work after feedback about the individuals relative performance has been received .This could be a contributing factor as to why PRP is less frequently found in long term employment relationships (Eriksson and Villeval 2007). It is also interesting to note how ER and Attribution rights might affect performance in the long term, although it is out of the scope of the current study.

the success of the creation. During the experiment all treatment groups had the right over their individual work meaning that even in the condition with no economic rights or attribution the author still kept the exclusive right to their idea even though the idea itself was anonymous and in economic terms had no consequence. Using this method it is possible to separate the extrinsic factors in the economic rights from the intrinsic factors to see if it is the extrinsic monetary motivation from economic rights which drives creation.

In the experiments the rewards were contingent on performance and relative rank compared to other in the same 5 person group. In the case of the ER group only the individuals own rank and score was known and no other information was given compared to the pay and attribution group where an individuals performance was known to everyone in the group. The two key elements here are reputation, rank dependent pay, and the interaction between the two. The size of the monetary incentive matters, if the pay is not large enough it can decrease the overall production of the participants compared to the control group. Similarly if there is pay the more there is the higher output was found to be (Gneezy, Rustichini, et al. 1998). I would argue that there is no evidence to say the incentives were insufficient as there was no unilateral decrease in production between treatment groups. There was evidence of some strategic decision making to increase quality by decreasing quantity, such as in the divergent task, but no evidence of an overall decrease in production or effort.

5.2 Ideation

The largest difference between the ER and ER and attribution group was the availability of information present when attribution was present. Not only was ones own rank and performance known, like in the ER group, but ones rank relative to others when attribution was present. It also allowed individuals to observe everyone's effort during the task and so there was more information about the other players and their effort. This could explain the consistently larger number of ideas in the economic rights and attribution group compared to the pay group. In the ER and attribution group individuals could be competing for the number of ideas during the task as well as quality after the task compared to the ER group where their ideas are anonymous and so the competition is only for the favour of the judges or market. There is evidence which suggests that if productivity differences are observable then performance related pay has no effect on overall productivity (Breza, Kaur, and Shamdasani 2016). Suggesting that the ability to observe others production can decrease the effectiveness of the external motivator which can help to explain why there is a number of overall ideas being created between groups.

Based on evidence from the statistical analysis from the first of the two creativity tasks the results suggest that the theories forwarded by Boldrin and Levine are closer to explaining the effect of attribution and economic rights on creative output. The number of ideas created in the divergent task, the first of the two tasks, were consistently fewer compared to the control group. Pay was significantly negative and the interaction affect between pay and attribution was positive although the model overall estimated the number of ideas to be less than the control group. This would indeed suggest that pay and attribution [21] whether it be on their own or combined. This coupled with the mostly insignificant effects found in the figural task would suggest that the theories of Bolrdin and Levine were closer to explaining the results.

To say that the results do not support Landes and Posner propositions would not be accurate either. There is some evidence that the attribution and ER in combination increase the number of ideas in the figural task [22] and in the ER group the creativity per idea was higher in the divergent thinking task. This suggests an adaptation to the market by the participants.

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21. although the coefficient for attribution was insignificant

22. In the figural task means are higher in the pay and attribution groups along with there being a large interaction affect between ER and attribution although only significant at around 13%.

The question is however would there be sufficient incentive to create without copyright. To answer the discussion will focus on how the ER and attribution might motivate creators and whether there is evidence that the two incentives operate through different mechanisms.

5.3   Creativity and Subjective Scores

When taking into account creativity and later subjective scores the picture of how ER and attribution and ER on its own affect the agents decisions in the market become a bit more neuenced and so juxtaposing Boldrin and Levine and Landes and Posner is not as straight forward. Especially when taking into account per idea creativity there emerges some patterns of how agents make decisions between quantity and quality. Keeping in mind overall creativity was not significantly different treatment groups and the control [23]. However per idea creativity was larger in the Divergent task for the ER group [24] compared to the control while the interaction affect for pay and ER was negative [25] in the figural task. The similar pattern emerges when observing the subjective scores as the total creativity scores were not significantly different between treatment groups, however the per idea scores did differ.

Admittedly external validity is low in experimental research, however the main aim of this research is to observe if there is a justification to research the issue further or whether there is no evidence of a need for further research. The data suggests that there are interesting effects taking place, namely the effect of ER individually compared to a very different affect when coupled with AR. This not only suggests that attribution and ER could be substitutes in the way they motivate creativity but also seem to suggest they could operate using fundamentally differing mechanisms. The following section will argue that attribution works with mechanisms more closely related to intrinsic motivation while ER on their own work through external mechanisms.

