

Creative Output in a Market Context

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Abstract

The paper will present experimental results discussing how creativity is effected by the existence of economic and attribution rights. The results are discussed in the context of arguments regarding the ineffectiveness or effectiveness of copyrights by Bouldrin and Levine and Landes and Posner respectively. The results for overall creativity and subjective judgments suggest Boldrin and Levine are correct in arguing that copyright does not motivate creativity. However taking into account the per idea scores suggest that, on average, ideas were more creative and subjectively better in the groups with anonymity and economic rights. However when attribution and economic rights are this effect is, depending on the case,

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

- Oscar Wilde

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1 Introduction

There are two arguments the author will be focusing on are arguments by Landes and Posner and Boldrin and Levine. Both pairs of authors have a series of papers which bring forward their theories on the role and effectiveness of copyright. Landes and Posner argue that without copyright there would be inefficient incentive for artists to create (W. M. Landes and R. A. Posner 2002). They also state that the point of copyright is to maximise creating 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 (Bandura 2006). It is important to note that the paper refers to copyright but the paper can be viewed in the wider context of innovation literature. 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, Millar, et al. 2010; Eisenberger, Haskins, and Gambleton 1999).

The paper will review the effectiveness of economic rights and attribution 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 copyright on creativity and how these results might contribute to existing theories regarding copyright. Before the paper delves into the arguments presented, some basic concepts will be clarified. Economic rights is a legal concept which refers to the rights a creator receives, in the context of copyright. In the experiment these economic rights are mimicked by allowing ownership of submission in a market so that the creators pay 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. How exactly this mechanism will work in the experiment will be presented in the methods section. Economic right will simply be referred to as 'ER'. 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 is to name the author of each submission so that it is public knowledge who came up with which idea and when.

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 it has even been alluded to as a faith based system compared to an evidence 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 papers which focused on the effects of monetary incentives and creativity thresholds on creative performance. The paper found that monetary incentives are more effective in high threshold conditions or when the creative standards in order to gain a pay-out are significantly higher (Buccafusco et al. 2014). What this means is that monetary incentives are more effective the harder it would be to gain a copyright or the higher the creative standards in order to gain economic ownership of an idea.

The authors of the previous paper wrote an earlier paper about how authors value attribution. The paper found that it matters if attribution is granted as a default compared to if the author needs to bargain for it when selling their work. The authors found that artists were willing to take a lower price to gain attribution but 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 it would suggest 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 is the market producing what it socially optimal and are the 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?

1.2 What is Creativity?

Creativity can be defined in many different ways but for simplicity I will define it as: something new and novel or a new and novel way to solve a problem (Batey and Furnham 2006). When referring to creation it is the number of new creations produced. It should also be noted that the creativity tests mentioned later in the paper will have their own objective measure of creativity which has been created specifically for the test and has been found to be robust by the authors of the tests.

1.3 Why is Creativity important in an innovation Context and Copyright Context?

To fully understand why creativity is important in a copyright context we have to go back to the beginning of copyright and the justifications for the creation of it.

The core argument being that the more creative individuals are the more quality works will be created, thus the key of is for copyright law to promote creativity to serve it's original purpose. If there is significant evidence to the contrary or if there is significant evidence to suggest economic rights or attribution have no effect on creativity then it would suggest that copyright law might not be serving its purpose. However if there is evidence to support the claim that economic rights or attribution are a positive influence on creation and creative performance, then it will be important to continue to support these rights. The papers aim is to contribute to existing literature on motivation by studying whether economic rights and attribution affect creation and creativity but also how the rights might affect creation and creativity. It is also worth stating that the aim of this paper will not provide definitive answers about the effectiveness of copyright law or the rights studied but to contribute to a conversation which lack empirical evidence.

2 Conceptual Framework

This section will be to introduce the conceptual framework of the paper and add context to the paper and how it is studying the phenomena of creation in a market context. The creative marketplace will be discussed from the perspective of the creators decision making in the market and what aspects of the market influence this. The market conditions will be juxtaposed with conditions where creators do not take part in the market in order to introduce the market place and how it affects the artists decision making. Finally the concept of creativity will be introduces, defined, and explained in terms of why it is important in copyright research. This section is designed to give a conceptual framework to the experiments described in the method section and to introduce the market structure of the creative industries which are being mimiced in the experiment.

