Boys will always be boys?

The impacts of gender-based Affirmative Action and Role Models on competitiveness in the lab

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Abstract

Gender differences in labour market outcomes are pervasive in current society. Competitiveness is viewed as a possible factor contributing to the favourable labour market outcomes for men, with the stylised fact being that men are more competitive than women on average. In this study, we experimentally investigate whether institutional structures (gender-based Affirmative Action and Role Models) mitigate the gender differences in competitiveness. Although Affirmative Action has been explored in the literature, the longer-term implications of the preferential treatment creating role model representation have not been examined. Consistent with the literature, we find men have a higher preference for a competitive environment compared with women in our sample. However, there are no significant impacts of the gender based institutional structures on the choice to compete in our experiment. When analysing the responsiveness of performance to a competitive environment and the associated beliefs, we see the female role model treatment encourages a competitive spirit in everyone, whereas the Affirmative Action treatment has a negative effect on the competitive performance of African men. In this experiment, gender-based institutions therefore either have unexpected effects of encouraging competitiveness in all participants, or inadvertently reinforce competitiveness gaps across other dimensions of identity, such as population-group. One therefore needs to be considerate of other dimensions of identity in addition to gender when devising preferential treatment policies, and the resulting role model representation, in practice. Changes in beliefs can only partially be exercised as an explanatory channel for these effects.

Keywords: Competition, Gender, Affirmative Action, Role Models, Lab experiments

JEL: C9, D04, J16

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Contents

1 Introduction

There are still considerable differences in the way that women are perceived and interact within society compared with men[1]. Clear disparities can be seen with specific reference to the labour market, for example, through lower female labour force participation compared with men and gender pay gaps. In the United States, the median earnings for women working full-time all year-round were only 79 percent of the median earnings for men and researchers note this gap was not due to differences in educational attainment (Fechner et al., 2011). Other countries also have gender gaps in wages. For example, in South Africa when comparing individuals who have tertiary education, women earn 82% of what their male counterparts earn on average (Statistic South Africa, 2011).This highlights the ubiquity of gender gaps in many different contexts. Even though in many regards women have an improved position, access to education and power in society relative to men as compared with previous decades (Langdon, et al. , 2001), these gender gaps still continue to exist. Much of the research in this field explores key reasons for the gender wage gap, with prominent explanations for the gap being based on vertical and horizontal segregation reasons (Bertrand et al., 2001), discrimination or preferences for certain jobs (Goldin et al., 2000), and competitive behaviour[2]. In practice, policies and institutions have been developed to mitigate the gender differences. For example, affirmative action or quotas have been implemented in some countries to improve the representation and success of women. In over 30 countries representation through a form of quota has been enforced for women in the political parties' list of candidates or in the assembly (World Bank, 2001). One such setting is in India where 30% of local assembly seats are allocated to women (Sen et al., 2000). Our study focuses on the impacts of such institutions (through Affirmative Action and the Role Models they generate) on not a directly observed, but existent gender gap in the labour market: competitive behaviour. More specifically, we ask if pro-female institutions can mitigate the gender gap in competitive behaviour.

A stylised fact in the literature notes, on average, men are more competitive than women (Niederle et al., 2007; Gneezy et al., 2001). This factor, if correct, has consequences for the labour market and may be a contributing characteristic to a number of gender gaps observed in different domains in the labour market. Since women are more reluctant to compete, they may not seek out promotion or negotiate a higher wage. The competitiveness influence therefore may have large implications when it comes to wage negotiation outcomes, pay gaps and job access. Quantifying competitiveness can be difficult in the real world, as there are many possible confounding factors that could challenge the causal inference. Researchers have designed a method to quantify a measure of competitiveness in the lab (Niederle et al. (2007); Balafoutas et al. (2011)) and we implement this experimental approach, using a computer-based lab experiment, to identify the underlying causal mechanism in a more controlled environment. We also investigate this effect in a developing country, South Africa.

Previous experimental literature has found that in the lab, many high performing[3] women do not choose a competitive environment even though they have the ability to win (Niederle et al., 2007). In addition, the quantifiable

[1]This study mostly approaches the aspects of identity in the same way as Loury (2003), by noting that both gender and race are social constructions from which meaning is derived. Loury (2003) considers race as "bodily markings, carried by a largely endogenous group of individuals, that can be observed by others with ease, that can be changed or misrepresented with great difficulty, and that have been invested in a particular society at a given historical moment with social meaning". This study assesses gender in a similar way, with both gender and race carrying social meaning and creating certain expectations based on membership to a certain group. Although this study acknowledges the gender is not a binary construction and that there are individuals who may not fall into the male or female gender categories, for simplicity of this study and to examine the dominant gender constructs, we compare only male and female genders and the way the associated social meanings influence behaviour. Note the category labels race and population-group are used interchangeably.

[2]The idea of gender differences in competitive behaviour has become popular within the experimental literature and many experiments have been performed in different contexts to test its robustness (Cason et al. (2010); Healy et al. (2011); Darnies (2012); Price (2012); Almas et al. (2015); Dreber et al. (2014); Lee et al. (2014); Wozniak et al. (2014); Halko et al. (2015)).

[3]Note high ability performers in the Niederle et al., (2007) study includes individuals in the top quartile of the performance distribution.

effects of competitiveness have also been observed in the real world. Field studies have investigated the relationship between the measure of competitiveness in the lab and outcomes such as employment and investment in the real world. Researchers have shown the positive link between competitiveness in the lab and success in real life (Berg et al., 2015). The work of Niederle et al. (2007) suggests the effects seem to be most severe for high ability women in high paying jobs, whereas Berg et al. (2015) highlight the importance of the competitiveness measure on general success in a non-lab setting. Overall, the evidence implies gender differences in competitiveness have implications both in the lab and when investigated directly in the real world.

Affirmative Action is often contentious and therefore, an investigation of the implications and costs in a lab setting can be a useful tool to understand possible behaviour changes. It can also be a useful form of evaluation to identify the causal impacts of the gender-based Affirmative Action decisions in a more controlled environment. One longer term implication of a gender-based Affirmative Action policy is the creation of Female Role Models. Female Role Models have been argued to be important as a tool to inspire other women (Gibson, 2006). This longer term effect of Affirmative Action is often not captured when evaluating the impacts of Affirmative Action, as they are very difficult to quantify and require a considerable study timeline to capture effects. Failing to include the role model creation may underestimate the true effect of Affirmative Action policies. With these insights in mind, we designed a study that adds to the understanding of the impacts of Affirmative Action, and the longer term Role Models created, in the competitiveness framework. Although the effects of Affirmative Action have been partly explored in the competitiveness literature (Niederle et al. (2012), Balafoutas et al. (2011), Balafoutas et al. (2016)), the longer-term implications of the role model creation (a possible outcome of affirmative action) have not been investigated. We conduct a comparison of two separate treatment groups; one capturing the effects of Affirmative Action and the other identifying the effects of a Role Model representative, on the gender gap in competitiveness in the lab[4].

The effects of the Affirmative Action or Role Model treatments are not an obvious outcome. It is unclear if the Affirmative Action treatment and Female Role Model treatment will inspire competitive behaviour for women, stimulate competitive behaviour for men[5], or create a feeling of demoralisation amongst men. The need for women in leadership is indeed often justified on role model-type arguments, with these role models being exemplars of achievement (Gibson, 2006). The assumption is that such representation in leadership will inspire other women to also strive for a leadership position. However, this inspiration effect is not inevitable and these Female Role Models may implicitly create a situation that challenges men. The inverse puzzle of Male Role Models inspiring men or stimulating competition for women is also unknown. The direction of the effect is therefore unclear and warrants further investigation. Our lab experiment examines this puzzle and tries to identify the directions of the different effects.

In addition to the inspiration, provocation, or demoralisation effects, there is also the possibility that stereotype threat may also be activated in the Affirmative Action treatment. Stereotype threat is the notion that reminding an individual of their low status impacts on self-confidence and makes individuals conform to the stereotype established for that specific social group (Steele and Aronson et al., 1995)[6]. Stereotype threat may remind women that they aren't high performers, which is implicit in the application of gender-based Affirmative Action. This could affect the participants' beliefs and discourage female participants in our experiment. In addition, stereotype boost, which

[4]We do not implement a design of using the Affirmative Action treatment to *create* the role models for the Role Model treatment. This could be looked at in future research. In this experiment, the treatments are regarded as separate groups.

[5]Note a similar uncertain outcome (between inspiration or provocation effects) is realised if one views Role Models as a source of updating information asymmetry of the performance of *group identities*, rather than from the more romantic view that the Role Model creates an inspirational figure.