When there is no or low intrinsic motivation economic rights have been found to be effective (new ref) however extrinsic motivators have also been found to crowd out already existing extrinsic motivation (Amabile 2012; Frey 1994; Deci 1971). Thus the paper argues that attribution works to strengthen intrinsic motivation while ER as an works as an extrinsic motivator. And so when the two are combined they work as if they were substituted crowding each other out while on their own they work independently through different mechanisms. Admittedly attribution is not significant in this study however its coefficient, which is non-significant, is estimated with the same sign as ER. When attribution and ER are combined there is evidence they counteract each other. This suggests that individually AR or ER are not significant however when combined AR and ER become is more salient to participants and so the interaction affect is significant even though the individual affects are not.

The results from the creativity tasks are, at least to some extent, supported by the results for the math task. The interaction affect is mostly significant and the coefficient is opposite to the ER for both the overall number of questions answered and the number answered correct. The coefficient for AR is 0 or negative for the total number answered but positive for the total answered correctly. Both ER and AR are insignificant throughout however the coefficients give some indication of the interpretation of the interaction term. The interaction term suggests that the interaction between AR and ER there are some cross effects, meaning that although there is no overall affect of either AR or ER there is a difference between there being AR or AR and ER combined. Suggesting that, irrespective of task, in a market context, there is evidence that AR and ER affect performance through different mechanisms. The math results also seem

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23. although there was a positive interaction affect which suggests creativity was significantly higher for the ER and AR group. Compared to the groups with only AR or ER where the coefficient was negative but insignificant

24. around 13% increase compared to the mean

25. approximatly 11.5% decrease when controls and or session dummies were taken into account

to support the findings of Deci and Ryan where the pair find that pressure to perform drives down performance . They theorise that intrinsic motivation is crowded-out by the existence of an extrinsic motivator (Deci 1971, 1972; Gagne and Deci 2005). However overall the results seem to suggest that, if there is an effect of AR or ER, it is likely due to a cross effect or an opposite effect on performance, creative or in the math task, of AR or ER separately compared to when combined.

In the case of pay and attribution in the figural task the overall quantity was at its highest, however the per idea subjective quality was lower and there is evidence that the per idea creative quality was lower as well. The results also suggest that attribution is worth considering , at least in the creative industries, when studying the impact of monetary rewards in a tournament pay structure. Rosen 1981 suggests that consumers attempt to minimise consumption costs and so seek quality. The paper also theorised that the superstars who earn large rents in winner takes all markets is not necessarily only because of quality but the ability to be efficient and enjoy large rents due to reputation. Interestingly there is some evidence that in the ER group the producers focused more on quality, while in the ER and AR group participants focused on increasing the quality [26]. Thus when ER and attribution or reputation was taken into account participants focused on quality while focusing more on quality when only economic rights were granted.

Results of the overall creativity and overall subjective judgment scores suggest Boldrin and Levine's argument that copyright is inneffective in motivating creation is accurate. However taking into account per idea creativity and the picture becomes more complicated. Per idea creativity scores and per idea subjective scores are both higher in the ER groups but in the attribution and ER group the interaction affect is negative to the point that it negates any positive effects modeled from ER and Attribution. This suggets that Landes and Posners assertion that economic rights are a motivator for creators is not completely off base. The results in this paper suggest that if the extrinsic motivator can be abstracted from attribution then it is likely that the ER would motivate higher quality ideas. Although this effect disappears when attribution and ER are combined. The effect of attribution and long term reputation effects would be a possible extension to the existing literature which would allow the possibility to observe how ER and attribution interact when reputation can be monetised. This study should not be taken as a study of copyright per se, but rather a juxtaposition of ER and Attribution as an incentive for creation, and so there is an abstraction from the strict concept of copyright. However the results presented do shed light on how attribution and ER interact and so help to understand what exactly might motivate creators.

5.4 Feedback and Differences Between Tasks

The two tasks are different in nature but mechanically the same and so the feedback from the first task can influence decisions in the second task. The number of ideas for the two ER groups being lower in the divergent task but higher in the figural task could be that the participants felt pressure and a creative "block" and settled down the next round. If this was the case there is no evidence that it affected the difference in how individuals acted between the two ER groups from one task to the next.In addition there could be three possible reasons for the differences between tasks.

1. Due to differences in the tasks themselves.
2. Due to a reaction to the feedback from the market after the first task.

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26. This is found in the figural task for per idea subjective judgements and the divergent task for per idea creativity scores. There is also a higher number of ideas created in the ER and AR group compared to the ER group in both tasks

3. Learning Effects.

The tasks are conceptually different and will be treated as such, however they are close enough mechanically to be able to make some conjectures about how individuals reacted to the feedback from the market. This is especially true as it is unlikely that individuals in different treatment groups reacted differently to the change of tasks compared to the conrol group. To be unable to make even a weak conjecture about the reaction to feedback would mean that there was a fundametal difference in how individuals understood the task between treatment groups which is unlikely as the tasks were relatively simple in nature.