2.0.1 The Agent

Each agent in the market is concerned with both the quantity and quality of output if they feel that success in the market is important. Market success can be defined by two factors fame and pay, 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 is important. When the quantity produced is higher there is more product to sell to potential buyers but also potential for more exposure and notoriety. However if the quality of the production is poor no one will be willing to buy or stock the creative product. There is a strategic decision to make between quantity and quality because they cannot be increased to infinity, that is to say there are constraints which limit the quality and quantity of work. For example, in the experiments that were conducted experiments there was a time limit of 5 minutes. In a non-experimental and experimental setting the two Individuals constraints of focus will be ability or talent and effort. There can only exert some maximum level of effort which an individual puts into their creations. They will be constrained not only by cognitive constraint of effort but also constraint, such as, fatigue, loss of focus or the need to carry out other essential activities. Let us assume talent, or some relative measure of skill that individuals have, is exogenous. Therefore even though past experiences, environments, and decisions have shaped talent, talent cannot be changed instantly.

2.0.2 Personal versus Market Incentives

So there are two simple scenarios to consider. A Scenario without a market where individuals create to satisfy themselves and their own need/want to create and the other a scenario where there is a market is considered where individuals compete for external rewards from fame/notoriety and monetary rewards/pay. Based on the quantity and quality of their outputs they gain some popularity which in turn is a large factor in their overall market success, this market success can be in the case of notoriety or monetary rewards. This means that through market success agents can either enjoy the benefits of being known to be the best i.e. notoriety, they benefit from the highest monetary rewards, or both.



Figure 1: Actions and Consequences

The constraints shape the decision making of the agents quantity quality decision making and so have effect on the popularity and their market success of their output. Individuals also have some costs for creating, which in the context of the experiment are effort costs but for the purposes of a wider reach of the model can also include costs for materials or even opportunity costs. Thus the factor of interest is how the quality and quantity of the agents creations change in different conditions will. It is also important to recognise the environment which the creators choose their effort level given some talent. 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 other producers. Each producer will thus have some beliefs about how talented others are and how much effort others in the market are exerting. Thus each agent will have some expectations about the probability of their own success based on the beliefs of their relative talent and effort. Further we can think of there being some threshold probability of success which determines if an individual exerts effort. If the probability is below a threshold level, then they will not exert effort. If the probability of success is above some threshold level then the individuals will exert effort. This threshold could be influenced by risk attitudes, confidence, and upbringing for example. It can be also thought that there is not a threshold probability of success but some threshold expected utility which dictated the choice of each producer to exert effort or not.

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 in the University of Glasgow in the experiment. 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. The decision to use art students was to increase accuracy when substituting creators in the market with art students compared to business school students or engineering students.

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

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. Torrance (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. For the task itself they were asked to come up with alternate objects to a stapler. 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.