[6]Previous work has identified this effect when examining the effect of caste identity on the performance gap of high and low caste participants in India (Hoff and Pandey, 2006).

encourages individuals when reminded of their high status (Steele and Aronson et al., 1995), could have a positive effect for men in the Affirmative Action treatment. This is even though the intention and incentive is designed to increase competitiveness for women. Overall the direction of the treatment effects are theoretically ambiguous and therefore identifying the impact is an empirical question.

Over the last decade, the experimental literature has provided compelling evidence that there are differences in competitiveness between individuals of different sexes, with men showing a higher tendency to competition (see review paper Niederle (2014)). The experimental framework is based on within-person design, where different payment mechanisms are used to elicit competitiveness. The choice between a piece-rate and tournament payment round, with the latter being the competitive environment, has been used as a measure of willingness to compete (Niederle et al., 2007; Balafoutas et al., 2011). In addition, the responsiveness to a competitive environment has also been examined as a measure of competitiveness (Gneezy et al., 2001; Gneezy et al., 2003; Kuhnen et al., 2011).

Our analysis looks both at the choice to compete (Niederle et al., 2007) and the responsiveness of performance to a competitive environment (Gneezy et al., 2001). We also look at the way the Affirmative Action and peer Role Models treatments influence behaviour in the lab[7]. We implement a lab-based study with a sample of students at the University of Cape Town, to investigate the impacts of these treatments. Consistent with the literature, we find a strong gender difference in choice to compete in our sample, with men choosing to compete far more than women. This is consistent with the literature. It is interesting that in South Africa, a developing country, the difference in competitiveness based on gender is still consistently significant. The Affirmative Action and Role Model treatments have no significant impact on the choice to compete. This contrasts with previous studies that have examined Affirmative Action (Balafoutas et al., 2011; Niederle et al., 2013).

When analysing the way performance changes when presented with a competitive environment, gender-based institutions can have either an unexpected effect, or inadvertently reinforce race-based heterogeneity in competitive performance. The Female Role Model has a positive effect on the responsiveness of performance in Round 2[8]. We see that all individuals increase performance in Round 2 relative to the control group, and this effect cannot be attributed to a particular gender of the respondent. This highlights an unexpected effect, as the effect is not driven by the male or female sub-sample specifically. This is contrasted to the Affirmative Action treatment, where we see a decreases African males' responsiveness to a competitive payment compared to the control. This effect increases the heterogeneity of performance within the male sample. Changes in beliefs of personal success in the tournament partly correspond with the changes in performance, with specific reference to the Female Role Model treatment. This means beliefs only partially explain the change in competitive performance given a specific treatment[9]. Overall, these results highlight that gendered institutions therefore can have unintended effects with regard to other identity groups, such as race. One therefore needs to be aware of possible adverse effects when devising preferential treatment policies, and the any role models that may come from the Affirmative Action, in practice.

The remainder of this paper is structured as follows: in section 2 and 3 we examine the existing literature in this

[7]In this setting, we define Role Models as participants who had exemplary performance from the control group and should therefore be interpreted as a peer Role Model.

[8]Round 2 is the second round in the experimental lab-based game, where participants perform a real effort task in a competitive environment.

[9]Note we also find changes in beliefs of success in tournament with treatments that do not result in changes in performance. We find that the Affirmative Action treatment creates demoralisation of beliefs for women, lowering beliefs compared with women in the control group. In addition, the male role model creates demoralisation of beliefs for non-African women and provocation in African women's beliefs.

field, we then explore the experimental design in section 4, and the basics descriptive statistics are discussed in part 5. Baseline ability and a presentation of the first part of main results is shown in section 6. This includes the analysis on the choice to compete, and also shows the second main result where the responsiveness to a competitive environment is analysed. Beliefs, as a key factor behind these causal pathways, is explored. Finally, discussions about the main findings are shown in section 7 and the paper is summarised with conclusions in section 8.

2 Leaning in? Measuring competitiveness in the lab

Competitiveness can be captured in different ways. Willingness to compete and the responsiveness of performance to a competitive environment are the two ways competitiveness is measured in the lab. Both techniques of measuring competitiveness are useful, as they allow one to quantify this previously "unobservable" trait. The experimental methods also allow us to cleanly measure the variable with limited confounding effects. This is just one of many useful qualities of lab experiments (Charness et al., 2010). These two indicators of competitiveness are described.

2.1 Willingness to compete: Competitive choice

This technique uses choice as the tool to reveal willingness to compete and is based on a benchmark paper by Niederle et al. (2007). The choice is measured through a within subject design and implements multiple rounds using a real effort task. The type of real effort task varies depending on the experiment. In the original Niederle et al. (2007) experiment, they implemented the task of adding up many collections of two-digit numbers without using a calculator within a five minute period of time[10]. Each collection contained five two-digit numbers. This real effort task was established to capture a level of performance. By design, the incentives for the real effort task vary between rounds and this is captured through the payment mechanism.

(i) In Round 1, players are paid in a piece rate format, with each successfully completed collection of two-digit numbers being worth a set amount of money.

(ii) In Round 2, a tournament takes place and is considered a competitive environment. A tournament means that players are assigned into 4-person groups and play against one another within their group. The player who has the highest performance in the group[11] is considered the winner of the group. The winner receives payment in proportion to the performance in the real effort task in Round 2, but the assigned monetary value of each collection of two-digit numbers is far higher than in Round 1[12]. The players who are not the highest performer in the group receive nothing for this round.

(iii) In Round 3, players have a choice ex ante. They can either choose to be paid according to a piece rate, as in Round 1, or according to a tournament, as in Round 2. They make this choice upfront. The participants then play the round and are paid according to this choice made in this round. If piece rate is chosen, the participant is paid using the Round 1 payment values[13] and if tournament is chosen then the participant is paid using the Round 2 payment value[14].

[10]Note there have been some critiques of the real effort task used in Niederle et al.. (2007). The critiques and reasoning behind our implementation of alternative task is explained in Section 3.3.

[11]For example, in Niederle et al. (2007) the player that completes the higher amount of two-digit number collections.

[12]Niederle et al. (2007) for example implements a value of 50c per collection of two-digit numbers in Round 1 and \$1.50 for the same collection of two-digit numbers, given a group of 3 people competing, in Round 2.

[13]The piece rate payment value was, for example, 50c per collection of two-digit numbers in Niederle et al. (2007).

[14]The tournament payment value, for example in Niederle et al. (2007), was \$1.50 per two-digit collection of numbers if the individual was the winner and zero if they were not the winner

(iv) In Round 4, a similar choice is made as in Round 3, but the choice is based on past performance. Rather than making the choice and then playing the game, as applied in Round 3, the choice is made based on Round 1 performance. Since this performance has already been captured, only the choice of how to be paid is made in this Round[15]. The only difference between Round 3 and Round 4 is the choice in Round 3 is based on having to physically complete the real effort task again, whereas choice in Round 4 does not have requirement of physically playing the game. In the final regression analysis, Round 3 choice is used as the dependent variable and different factors such as Round 4 choice are included as control variables. The Round 4 choice acts as a within-person control of the choice. The Round 4 choice is able to control for risk aversion[16] and all other factors that may explain the choice between piece rate and tournament, but aren't related to physically playing in a competitive environment. Since Niederle et al. (2007) are interested in the willingness to be in a physically competitive space, the Round 4 choice acts as a necessary control.

(v) Beliefs are captured at the end of the experiment. This involves asking the participants to rank how they think they placed in their group in Round 1 and in Round 2. This is argued to capture a level of beliefs or expected performance which may explain the choice made in Round 4 and Round 3 respectively.

In the Niederle et al. (2007) design, the choice to compete in Round 3 is the key measure of competitiveness. The participant has experience in the piece rate and the tournament rounds, and then chooses how they would like to play Round 3. If the player chooses tournament in Round 3, they would be considered to be more willing to participate in a competitive environment, compared with the participant who choses the piece rate.