If learning effects were consistent between treatment groups there would be no problem, if the learning effects were asymmetric then it would be tough to separate if the differences in participant performance between tasks are due to learning effects or something else. Unfortunately it is not directly possible to observe the learning effects on their own and so it is hard to definitively say if the differences are due to learning effects or other factors. However it is possible to say that it is very unlikely that the learning effects between groups were asymmetric. What would fall under learning effects would be factors, such as, the difference in speeds that people inputted information or how they understood the task in general. There are differences between groups in the number of ideas created for example but there is also evidence of a trade-off between quantity and quality which makes it more likely that the differences between tasks were due to reactions to market feedback than a difference in learning.

In future research the aim will be to be able to change the order the participants receive the tasks however this was not logistically viable at the present time. The reason is that it would of required a session size of, at least, 40 individuals i.e. 2 sets of groups of 5 for each of the 4 treatments which was a logistic hurdle which was too risky given the capacity to recruit art students specifically. In the future I hope to work closely together with arts schools in order to be able to secure a larger session size consistently.

6 Improvements to the Method

There are two major improvements that can be implemented in the study, one is that pay can be much higher and even more unequal thus mimicking the pay structure of the creative industries more accurately, however this can be very expensive. The effects of attribution could also be strengthened by having participants be split into groups and then asked to introduce themselves and talk a bit about their interests etc., after being split into groups. This would allow people in a group to be more familiar with each other and make any effects from attribution stronger.

It would also be worthwhile to decrease the size of the groups in order to increase the number of group observations with a given number of participants but also to decrease the time taken in the similarities round. Decreasing the total time taken in the experiment is crucial as it helps to keep people engaged and increases the hourly wage for the participants making the incentive more powerful.

Althought there was evidence that attribution did have some effects when coupled with ER the effect could be strengthened by introducing more concrete ways of attribution. The study could be repeated after a week with the same individuals for example, or have the results of the best and worst performers posted on a school twitter or facebook account. A downside to this method is that it could be tough to receive ethics approval using this type of attribution.

7   Conclusion

Results for overall creativity and subjective judgment is support for Boldrin and Levine's argument of copyright not affecting performance. In contrast per idea creativity is often higher with economic rights and in some cases attribution which would support the Landes and Posner assertion that copyright does provide an incentive for creators. However the results do not support a claim that without copyright there would be inefficient incentive to create. There is also evidence that ER an AR operate through different mechanisms as the interaction affect is often an opposite sign with the coefficient large enough to negate any individual affects from attribution or economic rights. The results presented supplement existing literature on copyright thresholds (Buccafusco et al. 2014) and the value of attribution (Sprigman, Buccafusco, and Burns 2013) and investigated how attribution and economic rights interact. Importantly the research builds on existing research and investigates how the rights interact with each other in a market setting. This is important as previously attribution and copyright thresholds have been studies separately and so the presented research allows for market factors to be taken into account when observing the effects of economic and attribution rights. The research does has its limitations and so the aim of the research is to observe whether economic and attribution rights affect creativity and if so whether it is worth researching in the future. Future research could mitigate the low external validity by combining lab experiments with field experiments and so gather a wider range of data. The next step of the research is to take the findings of how attribution and economic rights interact and test these findings with field work using working artists. Overall the results would suggest that what the market promotes is more influential compared to what copyright law might promotes in influencing creators decision making.

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8 Appendix

8.1 Controls

Controls Used in All Regressions

Variable	Reason	Cite
Creative Efficacy	Confidence can correlate with creativity	Bandura (2006)
Risk Taking Behaviour	Risk attitudes correlate with pay preferences	Niederle and Vesterlund (2007)
Ambiguous Risk	Creative Market exibit ambiguous risk	Charness and Grieco (2014)
Handedness	Left handedness associated with creativity	Wolman (2012), Coren (1995)
Creative Family	Environment has a large effect on creativity	Hennessay (2010), Abbing (2010)
More in Creative Fields	Do people think they can make more in arts?	Abbing (2011)
Famous Due to Art	Do people want to become famous due to art?	Abbing (2011)
English Speaking	Performance can depend on language skills	
Age	Age can affect creativity	
Institution Dummy	Environment has a large effect on creativity	Hennessay (2010), Abbing (2010)
Art Hobby Dummy	Can be a proxy for intrinsic motivation	

8.2 Multicollinearity Checks

The VIF or variance inflation factor test was used to test for multicollinearity i.e. a VIF over 2.5. There was high multicollinearity in some session dummies and the interaction term between ER and AR. The multicollinearity in the interaction term (AR & ER) can be ignored as the multicollinearity does not affect the p-values. Also the collinearity in the session dummies can be ignored as they are not variables of interest.