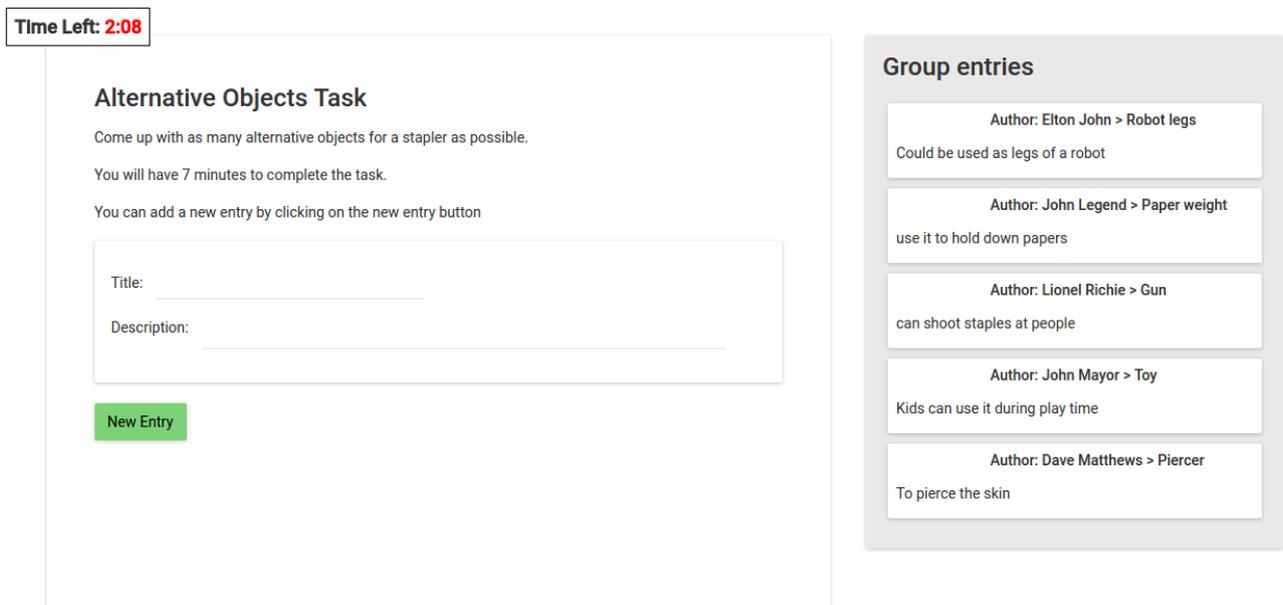


Figure 2: Screen Shot of the Divergent Task

The image shows what the participants 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 were be sent to another randomly generated group whose ideas were then sent to another group. When all of the groups have received ideas from other groups they will be asked to mark ideas which are similar to other already existing ideas within the list given to them. The participants will be given instructions how to judge similarity and they will be primed into a copyright frame. That is they will be given directions on how to judge similarity similar to 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. The similarity judging will be completely anonymous and will not affect how the judge's ideas will be judged by others. The creators of the ideas will not know which ideas were voted as similar and discarded.

3.6 Mechanism of Deciding Popularity

The ideas that remain after the rights enforcement round will be judged based on the preferences of the person judging the ideas and so is purely subjective. Each participant will be given the

opportunity to give stars to their favourite ideas from the list previously shown. Each group judges another groups ideas anonymously similarly to when rights were being enforced. This is designed to mimic how popularity of a song or book is decided in market conditions since most purchase decisions in creative industries are largely subjective. There is complete anonymity and only the ideas and the descriptions of the ideas will be shown with no indication of whose idea is which regardless of treatment group.

3.7 Winner-Takes-All Pay Structure of the Market

The pay structure for the ER group is shown below and has been 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 inner-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 the food served after the experiment. The below is the pay structure for each separate task, meaning that the maximum earnings are $£5.55 \times 3 + £3 = £19.65$ and the minimum earnings are £3.

1. £5.55
2. £2.1
3. £1
4. £0.5
5. £0

The more stars an idea or group of ideas were the more popular it was. For example, 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 were 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.

3.8 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.

3.8.1 Control Group

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

3.8.2 Attribution Rights

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

3.8.3 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.

3.8.4 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 will see other participant's ideas but 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. Groups 2 and 3 will have economic rights meaning they earn money based on their performance in the tasks. When results are shown, in the treatment groups with attribution, everyone in the group will be ranked from 1st to 5th based on their performance their name and their performance will be seen by everyone in the group in the results. Thus everyone will know how well they did 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.

3.9 Survey

The survey given to participants of the experiment will be split into two surveys, one before the experiment and one after. This will allow 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; Bandura 2006; Tierney and Farmer 2011; Tierney and Farmer 2002) measures the confidence a person has regarding a skill, in this case, creativity, math and job search 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 Stähle 2013).

3.10 Measuring Creativity

The criterion used to judge creativity for both the figural and the divergent thinking task are fluency, flexibility, and originality. 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. Finally originality is the ability to generate ideas away from the obvious and common place. The author has used a subjective measure of novelty compared to a more commonly used statistical rarity measure to measure originality¹. All of the three criteria have been found 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, Millar, et al. 2010; Runco 1986; Charness and Grieco 2014; Moore et al. 2009) The author has also added humour as a fourth variable in order to capture 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 will be 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 judgement 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 judgement of all the ideas from both tasks by giving them anywhere from 5 to 0 stars. subjective judgements 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 were given if they did not like the idea and anywhere from 5-1 stars 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.