2.2 Responsiveness to competitive environment: Performance

However, performance can also be examined from a competitiveness perspective. Gneezy et al. (2001) implement an influential study based on performance in a real effort task. In their experiment, the task is completing as many computerised mazes in a 15 minute period as possible. They then compare performance in two treatments: a piece rate treatment and a tournament treatment. The piece rate treatment involved an incentive paid at per maze rate. This was contrasted to the tournament treatment that involved players being assigned to groups of 6 and then players competing against each other. The winner in the group received an amount proportional to the number of mazes completed and the rate was far higher than the piece rate treatment. The authors look at the gap in performance between men and women, with men displaying a higher performance compared women in the competitive task. In addition, when performing in a tournament with a mixed-sex group, performance is far higher than when performing in a single-sex group or the piece rate round. This highlights that even when differences baseline performance are accounted for, playing in a tournament in a mixed sex group ignites the competitive spirit especially amongst men, and increases the gender gap in performance[17]. In this thesis, we follow a similar interpretation of competitive performance as Gneezy et al. (2001). The Tournament performance in mixed sex groups, controlling for piece rate performance, is examined. The increase in performance when presented with a more competitive tournament environment, controlling for individual piece rate performance, is interpreted as the responsiveness to competition.

[15] In practice this means that participants are paid twice for their performance in Round 1, once in Round 1 and once in Round 4.

[16] Previous literature has examined gender differences in risk aversion (Eckel et al., 2008). Since competitiveness is linked to taking risks, it is important to have a measure of control of risk and related preferences. This choice in Round 4 controls for risk aversion, because it involves a choice based on a past performance. This means the choice variable in Round 4 captures all fixed characteristics of an individual, besides the factors involved in physically playing the round. One of the fixed characteristics would be risk aversion. The Round 4 choice variable is therefore used as a control in the main regression to control for risk aversion.

[17] Note in Gneezy et al. (2001) they do not implement a regression analysis in this study, this may possibly be due to the small sample size.

3 Are gender differences inevitable?

3.1 Nature versus nurture

Part of the debate with regard to competitiveness is founded in 'nature' versus 'nurture' arguments. Some have looked at gender difference as a result of differences in innate characteristics (Lawrence, 2006). These arguments are often based on biology and argue that there are biological differences that make men more innately equipped with the capacity to compete. For example, Baron-Cohen (2003) argues that, on average, female brains are built for empathy, whereas male brains are built for building systems, and these biological differences contribute to constructing biological differences in competitive behaviour. Further work in analysing the hormonal cycles (thus biology) of women has also been performed to try to highlight the significance of the impact of hormone phase on the willingness to compete. They find that women in a high hormone phase are more wiling to compete than women in a low-hormone phase (Wozniak at.al, 2014). These studies therefore focus on the explanations based on the nature of men and women as key indicators of competitiveness.

There is also an extensive literature, which focuses more on the 'nurture' side and the ways that society/context can influence competitiveness, and possibly even change one's willingness to compete. Notably, a study which highlights 'nurture' and the role of society in competitiveness is the work by Gneezy et al. (2009). They examine two different societies, the Maasai in Kenya who are known to be a strongly patriarchal society and the Khasi in India who are a matrilineal society. They find that in the patriarchal society the men are more competitive, but in the Khasi, the women take on a more competitive role. They argue that society has a large influence on developing competitive behaviour and is suggestive of the way that environmental factors can shape the competitiveness preferences of individuals. This line of reasoning is the approach adopted in this thesis.

3.2 Background and institutional context

Differences in background characteristics may also explain why men tend to display a higher tendency towards competition compared with women. Individual background is considered to be of particular importance. Almas et al. (2015) show that socio-economic status is relevant when looking at the competitiveness gender gap in children, with there being a significant gender gap in competitiveness in wealthier children, and no significant gender gap in competitiveness for children of poorer families. They find fathers' socioeconomic status is what drives the effects of socio-economic status[18]. The researchers find the effect of the socio-economics of the father on competitiveness is most influential for boys, with fathers having a stronger influence on shaping the competitive preferences for their sons, but not their daughters. It is unclear if it is the overall socio-economics of the situation or the involvement of the father in the child's life that drives this outcome. The authors argue the effect is most likely due to high socio-economic status fathers being more present in the child's life, compared with low socio-economic status fathers, which cultivates willingness to compete in boys.

The gender composition of whom one grows up and interacts with has also been examined. The literature has mainly examined the gender composition through the natural groupings of siblings and schools. Siblings and sibling composition in the family has been shown to have mixed results on competitiveness. Okudaira, et al., (2014) show that siblings have an effect in shaping competitiveness. They find that as a man in Japan, having an older sister results in significantly lower likelihood of entering competition compared with having no siblings. This is contrasted to Almas et al. (2015) who find, in their representative sample in Norway, that siblings do not have an effect on

[18]They find mothers' socio-economic status does not have an effect on competitiveness or gender gaps in competitiveness.

competitiveness preferences. The effects of siblings is therefore ambiguous and possibly sample dependent. Other studies have examined the influence of schooling type (either single sex or co educational) as a reason for the gender gap. Lee et al.(2014) draws on a natural experiment of the random allocation of participants to schools. They show that, in a South Korean setting, single sex schooling does not have a significant effect in reducing the gender gap in competitiveness. This evidence is therefore suggestive that the composition of whom one competes against is less important in determining competitiveness preferences.

Along with background characteristics, another study was completed that looks at the nature of competitiveness at different ages and over time (Sutter et al., 2014). This was a panel study of subjects, with participants being between the ages of 3 and 18 years in the first panel and shows that competitiveness stays relatively stable within individuals over a two year period. This indicates that formative years are the more important years to consider when looking at the development of competitiveness, that is if we believe that it is a 'nurture' more than an a 'nature' argument. Although competitiveness seems to be stable over time, this does not mean that these preferences are not influenced by the environment in later years. The structure of the society and the institutions may be able to affect or adapt the competitiveness preferences. We now turn our attention to the means by which these gender gaps could be reduced.

3.3 Policies to reduce the gender gap

There are two main broad categorisations of interventions applied in this study to reduce the gender gap: structural changes and shifts in the more implicit features of society. Affirmative Action can be thought of as a more structural change that could be intentionally implemented, whereas the Role Models are more a function of the societal context and/or may be a longer-term result of a structural change (such as Affirmative Action) that is implemented.

3.3.1 Role Models: Information, Inspiration or Demoralisation?

Role models could influence individuals in a number of different ways. They can be viewed as a tool for inspiration, a source of demoralisation, a tool for information or a combination of these effects. On one side, the role model may just be a way of inspiring others to follow a similar trajectory (Marx et al., 2012) (or stimulating others to challenge that trajectory). Role models may demoralise those of the opposite identity (Lockwood et al., 1997), with such a position being seemingly unattainable. In addition, the role model may create a pathway in which information about group identities are relayed to the participants. The role model could be interpreted as a feedback mechanism (Wozniak et al., 2014), which emphasises to all the players that individuals who have this group identity are top performers. Depending on how much the individual associates with the group identity and how much players associate their group members with this identity, this information effect could impact on behaviour.

Some work has examined the effect of individual feedback (by information) on competitiveness. The literature has explored the idea of direct individual feedback and indirect individual feedback from an experienced prior player. Researchers find direct relative performance feedback[19] positively influences the decision to enter competition, and this effectively mitigates the gender gap (Wozniak et al., 2014). From an indirect feedback perspective, Brandts et al. (2014) find that advice to compete or not, from an external experienced player[20], significantly influences

[19]Direct relative feedback, according to Wozniak et al. (2014), would be that the performance of all the individuals in the session in non-competitive piece rate treatment is known to all players i.e. players know how everyone performed and where they fell in their ranking. in contrast, indirect relative feedback would involve a more subtle way of communicating the performance of other members of the experiment.

[20]Note in this study the advice comes from a player who has already participated in all the rounds including the choice round. The participants are shown the performance of the player they have been asked to advise, and then they suggest whether this person should compete or not.

competitiveness in a positive direction. In this example, the indirect feedback is captured through the advice of other players given their experience. They find feedback mainly increases high-ability women's willingness to opt into competitive environments and decreases the competitive entry for low performing men[21]. Individual feedback, both direct and indirect, therefore has a positive impact on competitiveness. Feedback effects on group identities have not been examined, but is a possible pathway that may effect competitiveness behaviour. A role model could be thought of as an indirect form of feedback for group identity.

It is possible that an inspiration effect may be present. One could hypothesise that the process of knowing that a peer role model (with similar identity characteristics to you) has performed well, may increase your confidence in your own abilities[22] or likelihood of success, and alter your willingness to compete. This is consistent with the psychology literature's explanation of role models. The experimental psychology literature shows that when a woman is administering the mathematics test as opposed to a man, the performance of the women taking the test improves (Marx et al., 2002). This effect of the influence of the gender of the administrator is also confirmed in another study which tests political knowledge (McGlone et al., 2006). The "Obama Effect" was studied which initially showed that having Obama as a role model implicitly induced increased performance for black youth (Marx et al., 2012)[23]. The experimental economics literature has found that there are many high performing women who do not compete even though they could win the competition (Niederle et al., 2007). It is possible that seeing previously successful women who have performed well, may alter the woman's perceptions of her own ability, increase her confidence, which improves performance and increases her willingness to compete.