Table 8: VIF For all Controls When Regressed Against Total Creativity

Variable	VIF	1/VIF
Economic Rights (ER)	2.26	0.44208
Attribution Rights (AR)	2.18	0.459513
AR \& ER	3.27	0.305454
Male*	1.13	0.882681
Creative Efficacy Score	1.12	0.895425
Creative family Members*	1.09	0.918787
englishspeaking*	1.14	0.877044
Risk Aversion	1.09	0.918026
Willingness for Ambiguous Risk	1.14	0.877584
Righthanded*	1.61	0.622374
Prefer to be Famous*	1.11	0.898809
Earn More in Creative Industries*	1.17	0.856625
Artshobby*	1.28	0.77854
GSA*	1.41	0.710972
Session 1*	2.32	0.431188
Session 2*	2.47	0.404466
Session 3*	1.88	0.532519
Session 4*	2.21	0.451509
Session 5*	1.86	0.537168
Session 6*	2.54	0.394101
Session 7*	1.88	0.532972
Mean VIF	1.72	

* Denotes dummy variables

8.3 Random Allocation Check

Table 9: Correlation Between Treatment Groups and Individual Charasteristics

	Treatment Group
Treatment Group	1
Age	-0.05
Male	0.1173
Institution	-0.0099
Year of Degree	0.0288

There is a relatively strong correlation between being male and being in a group with economic rights.

8.4 Pre Experiment Survey

Entry Survey

N.B. The participants will see this in a program with dropdown menus and proper examples and so it is visually easier to understand. The participation in this experiment and questionnaire

is optional and the participant can withdraw at any point, no questions asked. It should take around 5 minutes to complete. All information will be kept confidential and is for research purposes only. Your answers matter to us and help improve our research.

1. Age = ⎯⎯⎯⎯⎯⎯⎯

2. Gender Identification = ⎯⎯⎯⎯⎯⎯⎯⎯⎯

3. Do you think you are more creative than 80% of your fellow art students the room? (yes/no) ⎯⎯⎯

4. Year of current Degree = ⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯

5. If you had to choose between being rich or famous as a result of the art you create, which would it be?
   a. Rich
   b. Famous

6. Do you think you are more creative than 50% of your fellow art students the room?
   a. Yes
   b. No

7. Imagine you are presented with the opportunity of taking part in a coin toss. You are given six different options for how you will be paid depending on if it is heads (low) or tails (high). Which option would you choose? (choose only one)

Choice of outcomes	50% Low	50% High
Option # 1	£28	£28
Option # 2	£24	£36
Option # 3	£20	£44
Option # 4	£16	£52
Option # 5	£12	£60
Option # 6	£2	£70

8. Imagine that tomorrow you are seeking a job outside the arts, for example, accountant, social worker. Please use the following scale to indicate your confidence from 0 to 100 in relation to each question.

0	10	20	30	40	50	60	70	80	90	100
Cannot do at all					Moderately Can do					highly certain can do

	Confidence (0-100)
Requesting a job application form.	⎯⎯⎯
Completing a job application form.	⎯⎯⎯
Producing a curriculum vitae (CV).	⎯⎯⎯
General interview skills.	⎯⎯⎯
Oral self-presentation at the interview.	⎯⎯⎯

Meeting new people. _____

Contributing to a work related meeting or discussion. _____

Working with a team. _____

Working on your own. _____

Career progression. _____

9. Please use the scale to answer how confident you are about the following statements. Assume the maths being referred to consist of only addition, subtraction, multiplication, and division problems.

0	10	20	30	40	50	60	70	80	90	100

Cannot   Moderately   highly certain

do at all   Can do   can do

Confidence (0-100)

I'm confident that I can do an excellent job on my maths tests. _____

I'm Certain I could understand the most difficult material
presented in math textbooks. _____

I am confident I can do an excellent job on my math assignments. _____

I am certain I can master the skills taught in my math class. _____

I'm confident I can understand the most difficult material presented
by my math teacher. _____

10. Please use the following scale to answer how confident you are about the given statements.

0	10	20	30	40	50	60	70	80	90	100

Cannot   Moderately   highly certain

do at all   Can do   can do

Confidence (0-100)

I feel that I am good at generating novel or innovative ideas. _____

I am good at finding creative ways to solve problems _____

I have confidence in my ability to solve problems. _____

I have a knack/skill for further developing the ideas of others. _____

I feel that I am more creative than others on my course. _____

8.5 Post Experiment Survey

Exit Survey

The participation in this experiment and questionnaire is optional and the participant can withdraw at any point, no questions asked. All information will be kept confidential and is for research purposes only. Your answers matters to us it would be appreciated if you would take the time to answer all questions.