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 or market performance. 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

¹The specific instructions can be found in the appendices added at the end of the paper

effective economic rights and attribution might be in incentivising creativity and better market performance. To conclude, using the data the author will discuss whether economic rights and attribution rights incentivise creativity or market performance.

4.1 Ideation

Ideation will be a key element of the research, it influences the strategic decision making of participants market success and affects creativity scores. Due to limited time each participant had to choose between the number of ideas a participant creates and the quality of those ideas. 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, and 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. 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.

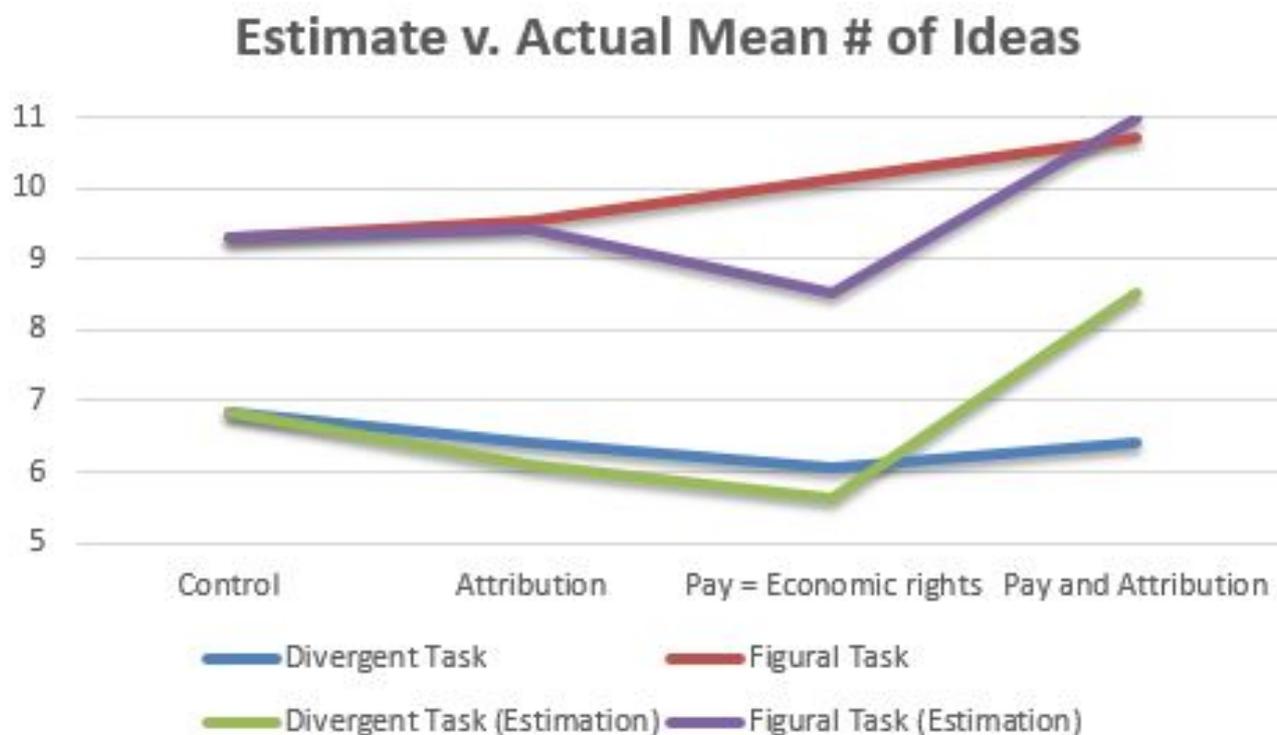


Figure 3: Number of ideas in both Tasks

In Figure 1 we see the difference between the control group, the attribution right group, the ER group, and the ER and attribution 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 rights group, although the

effect was weaker and non-significant for the figural task when controls and or session dummies were taken into account².