Conversely, there could be more negative effects at play when role models are presented: demoralisation effects. Lockwood et al. (1997) find role models can create inspiration effects when the success seems attainable, and self-deflation when the goal or task seems out of reach. Ory et al. (2003) see a similar discouragement take place when it comes to athletics and the way that more elite senior athletes actively dissuade other senior athletes from participating. In this way there is a decrease in participation due to a peer role model, as the success seems unattainable. In this study, the equivalent would be where an individual experiences a demoralisation effect where the opposite-sex role model is presented, as it could trigger the feeling that winning is unattainable for their identity group.

3.3.2 Affirmative Action: Information and/or incentive effects?

The Affirmative Action treatment may also encompass an information effect. By applying a gender-based Affirmative Action treatment, one is implicitly suggesting that women are lower performers in the task, as they need the additional "help". This information may also trigger a stereotype threat effect, where it is reinforced that women need assistance to be on par with men and therefore are reminded that they are lower performers (even though they may not be lower performers in reality). Stereotype threat is a theory which is based in the psychology literature and is founded on the idea that behaviour is dependent on stereotyped expectations. Specifically, this threat can influence performance and it has been suggested that a lower performance is associated with more negative views of personal performance (Cadinu et al., 2005). The implicit information and triggering of stereotype threat in the

[21]For Brandts et al. (2014) the real effort task applied the same task as Niederle et al. (2007). This included adding up a collections of two-digit numbers in a five minute period without a calculator. Note there were five two-digit numbers in each collection. In their study a high performer was an individual who correctly answered 11 or more collections of two-digit numbers and a low performer was someone correctly answered less than 8 collections of two-digit numbers.

[22]Note that the change in confidence would also be displayed in the information hypothesis, and therefore changes in confidence cannot be used as an indicator of the validity of the particular channel.

[23]When more robustly tested in an experimental setting, the different data didn't display an effect (Aronson et al., 2009).

Affirmative Action treatment may influence the competitiveness behaviour.

Other structural changes may also reduce the gender gap in the willingness to compete. Policies that favour one group can change the structure of the engagement. Multiple gender-based preferential treatment policies are examined in Balafoutas et al. (2011) and they look specifically at the efficiency effects of various possible Affirmative Action type policies. They focus on quotas, preferential treatment and repetition of competition[24], as the main means of producing a more gender equitable distribution. They find that quotas and preferential treatment significantly encourage women to choose to compete compared with the control group. The change of incentive therefore positively affects women's willingness to opt into the competitive environment. Notably, Niederle et al. (2013) look at the impacts of a gender quota on the decision to compete. They find that in the absence of Affirmative Action, high ability women are often the individuals who are less likely to choose the competitive environment, while implementing the Affirmative Action institution encourages these high ability women specifically to compete. Therefore, implementing the Affirmative Action policy improves the efficiency of the outcome, as more high ability women opt into the competitive pool when the treatment is applied. Niederle et al. (2007) and the updated Niederle et al. (2013) are a foundational paper for our analysis, although we apply preferential treatment as outlined in Balafoutas et al. (2011).

3.3.3 Role models, Affirmative Action and the impacts in the real world

Affirmative action and role models have real world impacts. Beaman et al. (2012) examined the case study of India where a randomly assigned quota of female leadership in India was implemented. The random enforcement of female leadership allowed them to causally identify the effect of female leadership. The authors show that boys and parents of a boy child, have higher aspirations compared with the girls and parents of girl children in villages where women are leaders. The authors also find that being in a village where a female leader was assigned for two election cycles, mitigated the gender gap in aspirations of parents and of adolescents between the ages of 11 and 15. Interestingly, the female leadership also had a measurable effect on real world outcomes. For example, the gender gap in educational attainment was completely eliminated and the adolescent girls also spent less time on the household chores. The authors identify that it was the role modelling, through the affirmative action quota that allowed these effects to take place. This study highlights how affirmative action and role models can have substantial influence in practice and how there is also the possibility that these types of interventions can change outcomes materially.

In addition, Affirmative Action and the associated role model can also have a big impact on attitudes of individuals, as well as public goods provisions. Beaman et al. (2009) look at the same randomly assigned female leadership policy decision in India. They show that exposure to female leaders reduces gender role stereotypes and mitigates bias of perceived effectiveness of women in leadership among the men in the sample. Using the same context, Chattopadhyay et al. (2004) find that the random allocation of female leaders affects the way that public goods are allocated. More specifically, they find for villages with a female leader, the investment in infrastructure is aligned with the investment preferences of the females in that village. Female leadership can therefore have a large impact on the perceptions of individuals and influences how the interests of women in the community villages are reflected in local public goods investments.

[24] Balafoutas et al. (2011) find no significant effects of repetition of competition on choice to compete in their experiment.

4 Experimental design

The framework used to elicit competitiveness was based on the varying incentive scheme method proposed by Niederle et al. (2007) and measures the willingness to opt into a competitive environment. Performance in the competitive environment compared to a non-competitive environment was also examined. As part of the design, a timed real effort task was completed by participants and the participant received monetary compensation according to his/her performance, as well as the decisions made in the session. For every session, participants were seated in rows, with each row corresponding to a group of 4 players. At the appropriate moment during the experiment, participants were told that the other individuals in their row were their group members. The study included, on average, 8 participants per session who were seated at different computer stations in a computer laboratory.

- *Number of participants in session*: Sessions included between 4 and 16 participants depending on the number of people who arrived at the session. Almost all sessions had 16 participants who had registered online to attend the session, however only 8 of those who signed up actually arrived at the session on average.
- *Computer station set up*: All computers stations were set up with a portable cardboard cubicle. Computer stations were selected in the lab with one inactive computer between every player. This assisted in maintaining privacy of the decisions/performance of the players throughout the experiment. Keyboards were placed outside of the cubicles and turned with arrow keys furthest away to ensure that the only tool used to complete the game during the session was the mouse. See Section 11 in the Appendix for images of the experimental set up.
- *Communication in session*: Note, participants were not allowed to talk to each other before or during the experimental session. All questions were communicated individually between the participant and the experiment demonstrator.
- *Session time* The sessions lasted approximately 45 minute to 1 hour in length.

It was explained to the participants at the beginning of the session that they would be completing a number of different real effort tasks for payment. The study was composed of a number of different rounds that used a slider based game (Gill and Prowse, 2009), as the real effort task. The game displayed a number of sliders on each computer screen, with an aim to move as many slider tabs into mid-position of the slider bar within a 2-minute period. Figure 1 displays what the slider game would have looked like for one of the practice rounds of our experiment. Two practice rounds were played before starting Round 1 in order to familiarise people with the game and to make sure they were comfortable with the task before performance qualified for payment. A very similar computer display was used for the subsequent Rounds. The screen displayed information regarding payment for the round[25], the number of sliders completed in that round (updating in real time as the round progressed), the remaining time for the Round, a short title of the Round, and brief summary of the instructions for the specific round[26].

[25] As described shortly, payment in Round 3 and 4 is dependent on a choice made by the participant. The computer displayed only the payment based on the choice made by the participant, rather than displaying both payment options for the choice. This is hoped to improve salience of the payment received per slider in the round for the specific individual.

[26] The written instructions were included in addition to the verbal instructions that were the main form of explanation for the round.