11. Do you have any siblings or close family members working in the creative industries (movies,

tv, writer etc.)?

_____

12. Have you been to an art school before the institution you attend now?
    a. Yes
    b. No

13. Have you gone to a Steiner School or a Waldorf school? _____

14. Do you think you could make more money in the long run if you chose a field outside of the arts (for example, student of non-arts or an alternative career) compared to a career in the arts (painter, musician, etc).
    a. Yes
    b. No

        14b. If yes, give your best estimate of how much more do you think you could earn per year in pounds? _____

15. Please list any previously earned graduate/university level degrees.

_____

16. How satisfied are you with your overall performance in the experiment?
    a. Very satisfied
    b. Satisfied
    c. Quite satisfied
    d. Quite unsatisfied
    e. Unsatisfied
    f. Very unsatisfied

17. Which country and city did you grow up in until you were 18? (please indicate country or countries along with an approximate postcode)

_____
_____
_____

18. Assuming you gain £200 would you prefer to... (Choose the preferred answer)
    a. Have a 50% chance of receiving £300 and a 50% chance of receiving £100
    b. Have a 50% chance of receiving £400 and a 50% chance of receiving £0
    c. Have a 10% chance of receiving £1500 and a 90% chance of receiving £0
    d. Stay at £200

19. Assuming you could risk up to £100 but the probability of winning would be unknown, how many pounds of the £100 would you be willing to risk? _____

20. Which would you prefer?
    a. Receive £180 with a 100% probability
    b. Have a 50% of winning £400 and a 50% of receiving £0

21. How much fun did you have or how much did you enjoy the experiment from a scale of 1-10? (1 being the least possible enjoyment and 10 being the most possible enjoyment) _____

22. Are you right handed, left handed, or ambidextrous? _____

23. What are your hobbies or an activity in which you spend 5 or more hours a week (for example a sport or club or society you belong to)?

_____

24. Assume you have £200 and had the chance to risk £5 to have a 50% to win £10, would you either...
    a. Stay at £200
    b. 50% chance of gaining £5 (to have a total of £205) and a 50% of losing £5 (To have a total of £195)

25. How fair did you find the rewards in the experiment?
    a. Highly unfair
    b. Unfair
    c. Quite unfair
    d. Quite fair
    e. Fair
    f. Very fair

26. Would you wish to change places with any other participant in the experiment, assuming you put in the same effort as they did for the pay they received?

_____

8.6   Creativity Instructions

Judgement criterion for both tasks

In the excel file given task 1 is market as "0" in the task column and task 2 is market as "1". Each participant participated in both tasks but there is one case in session 7 where an individual only submitted ideas for the second of the two tasks.

Please go through one task at a time, it will make the process easier and clearer.

After each individual there is a table with the 4 criterions Flexibility, Originality, humour, and sarcasm. The scores can be inserted into the cells of the table when you are finished. How exactly each criterion will be scored will be explained next.

I will also ask you to rate your favourite ideas from the two tasks by giving them stars from 5 (the most) to 0 (if you feel the ideas do not warrant stars). Not all individuals need to receive stars and there is no minimum or maximum amount of stars that need to be given. If you think the idea is very good, or one of your favourites put a 5, then 4 for ideas which are almost as good, etc. The scale from 5-1 stars is supposed to be a simple scale to show how much you like an idea. If the idea does not warrant a star simply leave a 0 or leave the cell blank. At least half of the cells should be blank, i.e. at most only half of the ideas get some stars. These should not be distributed individually, meaning that some individuals could have stars for every idea while others receive none. Simply put the amount of stars you think an idea should have into the cell which is highlighted in green. This is to speed up the scoring process and also to add some meaning to the stars. Remember this judging process is anonymous. No one will receive feedback from what scores they received.

In "sheet 2" in the excel file sent there is a table where you can fill in the scores for criterions Flexibility, Originality, humour, and sarcasm. You also received the printouts of the ideas separated by session and task, it might be easier to judge the 4 criterion using the paper but please fill in the excel table when you are finished scoring.