The number of ideas³ were regressed against the treatment groups, controls, and session dummies. The regression results for ideation⁴ for the divergent thinking task can be seen in Table 1 and the regression results for the figural task can be observed in table 2. The regression is seen 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. attribution etc., C_i is the vector of treatment groups, and D is the set of session dummies.

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

The controls were selected based on theories and intuition on what affects creativity and creative output. For example, risk preferences and potentially making more in creative fields were 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). I have also added a measure for ambiguous risk in order to see if ambiguous risk preferences affect the creative performance as the probability success in the market is unknown. Creative family members, institution (gsa), and preferring to be famous rather than rich because of one's art are variables which seemed intuitively like they could affect creativity of an individual. Thus the controls were added based on existing theories but also intuitive speculation about what is likely affect creativity.

Table 1: Divergent and Figural Task Ideation

	Divergent Task			Figural Task		
	(1)	(2)	(3)	(1)	(2)	(3)
Pay	-1.327** (0.67)	-1.192 (0.73)	-1.211* (0.71)	0.062 (0.76)	0.087 (0.8)	0.124 (0.79)
Attribution	-0.818 (0.65)	-0.574 (0.68)	-0.74 (0.7)	-0.869 (0.74)	-0.687 (0.68)	-0.767 (0.7)
Pay and Attribution	1.787* -0.94	1.756* -0.96	1.679* -0.94	1.818* (1.06)	1.78 (1.14)	1.682 (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: * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$. Robust standard errors in parenthesis.

²There was a mixup 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.

³Ideas 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.

⁴Ideation is simply a word used to express the capacity to create new ideas

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 were 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 result was negative ⁵ decrease at 10% significance level with the controls and session dummies added. 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. Thus overall there is evidence that the interaction affect between ER and attribution increases the number of ideas created and that pay 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's.

To calculate the correct impact of the interaction term the model predicts one should add the effects of the ER and attribution together and then add the interaction affect. In this case the interaction affect is positive with a 30% increase in the number of ideas however the total impact with taking into account the individual affects of ER and attribution the model predicts a decrease of .1 idea or a 1.5% decrease in the number of ideas. Thus in the divergent task there is some evidence which suggests ER and attribution are substitutes in the way they motivate. This is due to the relative size of the interaction terms coefficient compared to the coefficients of the ER and attribution group. The absolute value of the interaction term coefficient is larger and opposite in sign compared to the coefficient of ER or the attribution individually which suggests that the interaction of the two terms counteracts their individual effects.

To deepen analysis we will compare distributions using the. black test.

4.2 Creativity

Next it the quality 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 ⁶. The score from all of the measures is then added together and compiled into a creativity score. Table 2 shows the total and per idea scores for the divergent task. For the per idea score fluency, flexibility, and humour scores were added together and divided by fluency.

⁵-1.211 or a 18.8%

⁶Details found in the section 'Measuring Creativity'

Table 2: Overall Creativity in Each Task

	Divergent Task			Figural Task		
	(1)	(2)	(3)	(1)	(2)	(3)
Pay	-1.820 (1.29)	-1.421 (1.32)	-1.616 (1.40)	-0.842 (1.27)	-0.309 (1.33)	-0.496 (1.37)
Attribution	-1.535 (1.25)	-1.021 (1.27)	-1.092 (1.33)	-1.424 (1.24)	-0.701 (1.28)	-0.812 (1.30)
Pay and Attribution	3.550* (1.81)	3.298* (1.83)	3.020* (1.82)	3.432* (1.78)	2.858 (1.84)	2.762 (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: * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$. Robust standard errors in parenthesis.

An OLS regression was also used to observe the impact of the treatment groups on the level of creativity in table 2. Three regressions were run for each of the two different types of creativity scores, one with controls and the number of ideas created, the other with no controls. 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 treatments⁷ 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 an effect on overall creativity, although they could have an effect on per idea creativity. Thus 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. in the divergent task the coefficient for ER is positive and significant at 5% 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. When the control variables are taken into account attribution has a positive effect on creativity while the combination of attribution and economic rights had a negative impact on creativity. Even though only pay is significant it is interesting to notice the different signs of the coefficients between the attribution and ER group and the interaction affect between the two when controls and or session dummies were taken into account.