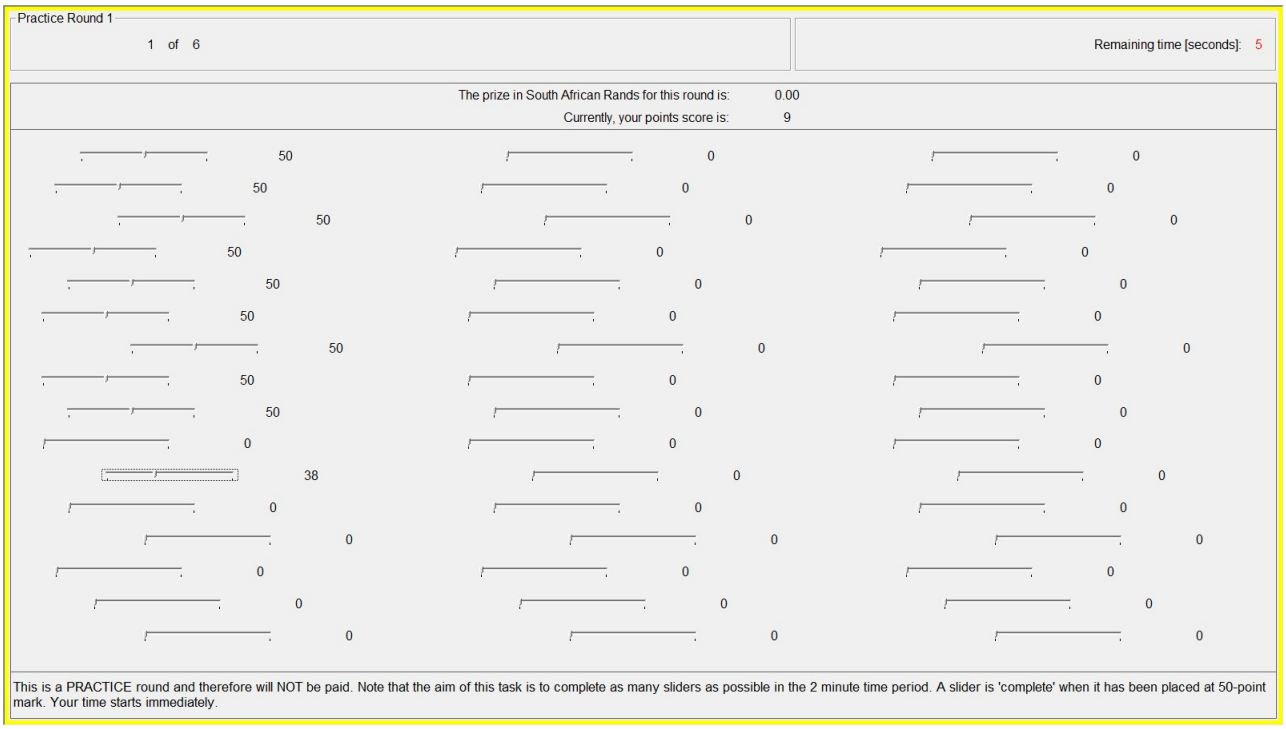

Figure 1: Practice Round slider screen

4.1 Within subject design

Various rounds were implemented as part of the within person design and the structure of these rounds are displayed in Figure 2. There are four main playable rounds, one ranking round where beliefs are captured and the experiment concluded with a short questionnaire. More details of each of these rounds is explained below. Note that participants only receive feedback about their personal performance at the end of the session and did not know their relative performance or the performance of other group members until all tasks/decisions were complete. In order to limit accumulation of wealth effects and to ensure significant effort was applied in all rounds, only one of the four rounds of the slider based game were randomly selected for payment[27].

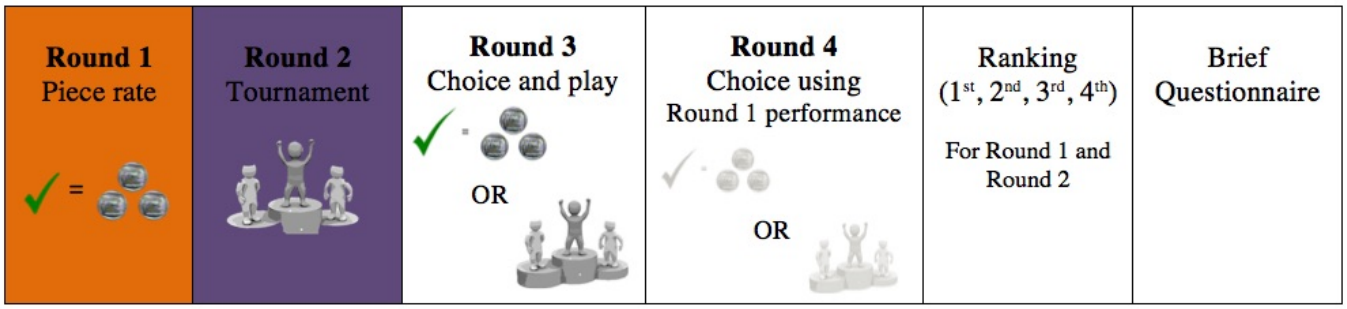

Figure 2: Within subject design framework based on Niederle et al. (2007)

[27]Payment transfers were organised through the university system. Payment receipt forms, with the unique earned amount accrued to the specific participant, were given at the end of the session. Payment could then be collected from the UCT bursar in exchange for the payment receipt form at a time convenient to the participant after the session. All participants were paid a R20 show up fee regardless of participation in the full session. Participants earned on average R85.00 for the session, which is the approximate value a student tutor would earn for a similar period of time.

All individuals in the experiment participated in the following activities:

(i) **Round 1:** *Piece rate*
This round involved completing as many of the sliders as possible in a 2 minute period. The payment was set at a piece rate scheme with each correct slider being worth R3.00. The total number of correct sliders were multiplied by R3.00 to obtain the value acquired for the round.

(ii) **Round 2:** *Tournament*
The tournament round used the same slider task as Round 1, with the same time limit. However the payment scheme and structure of incentives was different. In this round, the participants competed against the other players in their group[28]. The participant who completed the highest number of tasks in his or her group was the winner of the round. The winner receives R12.00 per correct answer, a far higher payout per correct arrangement compared with Round 1, and the other three participants that placed second, third and fourth in the round received nothing[29].

(iii) **Round 3:** *Choice and play*
The choice round provided the participant with the option to either choose to be paid by piece rate or tournament scheme. This choice of choosing the tournament, a more competitive environment, is therefore the measure of individual competitiveness. The participants made this choice individually and then completed the slider task once more to conclude the round. If the tournament payment was selected by the participant, then the comparison performance of their group members from Round 2 was used, rather than their Round 3 performance. For example, if a participant selected tournament payment scheme, then her Round 3 performance that she completed in this round was compared with her group members' performance from the previous round (Round 2). If piece rate was selected then piece rate payment was applied, which implicitly has no comparison associated with it. This allows for a more independent choice to be made, as it does not require all players to choose tournament for the tournament-choice to take place. Figure 3 displays an example scenario of the choices made within a group and illustrates how the comparison of performance between group members would have been implemented in the experiment for this round.

- The example shows that player 2 selected tournament in the Round 3 Choice Round. This selection of incentive is interpreted as a competitive choice, and immediately after the choice is made, the 2 minute game is played to capture Round 3 performance. To evaluate the accrued wealth of player 2 for this round, we compare the performance of player 2 played in Round 3 with the performance of his/her group in Round 2. If player 2 performed better in Round 3 compared with his/her group members in Round 2, then player 2 would accrue R12.00 per slider performed in Round 3. However, if player 1, 3, or 4 performed better in Round 2 compared with player 2's Round 3 performance, then player 2 would receive nothing for this round.
- A similar explanation is applied to player 3. Player 3 selected tournament and therefore Player 3's performance in Round 3 will be compared with player 1, 2 and 4's Round 2 performance. If player 3 performed better in Round 3 compared with his/her group members in Round 2, then player 3 received

[28]The associated group members of an individual are important in this tournament round and therefore this is the appropriate moment in the experiment to inform the participants of their group members. The participants were told that their group members were the individuals sitting in their row in the computer labs and participants were encouraged to see who was in their group. This ensured that the expectation of whom the participant was up against was partially controlled for by design. The different participants therefore didn't have varying expectations of the gender of their group members, which could impact on competitive behaviour and would have been unknown to the experimenter. The gender or race of the group members was not emphasised when groups were revealed to participants.

[29]Note that in the case of a tie, the ranking of participants with equal scores was determined randomly by the computer. This is the specification implemented by Balafoutas et al. (2011).

R12.00 per slider completed in Round 3. If player 3 doesn't perform the best in Round 3 compared with player 1, 2, and 4's Round 2 performance, then player 3 accrues zero value for this round.

- Player 1 and player 4 selected piece rate in the choice round. Therefore their Round 3 performance is multiplied by R3.00 individually to calculate the accrued value for the round. There is no comparison with group members required for player 1 and 4, because the piece rate choice is based solely on performance of the individual and not on performance in relation to their group members.