Flexibility

It will be scored by observing how many categories, from the ones listed, the ideas from each individual fall into. Note you have been given a file which has the creator identifier code, the task and the title and the description of the ideas. The fluency categories are different for the two tasks but there are 7 in total for both. If there is an idea which might not fit into any category perfectly see where it might fit in the best. The maximum the fluency score can be is 7 and the minimum is 0 but only if there were 0 entries. If there was one entry then the fluency score will also be one. The aim is to see how many different categories the individuals ideas fit into. If every idea the person entered fitted into the weapon category their flexibility score was 1. If the ideas fit into "weapon" and "decorative/beauty item" then the flexibility score would be 2. Thus the maximum different categories the ideas can fit into is 7 and the minimum 0 (only if 0 ideas are submitted).

Flexibility = How many categories are represented by the individuals ideas You are given 7 categories.

Divergent Task Flexibility Criterion
1. Weapon (Item which is used to hurt or gain control over another)
2. Decorative/beauty Item (including items such as Knick knacks, art objects)
3. Stationary or adhesive (stapler, paper weight)
4. Household item (shoe horn, camera holder, pin)
5. Medical item (stress relief, prosthetic limb, ear piercer)
6. Coping tool (printer, printing press, stamp)

Task 2 Flexibility Criterion

1. Non-animal Nature (includes maps, views of nature and descriptions of nature)
2. Life (includes humans, animals, insects etc.)
3. Food (reference to foods)
4. Feeling, Emotion or theory (humanising or representation of a situation feeling, or ideas of the object)
5. Aesthetic piece painting or design (includes art works, designs, or reference to clothes)
6. Household objects (includes references to things like yarn, rope, or pipe)
7. Formations or Markings (stains, markings, signatures)

Originality

Example definition of Originality = "The ability to think independently and creatively". Simply put down the number of original each participant had.

Humour

Example of a definition of humour = "The quality of being amusing or comic, especially as expressed in literature or speech". Simply put the number of ideas which were humorous or

used humour as a devise to distinguish the idea etc. The minimum score is 0 and there is no set maximum, however the humour score cannot be more that the number of ideas the participant entered. If there are, for example, 5 ideas and none of them use humour then the score would be 0.

Sarcasm

Example of the definition of sarcasm = "The use of irony to mock or convey contempt". Insert the number of ideas which used sarcasm the description or title of the idea. The minimum score is 0 and there is no set maximum, however the sarcasm score cannot be more that the number of ideas the participant entered. If there are, for example, 5 ideas and none of them use humour then the score would be 0.

8.7 Experiment Intructions for Groups Without Economic Rights (ER) and Attribution Rights (AR)

Figure 5: Experimental Structure(No ER or AR)

Experiment Structure

Welcome to the experiment. The following lays out the structure of the experiment and the basis on which you are to be paid for taking part in it.

The experiment will consist of 3 tasks. The first two tasks are 'idea generation' tasks undertaken in groups of 5 people: each task consists of 3 stages – In the order shown below. The final task will be completed individually.

1.Task Completion Stage: You are asked to generate ideas based on the instructions provided.

2.Similarities Stage: At this stage you will evaluate whether the entries from another group are similar. Likewise yours will be evaluated by another group.

3.Favourites Stage: You are asked to rate the ideas produced by another group. The pay each participant receives depends on the number of stars received. Most stars → highest rank → highest pay.

Final Task: You are asked to answer a series of questions. Your pay will depend on the number of correct answers relative to others in your group.

Attribution: Your ideas will remain anonymous to everyone

Pay: You will be paid £8.49 from completing all tasks.

I'm ready

Figure 6: Figural Task (No ER or AR)

Figure 7: Similarities Instructions (Same for Both Tasks and All Treatment Groups)

Instructions for Similarity rounds

This round is completely anonymous and will not affect your pay.

A list of ideas will be shown and you are to judge whether any two are similar. If a similarity identified more than once, the later entry will be disregarded in following stages.

Similarity guidelines:

1. Ideas are exact copies of each other.

2. Idea is largely expressed in an existing entry.

Ideas should be originally expressed and not be simply rewordings of each other

Example:

The following is a similarity judging example, but the final decision is up to you. Consider the task: "come up with alternative object for a coat hanger":

| 1. | **Back Scratcher** | Similar to: | 2 ⌄ | ⌄ |
| | Bent to scratch the back | | | |

| 2. | **Leg Scratcher** | Similar to: | 1 ⌄ | ⌄ |
| | Bent to scratch the leg | | | |

| 3. | **Reaching tool** | Similar to: | ⌄ | |
| | Moulded in order to reach high places | | | |

· 1 and 2 express the same idea similarly and are seen as similar.

· 3 expresses a similar idea differently and so is not similar to the first two.

I'm ready

Figure 8: Similarities Instructions (Same for Both Tasks and all Treatment Groups)

Favourites rounds

You will be asked to name your 5 favourites ideas by giving them stars.