⁷This means AR and ER groups without taking into account the interaction

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: * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$. 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 5 to 1 stars if you like them and 0 if you do not. The scores given by participants were measured against the scores given by the judges and the subjective judgments between the judges and participants correlate positively. The correlation coefficients for the subjective judgments, as shown in Table 5, 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 5% 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	
	Divergent	Figural	Divergent	Figural
Total Scores				
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 in the divergent task the personal judgments are not significant in any case. Pay is close to significant at 10% when only controls were taken into account but highly insignificant otherwise. This suggests that there is no 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 (1.77)	0.565 (1.79)	0.216 (1.89)	2.979 (2.32)	3.698 (2.36)	3.054 (2.41)
Attribution	-0.275 (1.73)	0.895 (1.85)	0.838 (1.98)	-0.572 (2.22)	0.548 (2.21)	-0.668 (2.29)
Pay and Attribution	2.093 (2.54)	0.587 (2.68)	0.384 (2.7)	-0.459 (3)	-1.971 (3.09)	-1.77 (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: * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$. Robust standard errors in parenthesis.

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. Thus per idea scores were largely similar between treatment groups in the divergent task. When observing subjective judgment scores per idea in the Figural task ER and the interaction effect between ER and Attribution 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. This suggests crowding out of incentives to produce ideas which are valued by the market. This suggests the incentives could be substitutes for each other in a market place. It is important to note however that ER is consistently at a higher significance level and with a larger coefficient in the figural task. 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).

It is again interesting to note the difference between the sign and size of the coefficients of the individual effects and the interaction effect. Overall popularity and popularity per idea are good to observe separately as this gives an idea of how the treatment groups affects popularity and individuals decisions on how many ideas to create and how much to focus on each idea. 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 in light of relevant literature.

Table 6: Per Idea Judges Subjective Score

	Divergent Task			Figural Task		
	(1)	(2)	(3)	(1)	(2)	(3)
Pay	0.284 (0.24)	0.405 (0.26)	0.376 (0.27)	0.357* (0.19)	0.426** (0.19)	0.365** (0.18)
Attribution	0.322 (0.27)	0.392 (0.27)	0.447 (0.27)	0.274 (0.19)	0.331* (0.2)	0.243 (0.19)
Pay and Attribution	-0.459 (0.37)	-0.632 (0.39)	-0.652* (0.38)	-0.558** (0.26)	-0.685** (0.26)	-0.664*** (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: * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$. Robust standard errors in parenthesis.

4.4 Judging Similarities

Interestingly the judging of similarities was not affected by treatment group and there was no evidence on people judging similarities differently based on if they were paid or if they were in an attribution group. This suggests that the similarities judging were not biased and also that if the person is not personally affected by their judgment of similarities their judgments will be unbiased.

5 Discussion

To fully understand the results they will be discussed in the context of existing 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 2012; Eisenberger and Cameron 1996; Eisenberger, Haskins, and Gambleton 1999; Amabile 2012) and how they both effect creativity. Productivity and creativity and, in some cases, can work against each other⁸ 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.

In order to gain background knowledge of the effectiveness of pay as a motivator, performance related pay and its effects on productivity will be discussed before moving onto how pay and performance related pay affects creativity specifically. Performance related pay 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; Deci 1972; Ryan and Deci 2000; Frey and Oberholzer-Gee 1997) and in a business setting (Amabile 2012; Amabile 1997; Suff, Reilly, and Cox 2007; Eriksson et al. 2007). Performance related pay (PRP) in business literature will be reviewed in context of how PRP might affect performance

⁸This can also be in the form of crowding out

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.

Attribution is likely an important part of a person's motivation to create. It can be external in the sense that they want to be superstars (Pitt 2010) or it can be a more personal reason such as being credited as the author and so the work remains the authors own work (Abbing 2011, p 81). Attribution as a motivator is a mix of an intrinsic and extrinsic reward as it can contribute towards a person's fame but which is also is a signal that a work is made by a certain artist and can be viewed as a protection of the work which can be seen as an extension of self by its creator. Intuitively attribution would increase production as the reputation or fame of an artist would be protected and disseminated but also the artist's work which can be an extension of self is protected from others copying the idea (Mills 2011; Suhl 2001). The results seem to suggest that attribution increases the individual's creative production but whether it is due to the internal or external aspect of the motivator is ambiguous. However to some extent the intrinsic motivation of the protection of ones idea from copying is taken into account in the treatment group with no attribution or economic rights and so the results seem to suggest the extrinsic motivation from attribution does increase creative production.