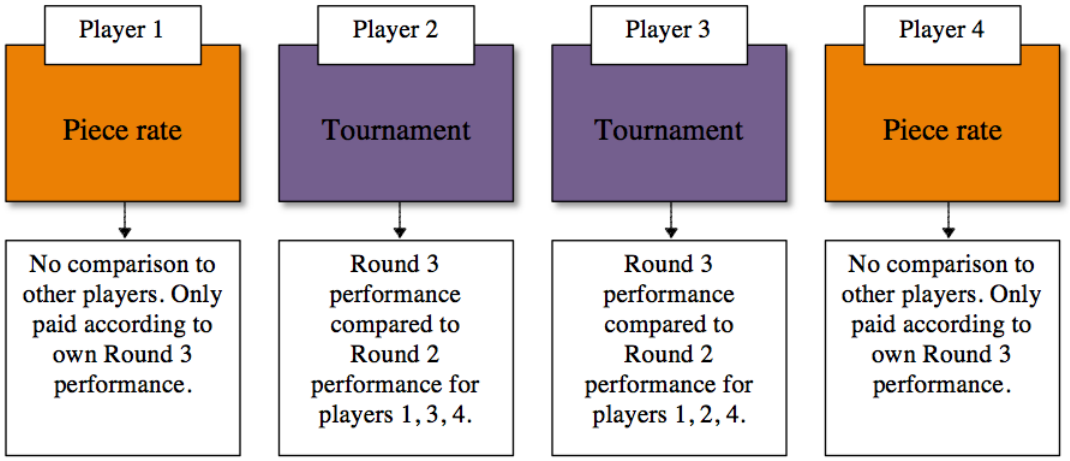

Figure 3: Example of player layout in the lab and associated choice made by participants in Round 3

This structure of comparative performance was devised and implemented in Niederle et al. (2007). It ensured that each choice is made individually and does not rely on the participation of all the group members in the choice round in order for the tournament to take place. It also decreased the possibility that other-regarding preferences would interfere. A participant might have chosen not to play the tournament round if the participant felt he/she was depriving someone else from winning the round[30]. We would then have been capturing gender differences in other-regarding preferences rather than differences in competitiveness. Since on average, some studies have found there to possibly be gender differences in other regarding preferences, this design was applied to mitigate the possible confound.

(iv) **Round 4:** *Choice based on past performance*

This was the final round of the slider task and asked participants to make a choice in payment scheme. This choice was very similar to Round 3, where they had to choose between a payment according to the piece rate or the tournament scheme. However, in this round the choice was based on the participants' past performance (Round 1 Performance) and meant that only the choice was required of participants in this round. There was no physical completion of the slider task in this round because the performance had already been captured in a previous round. This means the Round 1 performance was utilised for both Round 1 and Round 4.

Note for those participants who choose tournament, their Round 1 performance is compared with their group members' Round 1 performance. For example, Figure 4 shows in turn the different decisions made by the

[30]If the choice in Round 3 was designed to be based on Round 3 performance of the other players (rather than Round 2 in our experiment), then choosing and winning the tournament may deprive other players from winning the round. If this were the design and there are gender differences in other-regarding preferences, as suggested by Cox (2002), then this could confound the analysis. To eliminate such confound, the tournament choice compares the individual's Round 3 performance with their group members' Round 2 performance.

members of the same group.

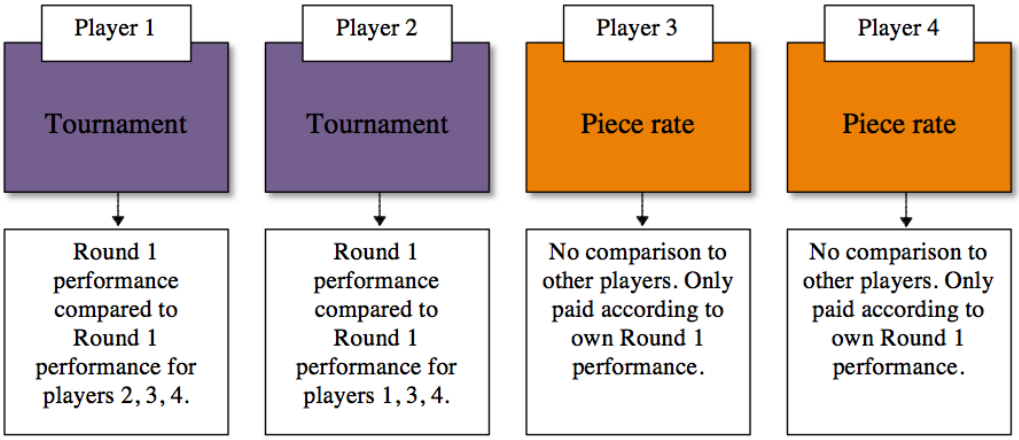

Figure 4: Example of player layout in the lab and associated choice made by participants in Round 4

- The figure shows that player 1 chooses tournament, therefore player 1's Round 1 performance will be compared with the player 2, 3 and 4's Round 1 performance. If player 1 completed more sliders in Round 1 compared with his/her team members, then player 1 will receive R12.00 per slider completed. If player 1 perform a slider amount lower than his/her team members then player 1 receives nothing for this round. A similar pattern is found for player 2 in this example.
- Player 3 and 4 choose piece rate in this example. Therefore both players would accrue R3.00 per slider completed in Round 1 for this round.

The choice in Round 4 is similar to the choice in Round 3, but does not contain the time pressure and physical competitive environment, as the Round 4 choice is based on performance already played. In effect, choice in Round 4 only involves the choice and no physical play in this round. As described in Niederle et al. (2007) there are different factors which may influence the choice in Round 3 compared with Round 4. These factors are categorised as either general or tournament specific factors. The general factors are characteristics that are not specific to the tournament setting, for example gender differences in the aversion to uncertain payments. This is compared with more tournament specific explanations, such there may be gender differences in the enjoyment of high pressure situations and having to perform in such an environment.

For this study, we are more interested in the tournament specific factors, as this gives more of an indication of competitiveness and the influence of a competitive environment on the choice to compete, rather than other more intrinsic characteristics that may determine the choice. As argued in Niederle et al. (2003), to isolate the general effects one could measure each factor and use them as controls in the competitive choice regression. However, this would add a large additional burden to the study design. In addition, one would not be certain that all the appropriate measures were captured. However, the choice in Round 4 can act as a fixed effect to control for the general factors in the competitive choice model. Choice in Round 4 is based on past performance. It is therefore a choice made in a competition free environment and does not contain in the choice the tournament-specific factors resulting from physically playing the game. Round 4 choice is the used as a control to eliminate the general factors, and the resulting variation only shows the tournament specific effect.

(v) **Ranking**

In order to capture the expected performance of an individual within a group, we asked participants to rank themselves relative to others within their group[31]. Participants were asked to assign a rank of either 1st, 2nd, 3rd, or 4th for their performance in Round 1 and Round 2[32]. Participants were not physically reminded of their performance before making their decision of where they ranked. However, they are encouraged to think back to their performance in the specific round and a couple of moments of silence to allow participants to think back to their performance is implemented. Participants were incentivised to make the correct decision and they were allocated an additional R5 for every correct ranking guess.

(vi) **Questionnaire**

A questionnaire at the end of the study was implemented to capture basic characteristics, personality traits and attitudes of the individual. A pre-experiment survey was also completed at least a week before the start of the study that collected additional background characteristics.

4.2 Between subject design

The study seeks to examine if the institutions and frameworks implemented have the ability to mitigate the anticipated gender gap in competition. The comparison between more formal structures, such as Affirmative Action, and role model representation, is performed. These treatments feature in real-world situations and potentially have policy relevance. Participants were assigned to different treatments based on the session they attended[33]. This study included one control group and three different treatment groups. The treatments included an Affirmative Action, Female Role Model treatment and a Male Role Model treatment.

The experimental design is shown in Figure 5. The control group implemented the within-subject design as described in the previous section. The treatments had the slight modification in the incentives and/or instructions. The Affirmative Action treatment involved preferential treatment and was applied to women, whereas the Role Model treatments primed participants through images and speech during the verbal instruction presentation. The circles in Figure 5 below indicate when the treatment was applied or re-emphasised, which was at the beginning of Rounds 2, 3 and 4.

For the control group there are no adaptions to the design of the study and the participants experience the session as outlined in Section 3.1. The control group is therefore the baseline of the experiment and the treatments were only slight variations of this baseline structure.

[31]Participants are also told that if there is a tie in actual performance then the computer would randomly select the highest performer from the tied individuals.

[32]Participants were asked about their expected within group rank for Round 1 and Round 2 separately. In the experiment we are interested in measuring the beliefs, with the perceptions of ability being a factor that explains competitive choice. The Round 2 performance would more predictive of the Round 3 choice, where as Round 1 performance would be more predictive of Round 4 choice. Seeing as the Round 3 choice is the focal choice of the experiment, Round 2 beliefs were asked before Round 1 beliefs. This hopefully limits possible priming of beliefs when thinking of Round 1 performance first, formulating beliefs and then considering Round 2 performance to formulate Round 2 beliefs.