You will be completely anonymous when giving stars.

The amount of stars an individual receives for his/her ideas will determine his/her rank within their group.

| 1. | **Reset button pressing tool** | ☆ ☆ ☆ ☆ ☆ ✕ |
| | A tool that can be used to press reset buttons which cannot be pressed with your fingers | |

I'm ready

Figure 9: Participant Results (No AR and ER)

Results Summary

Here you can see you performance with respect to ther other participants within your group:

Rank	Participant	Stars	Score
1	Jaakko Miettinen	✪ 0 ✪ 1 ✪ 0 ✪ 1 ★ 0	6

Continue

8.7.1 Experimental Structure(ER)

Figure 10: Experiment Intructions For Groups with Economic Rights (ER) and Attribution Rights (AR)

Experiment Structure

Welcome to the experiment. The following lays out the structure of the experiment and the basis on which you are to be paid for taking part in it.

The experiment will consist of 3 tasks. The first two tasks are 'idea generation' tasks undertaken in groups of 5 people: each task consists of 3 stages − In the order shown below. The final task will be completed individually.

1.Task Completion Stage: You are asked to generate ideas based on the instructions provided.

2.Similarities Stage: At this stage you will evaluate whether the entries from another group are similar. Likewise yours will be evaluated by another group.

3.Favourites Stage: You are asked to rate the ideas produced by another group. The pay each participant receives depends on the number of stars received. Most stars → highest rank → highest pay.

Final Task: You are asked to answer a series of questions. Your pay will depend on the number of correct answers relative to others in your group.

Attribution: Your name will appear next to your ideas

Pay: Your pay is based on your relative performance within your group for all tasks:

1. £5.55 − Highest ranking participant

2. £2.1

3. £1

4. £0.5

5. £0 − Lowest ranking participant

I'm ready

8.8 Instructions for Attribution Rights (AR) and Economic Rights (ER) group

Figure 11: Divergent Task (AR and ER)

Figure 12: Results (AR and ER)

Results Summary

Here you can see you performance with respect to ther other participants within your group:

Rank	Participant	Stars	Score	Pay
1	John Mayor	⋆⋆ 1 ⋆⋆ 0 ⋆⋆ 0 ⋆ 0 ⋆ 0	5	£5.55
2	Dave Matthews	⋆⋆ 0 ⋆⋆ 1 ⋆⋆ 0 ⋆ 0 ⋆ 0	4	£2.1
3	Lionel Richie	⋆⋆ 0 ⋆⋆ 0 ⋆⋆ 1 ⋆ 0 ⋆ 0	3	£1
4	Elton John	⋆⋆ 0 ⋆⋆ 0 ⋆⋆ 0 ⋆ 1 ⋆ 0	2	£0.5
5	John Legend	⋆⋆ 0 ⋆⋆ 0 ⋆⋆ 0 ⋆ 0 ⋆ 1	1	£0

Continue

8.9 Signals

The code for the program was written to take all the information about the favorites given. However there was a problem with the code and the full amount of information was not taken into account. This means from all the favorites given only a random few were taken into account by the code when calculating results. The way the code picked up information was random however it caused people to receive incorrect signals. There was no evidence of differences how people reacted to the signal between people who received the correct signal and people who received the incorrect signal. That is to say there was no difference how people reacted to the signal regardless if it was not the signal of popularity they were originally supposed to receive.

Below are some basic statistical analysis of how people reacted to the signal.
Let differentrank0 Be the group of people who received the correct signal.
Let differentrank1 BeBe the group of people who received the incorrect signal.

The Mann-Whitney Test will be used to see if distributions are statistically different from one-another.If the test is significant then the distributions are statistically different from one another.

8.9.1 Number of Ideas

The differences by treatment group are reviewed. I will start with the number of ideas created in the control group control group.

8.9.1.1   Control Group

Divergent Thinking Task
Mean for the differentrank0 is 6.2.
Mean for the differentrank1 is 7.625.
Ratio = 0.813 Mann-Whitney Test:
z-value = -1.927
p-value = 0.0540

Figural Thinking Task
Mean for the differentrank0 is 8.93.
Mean for the differentrank1 is 9.79.
Ratio = 0.912
Mann-Whitney Test:
z-value = -1.200
p-value = 0.2303
There seems to be some difference between the difference in the distribution but it is not conclusive this difference is because of the difference in signals since the ratio of the difference is relatively close. We would need to observe other treatment groups.