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). It should be noted that 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 the most 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. There are two concepts of interest related to PRP: crowding out and sorting. 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). Sorting, on the other hand, is when performance related pay causes the less productive workers to quit or produce low effort while attracting and motivating highly skilled labour (Eriksson et al. 2007; Lazear 2000). These two effects help to explain how, in some cases, conventional wisdom of "the more incentive the better" works, while sometimes PRP and other extrinsic incentives can decrease overall performance.

The way external incentives are administered and understood matters i.e. whether they are prosocial, in the case of high ability individuals, and increase production or controlling, which could be the case for low performing individuals, and decrease creative production (Amabile and Pillemer 2012). In essence crowding out and sorting are very similar effects since the sorting effect has the intrinsic motivation of the lower performers is crowded out while seemingly supporting it for the higher performing groups. Thus how people perceive themselves and their environment matters when observing PRP. If people think they are in the top group in talent they will increase their total production and visa versa. The question is how will the individuals

perceive attribution and ER? ⁹

5.1 Ideation

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 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.

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 was also known 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). This suggests that there is a difference in productivity between situations where the productivity of others is and is not observable which can help to explain why there is a number of overall ideas being created between groups.

Based on evidence from the mean 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

⁹This 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 et al. 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.

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 ¹⁰ 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 completely correct either. There is some evidence that the attribution and ER in combination increase the number of ideas in the figural task ¹¹ 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. 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.

5.2 Creativity and Subjective Scores

When taking into account creativity and later subjective scores the picture of how ER and attribution and ER affect the agents decisions in the market become a bit more nuanced 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. Overall creativity was not significantly different treatment groups and the control ¹². However per idea creativity was larger in the Divergent task for the ER group ¹³ compared to the control while the interaction affect for pay and ER was negative ¹⁴. 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. There was also a strengthening of effects between the divergent and the figural tasks which could be attributed to a learning effect between tasks. The coefficients for the per idea creativity were similar but more pronounced in the figural task. For example in the divergent task both the creativity scores and the subjective per idea scores had a positive coefficient for the ER and a negative coefficient for the ER and Attribution group. However in the figural task the coefficients had lower standard errors suggesting that there was less noise in the data. Thus the conjecture that the learning effect strengthened the signal from one task to the next.

Admittedly external validity is low in experimental research, but 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 attribution. 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 attri-

¹⁰although the coefficient for attribution was insignificant

¹¹In 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%.

¹²although creativity in the ER group was significantly higher compared to the attribution and ER and attribution groups

¹³around 14% increase compared to the mean

¹⁴approximatly 11.5% decrease when controls and or session dummies were taken into account

bution 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 when coupled with ER there is evidence it counteracts the effects of ER. This suggests that when coupled with ER, attribution is more salient to participants and so more noticeable compared to when there is only attribution.

Results of the overall creativity and overall subjective judgment scores suggest Boldrin and Levine's argument that copyright is ineffective 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 suggests 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. 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.

Theory in Lazear and Rosen 1981 suggested that as the difference of monetary reward grew between the lowest and highest ranks in a rank ordered tournament, it increased production. The results of the experiment do not support the argument, if we compare between non ER and ER groups. 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 factor to consider, at least in the creative industries, when studying the impact of monetary rewards in a tournament pay structure. A related paper Rosen n.d. also 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 ¹⁵. 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.

5.3 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. 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.
3. Learning Effects.

The tasks are conceptually different and will be treated as such, however they are close

¹⁵This 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

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 control group. To be unable to make even a weak conjecture about the reaction to feedback would mean that there was a fundamental 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 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. 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.

Although 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

The results from the two tasks are vastly different and show evidence of an adaptation mechanism of creators after receiving feedback from the results of the initial creativity task. Economic and attribution rights had an effect for the first of the two creativity tasks, but for the second creativity task exogenous factors, such as, risk preferences and creative efficacy became more

important in explaining variation between tasks. This could suggest that the rights affect existing and new creators differently and that the market signals affect performance more than rights.