[33]Note the sessions were randomly assigned treatments. However, control groups were run as the initial sessions in order to obtain the pictures of high performing students for the Role Model treatment.

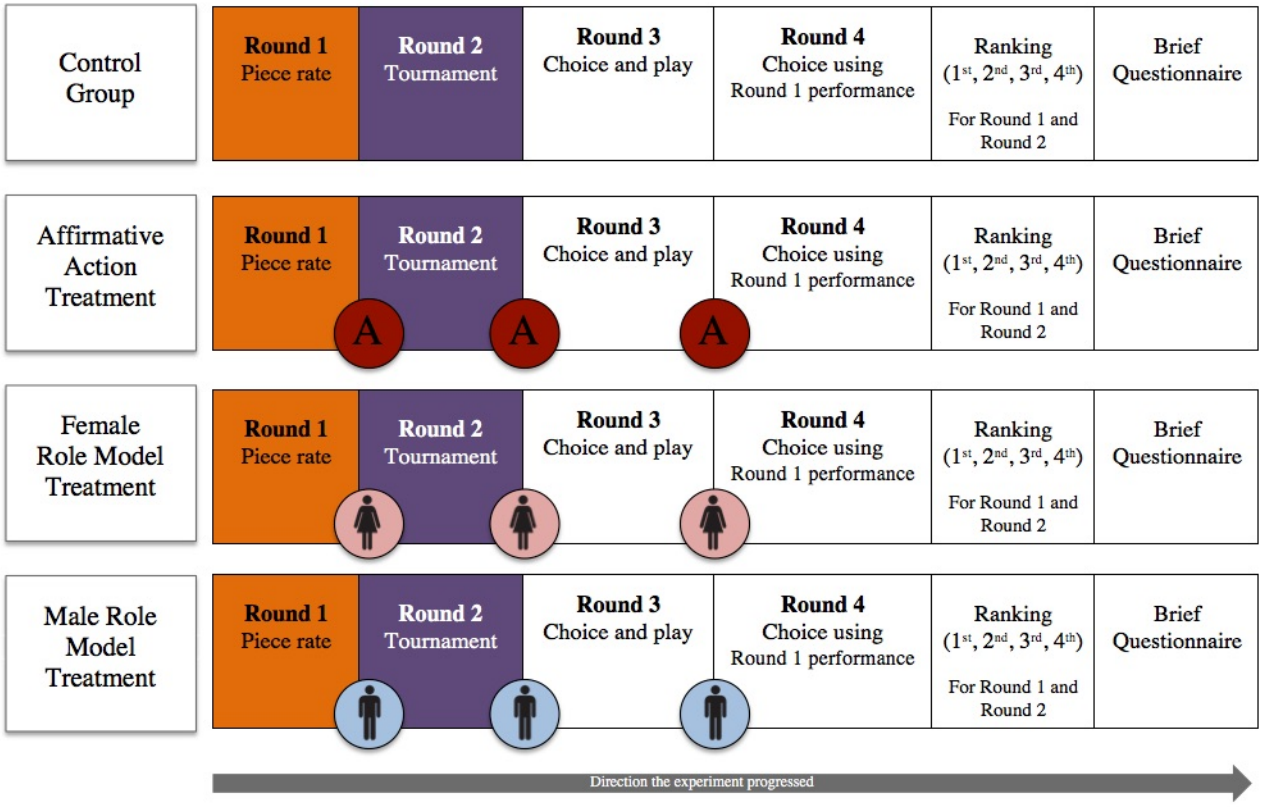

Figure 5: Between and within subject design framework

4.2.1 Affirmative Action treatment

The Affirmative Action treatment has direct applications for the real world and is a possible policy choice that could be implemented. We base the Affirmative Action rule on the policy that has been implemented in South Africa through the Employment Equity Act (EEA) of 1998. It outlines that individuals from designated groups, which includes people of colour, women and those with disabilities, should have equal access to opportunity and be equitably represented in all levels of the workplace. Section 15 of the EEA also highlights that affirmative action measures such as "preferential treatment and numerical goals [can be used] to ensure equitable representation. This excludes quota" (Employment Equity Act, 1998). For the reason of intending to best replicate the real world situation of South Africa, we used preferential treatment as the Affirmative Action rule.

In the Affirmative Action treatment, the structure of the incentives changed compared with the control group. This treatment included a preferential treatment for women and assigned additional unearned points to the women in the treatment. They therefore had a "head-start" from which to compete, and the men did not receive any preferential treatment. Women therefore received 1 additional slider to add to their points score[34], while the men did not receive any additional sliders. This preferential treatment incentive is the same as Balafoutas et al. (2011). This meant in the affirmative action treatment, if there was a tie in physical performance, then the woman would always win, as she was assigned the additional slider advantage. If there was more than one woman as part of the tie; one of the women

[34]The one additional slider was worth R3.00 in the piece rate round and R12.00 in the tournament round if the participant was the winner.

would be selected randomly from the tied women[35]. This treatment is considered a weak form of Affirmative Action as only one tie breaker slider advantage was given to women. An excerpt from the Affirmative Action treatment instructor script explains to participants the way that the advantage was designed. The instructor script text reads as follows:

> *"In this round we include a difference through added payment. For this round, all the females in the room will have one additional slider added to their overall performance for the round. Their performance (plus the one extra slider) will be used to calculate the payouts for the round. The males in the room will not receive any additional slider advantage in this round."* – Affirmative Action Instructor Script

Note in addition to this text, a brief further example was also included to ensure that participants understood the implications for the advantage.

> *"This means that if a male and a female are tied in physical performance then the female would always win, because she would have the 1 added slider advantage."* – Affirmative Action Instructor Script

The explanation of the slider advantage for women was applied at the beginning of Round 2, 3 and 4. A clear example of the payoffs, and the additional advantage given, was explained at the beginning of each of those rounds. This is the example text used to explain the advantage and the payoffs for Round 3, the Choice round.

> *"Every female in the room will have an advantage in this round. No matter which choice she makes, she will always have 1 slider added to her performance at the end of the round. Therefore: (1) If she chooses piece rate she will be given an extra slider of R3.00 to added to her score. (2) If she chooses tournament, her physical performance PLUS an added slider, will be compared against her group members performance in Round 2.*
>
> *Every male will not have any added sliders advantage, but will be paid according to his physical performance. Therefore: (1) If he chooses piece rate, he will be paid R3 per slider performed and no added slider advantage. (2) If he chooses tournament, his physical performance will be compared against his group members performance in Round 2."* – Affirmative Action Instructor Script, Beginning of Round 3

Although by design, the incentives are structured as a Affirmative Action treatment, the label 'Affirmative Action' was never used explicitly. This was intended to limit the additional connotation that may be associated with Affirmative Action as a concept. In addition, since Affirmative Action is more readily applied to race-based preferential treatment in South Africa compared with gender-based Affirmative Action, participants could automatically assume (explicitly or implicitly) that the advantage was race based and not gender based. Therefore not mentioning 'Affirmative Action' as a concept directly is implemented to decrease the possibility that participants confused this gender-based incentive with the race-based Affirmative Action[36].

4.2.2 Role Model treatment

It is important to define what is meant by a role model in this study. Founded in ideas of identification and social learning theories, the definition of role models in this paper refers to a cognitive construction of an individual in the minds of others who are perceived to have similar attributes, and results in an increased desire to emulate the

[35]Note for the other treatments and the control group, if there was a tie in physical performance then the winner was randomly selected from the tied individuals.

[36]For the full instructions implemented in the session are included in the Appendix.

individual (Gibson, 2004). Since role models are fairly difficult to "create" in the lab, as there is limited time to create reputations, through our application of role models we can only speak in terms of how temporary role models may influence behaviour. This would be a "weaker" role model than seen in the real world, as our peer role model is created in a shorter period of time and with less credibility. However, it can be interpreted as a lower bound of the effect of a more permanent role model. The Role Models we establish in the study are also peer-based Role Models, which allows for them to be more relatable to the participants, but implies the possible conclusions drawn are particular to this specification.