8.9.1.2   AR Group

Divergent Thinking Task
Mean for the differentrank0 is 6.551724.
Mean for the differentrank1 is 6.25.
Ratio = 1.048
Mann-Whitney Test:
z-value = -0.204
p-value = 0.8380

Figural Thinking Task Mean for the differentrank0 is 9.896552.
Mean for the differentrank1 is 9.05.
Ratio = 1.093
Mann-Whitney Test:
z-value = 0.329
p-value = 0.7422
No evidence that there is a change in behaviour after the differences in signals in the attribution group (AR).

8.9.1.3   ER Group

Divergent Thinking Task
Mean for the differentrank0 is 6.133333.
Mean for the differentrank1 is 5.95 .
Ratio = 1.03
Mann-Whitney Test:
z-value = -0.204
p-value = 0.8380

Figural Thinking Task
Mean for the differentrank0 is 9.733333.

Mean for the differentrank1 is 10.75.
Ratio = 0.095
Mann-Whitney Test:
z-value = 0.339
p-value = 0.7349
No evidence that there is a change in behaviour after the differences in signals in the attribution group (ER). The ratio does go from positive to negative however the ratio is close to 1 both times.

8.9.1.4   ER and AR Group

Divergent Thinking Task
Mean for the differentrank0 is 5.52.
Mean for the differentrank1 is 7.5 .
Ratio = 0.736
Mann-Whitney Test:
z-value = -1.749
p-value = 0.0802

Figural Thinking Task
Mean for the differentrank0 is 9.24.
Mean for the differentrank1 is 12.55.
Ratio = 0.736
Mann-Whitney Test:
z-value = -2.297
p-value = 0.0216
No evidence of differences in behaviour between signal groups.Incorrect signal groups had more ideas in both tasks (ration is 0.736 in both). Even though the distributions for the number of ideas between the two signal groups the ration of ideas between tasks is the same between signal groups in both tasks is similar and so no evidence of differences in how signals affected performance

8.9.2   Creativity Socre Per Idea

8.9.2.1   Control Group

Divergent Thinking Task
Mean for the differentrank0 is 1.33.
Mean for the differentrank1 is 1.19.
Ratio = (1.33/1.19=1.11)
Mann-Whitney Test:
z-value = 1.613
p-value = 0.1068

Figural Thinking Task
Mean for the differentrank0 is 1.49.
Mean for the differentrank1 is 1.33.
Ratio = (1.49/1.33=1.12)
Mann-Whitney Test:
z-value = 2.038
p-value = 0.0415

No evidence of different direction effects, Both distributions are different at 10%m and 5% before and after the signal. The ratio before and after is almost identical (1.33/1.19=1.11),(1.49/1.33=1.12).

8.9.2.2 AR Group

Divergent Thinking Task
Mean for the differentrank0 is 1.29.
Mean for the differentrank1 is 1.19 .
Ratio = (1.29/1.19=1.59)
Mann-Whitney Test:
z-value = 0.998
p-value = 0.3183

Figural Thinking Task
Mean for the differentrank0 is 1.46.
Mean for the differentrank1 is 1.45.
Ratio = (1.46/1.45=1.01)
Mann-Whitney Test:
z-value = 0.397
p-value = 0.6915
No evidence of different direction effects, according to the Mann-Whitney test both distributions are statistically different. (1.29/1.19=1.59),(1.46/1.45=1.01) there is a difference in the ratios before and after the signal however according to the Mann Whitney Test both distributions before and after are still statistically not different from each other.

8.9.2.3 ER Group

Divergent Thinking Task
Mean for the differentrank0 is 1.389372.
Mean for the differentrank1 is 1.303177 .
Ratio = 1.07
Mann-Whitney Test:
z-value = -0.545
p-value = 0.5855

Figural Thinking Task
Mean for the differentrank0 is 1.52899.
Mean for the differentrank1 is 1.354894.
Ratio = 1.13
Mann-Whitney Test:
z-value = 0.723
p-value = 0.4696
Different of effect from divergent to the figural task. However they are not Statistically different from each other in either task. The ratios before and after are also similar in both tasks.

8.9.2.4 ER and AR Group

Divergent Thinking Task
Mean for the differentrank0 is 1.30.
Mean for the differentrank1 is 1.28.
Ratio = (1.30/1.28=1.01)

Mann-Whitney Test:

z-value = 0.686

p-value = 0.4927

Figural Thinking Task

Mean for the differentrank0 is 1.47.

Mean for the differentrank1 is 1.24.

Ratio = (1.47/1.24=1.185)

Mann-Whitney Test:

z-value = 2.514

p-value = 0.0119

Some evidence of different direction effects. Statistically different distributions in figural task but not divergent task but the group with different signals had consistently lower scores before and after the signal (1.30/1.28=1.01)(1.47/1.24=1.185). However the number of ideas were also significantly different between groups. This could explain the significant different creativity scores per idea.