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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 exhibit 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	Hennessey (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	Hennessey (2010), Abbing (2010)
Art Hobby Dummy	Can be a proxy for intrinsic motivation	

8.2 Creativity Instructions

8.2.1 Into

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 really like 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 5-0 stars is supposed to be a simple scale to show how much you like an idea. If you want to leave a 0 simply 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.

8.2.2 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.

8.2.2.1 Divergent Task Flexibility Criterion

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

You are given 7 categories.

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)
7. Toy (chew toy, figurine)

8.2.2.2 Flexibility Task Flexibility

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

You are given 7 categories.

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)

8.2.3 Originality

Example definition of Originality = “the ability to think independently and creatively”.

Simply put down the number of original each participant had.

8.2.4 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 device to distinguish the idea etc. The minimum score is 0 and there is no set maximum, however the humour score cannot be more than 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.

8.2.5 Sarcasm

¹⁶ 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 than 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.

8.3 Experiment Instructions For Groups without Economic Rights (ER) and Attribution Rights (AR)

8.3.1 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

¹⁶Not used for the purposes of creativity scores

8.3.2 Similarities Instructions (NO ER or AR)

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 Bent to scratch the back	Similar to:	2 ▾	▾
2.	Leg Scratcher Bent to scratch the leg	Similar to:	1 ▾	▾
3.	Reaching tool Moulded in order to reach high places	Similar to:		▾

- 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

8.3.3 Figural Task (No ER or AR)

Time Left: 3:24

Alternative Objects Figural Task

Come up with as many alternative objects for the figure below as possible.

You will have 7 minutes to complete the task.

You can add a new entry by clicking on the new entry button



Title: Progress

Description: A figure as a metaphor for progress in my PhD

New Entry

Group entries

string

a piece of string on the table

Wave

It could be a wave in the ocean

8.3.4 Similarities Instructions (Same for Both Tasks)

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 Bent to scratch the back	Similar to:	2	▾
2.	Leg Scratcher Bent to scratch the leg	Similar to:	1	▾
3.	Reaching tool Moulded in order to reach high places	Similar to:		▾

- 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

8.3.5 Favourites Instructions (Same for Both Tasks)

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	☆ ☆ ☆ ☆ ☆ ×
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I'm ready

8.3.6 Participant Results (No ER)

Results Summary

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

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

Continue

8.4 Experiment Instructions For Groups with Economic Rights (ER) and Attribution Rights (AR)

8.4.1 Experimental Structure(ER)

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

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

8.5.1 Divergent Task (ER)

Time Left: 2:08

Alternative Objects Task

Come up with as many alternative objects for a stapler as possible.

You will have 7 minutes to complete the task.

You can add a new entry by clicking on the new entry button

Title: _____

Description: _____

New Entry

Group entries

Author: Elton John > Robot legs

Could be used as legs of a robot

Author: John Legend > Paper weight

use it to hold down papers

Author: Lionel Richie > Gun

can shoot staples at people

Author: John Mayor > Toy

Kids can use it during play time

Author: Dave Matthews > Piercer

To pierce the skin

8.5.2 Participant Results (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

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 Be 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.

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.

9.1.1 Control Group

9.1.1.1 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

9.1.1.2 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.

9.1.2 AR Group

9.1.2.1 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

9.1.2.2 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).

9.1.3 ER Group

9.1.3.1 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

9.1.3.2 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.

9.1.4 ER and AR Group

9.1.4.1 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

9.1.4.2 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

9.2 Creativity Score Per Idea

9.2.1 Control Group

9.2.1.1 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

9.2.1.2 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% and 5% before and after the signal. The ratio before and after is almost identical $(1.33/1.19=1.11), (1.49/1.33=1.12)$.

9.2.2 AR Group

9.2.2.1 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

9.2.2.2 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.

9.2.3 ER Group

9.2.3.1 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

9.2.3.2 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.

9.2.4 ER and AR Group

9.2.4.1 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

9.2.4.2 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.