For the Role Model treatment, participants from the control group, who were high ability performers, were selected as role model exemplars for the participants in the Role Model treatment. These Role Models were selected by identifying individuals from the control group who had come first in their respective group. A picture of the selected role model[37] along with continued reinforcement of the particular individual's excellence was used during the issuance of the instructions to each treatment group. The incentives and design was identical to the control group, but the framing of an expected winner in that group was altered in the Role Model treatment. Note the gender of the role model is not explicitly mentioned, but gendered pronouns and the photographs increase the salience of their gender to the treated participants. An example text from the Role Model instructor script includes this excerpt:

> *"We have been running these sessions for the last couple of weeks and here is a picture of someone who has performed really well in the task in a previous group. Because [he/she] has done so well, [he/she] gets to be acknowledged in our "hall of fame" and will be used to represent the tournament type payment. [He/She] was the winner in [his/her] group and had a very good performance. So [he/she] gets [his/her] picture up in this presentation."* – Male and Female Role Model Instructor Script

Only one female or one male was displayed per Role Model treatment session. For the role model treatments, it could be difficult to disentangle if the effect of the Role Model treatment is due to the gender or the race of the Role Model. To ensure that the race of the Role Model was controlled for in the study, half of the Female Role Model treatment contained an African Female Role Model and the other half contained a white Female Role model. The similar half-half application based on race was implemented for the Male Role Model treatment. This design attempts to neutralise the possible confound of the race of the Role Model, so that on average the gender and not the race is driving the result.

4.3 The Real Effort Task

The literature explores a variety of different real effort tasks in the field of competitive behaviour. These include the task of throwing balls in buckets (Gneezy et al., 2009), others have used solving mazes (Gneezy et al., 2001), and further papers have implemented running races between students (Dreber et al., 2011). In the main studies of interest (Niedlerle and Vesterlund, 2010; Balafoutas and Sutter, 2011) the task is based on adding up five 2-digit numbers, with the aim to complete as many sums as possible within a certain period of time. This time ranges from 3 to 5 minutes depending on the study. Although it would be advantageous to conduct a similar real effort task in this study, to allow for better comparison with the literature, there are important criticisms of these tasks that should be considered.

[37] The picture was collected from the VULA system, the University of Cape Town's online academic coordination platform. Pictures of all students can be accessed through this platform. Consent from all participants for usage of their pictures was ensured before they participated in the study.

The main critique is that the task itself may be creating an unintended gender bias. It is argued that the 2-digit number task mentioned above is stereotyped to induce better performance from men, even if this may not be the case in reality. It is this *perception* of the task itself, and not the competitive environment, which may cause the gender differential in competitive performance and willingness to compete (Gunther et al., 2010). The choice participants put forward is therefore a response to the task rather than based on the preferences to opt into a competitive environment. Niederle et al. (2007) argue that with simple mathematics tasks, as with their arithmetic task, there are no gender difference in performance and men only start to perform better when the task becomes more of an abstract mathematical form. Yet, even if performance were identical, the perception that the task may favour a particular gender would still influence the decision to compete. It is unclear if the gender gap that Niederle et al. (2007) have documented is due to a basic preference to complete in a certain way, or because there is a preference not to compete specifically in a mathematics-based task. It is concerning that these results may be derived due to the type of game used rather than being based on more fundamental preferences.

Further literature has examined the relationship between competitiveness and the type of task in more detail. Grosse et al. (2010) show that there are big differences in behaviour between quantitative based tasks (such as Niederle et al. (2007)) and verbal ordering tasks. They show that women are less likely to opt into the competitive environment only in the quantitative task (stereotypically male). Dreber at. al (2014) confirm this finding between verbal and quantitative based tasks with an adolescent sample in Sweden. In addition, Gunther et al. (2010) examine "male tasks" (solving mazes), "neutral tasks" (word generation problem) and "female tasks" (memory and matching game). Their predictions are confirmed by observing gender differences in the male task, a similar response by both genders in the neutral task and a stronger preference for competition by women in the task that females would stereotypically have an advantage. This further highlights that the type of real effort task completed is important and strengthens the critique that the arithmetic task proposed by Niederle et al. (2013) may not be appropriate.

In order to minimise the influence of the task itself, it was important to use a task which gives no apparent advantage to either gender. The gender-neutral task proposed by Gunther et al. (2010) involves putting a letter of the alphabet up on the board and requires the participants to come up with as many words as possible in a certain time period. Since such a task may disadvantage second language English speakers and may bias perceptions of relative rank based on language ability or race (as many white individuals are first language English speakers), this would not an appropriate task in the South African context, as it could confound the analysis.

Given the constraints of the above mentioned tasks, a computer-based game developed by Gill and Prowse (2009) with the adjustable sliders was selected as the most suitable approach. This game involves the effort of adjustment, but without the language bias and without being associated with a particular gender. We ran this slider game on z-tree (Fischbacher, U, 2007), as is performed in Gill and Prowse (2009)[38]. There are further benefits of the slider task, as outlined in Gill and Prowse (2009). Firstly, the task is identical across repetitions, therefore the tasks do not vary on degree of difficulty and thus are more comparable across rounds. Secondly, there is little randomness associated with the task as the sliders are standardised and it is not, for example, a series of numbers that need to be calculated. There is also no opportunity for guesswork by the participants, as the design is based on actual effort. Lastly, while the time required to complete the task is very short, there is lots of variation found in the results. This is especially important as it allows for differentiation of performance between individuals that is time efficient.

[38]We would like to thank David Gill and Victoria Prowse for sharing their ztree code for this game.

Drawbacks of the slider game include the possibility of learning effects. However such learning effects would be present in most tasks and are not specific to just the slider task. On average, Gill and Prowse (2009) observe an increase in learning from round 1 and 2 and this disappears in the following rounds. This is something that should be taken into account for the current study even though it can be argued that the learning effects should not be different across gender group. Benndorf et al. (2014) note that the slider task has a lower learning effect than the other tasks, providing evidence that the slider task may not have the highest sensitivity to learning effects. In conclusion, the slider task provides a way of capturing the performance of individuals in a way which mitigated the effects of stereotype threat and other critiques, and also created high variation of effort in the most time efficient way.

4.4 Value of the Task

The value of each slider in the task is important, as it is the tool the experimenter uses to incentivise performance. This study based the pricing on two studies, with values in line with the related literature. Note that the task and the currency used is different for this experiment compared with the benchmark studies, and therefore this needs to be taken into account. The Table 1 below displays the pricing values for the different components of the benchmark studies.

	Balafoutas et. al (2011)			**Niederle et. al (2010)**		
Currency used in paper	Euros			Dollars		
Average performance in paper	6 - 9 puzzles			10 - 12 puzzles		
		2006	*2016*		*2006*	*2016*
Payment for piece rate	0.5 Euros	R4	R9	0.5 Dollars	R3	R8
Payment for tournament	1.5 Euros	R12	R27	1.5 Dollars	R9	R24
Guess rank payment	1 Euro	R8	R18	1 Dollar	R6	R16
Show up fee	3 Euro	R24	R54	10 Dollars	R60	R150
Completion fee	-			5 Dollars	R40	R80

Note: The exchange rate used is approximately 1 Euro = R8 and 1 Dollar = R6 in 2006; 1 Euro = R18 and 1 Dollar = R16 in 2016

Table 1: Payments and pricing of benchmark studies

In the slider task, the average performance score was 22 - 26 sliders[39] (Gill and Prowse, 2009), which is higher than the average completed puzzles for the benchmark competitiveness studies (Niederle et al., 2010, Balafoutas et al., 2011). We therefore divide the value obtained from the puzzle by a certain factor in order to make the incentives more equivalent across studies. We divide the value of each task by 3.2[40] for Balafoutas et al. (2011) and 2.18[41] for Niederle et al. (2010) to roughly allow the earnings from the experiment to be more in line with the amount gained in the literature on average (see Table 2).

[39]We use Gill and Prowse (2012) results as the expected baseline in the planning process. However, when examining our results we see a lower average performance. This means that our participants may have captured slightly lower incentives compared with the benchmark studies on average. We present our findings with respect to the Gill and Prowse (2012) performance levels.

[40]This is calculated by dividing the average performance for our task (26 + 22)/2=24 by the average performance for Balafoutas et al., (2011) which is (9 + 6)/2=7,5. Therefore the ratio of average performance between the games (24/7.5) would be 3.2.

[41]This is calculated by dividing the average performance for our task (26 + 22)/2=24 by the average performance for Niederle et al., (2010) which is (10 + 12)/2=11. Therefore the ratio of average performance between the games (24/11) would be 2.18.

	Balafoutas et. al (2011)		Niederle et. al (2010)		Current Experiment
	2006	*2016*	*2006*	*2016*	*2016*
Piece rate payment	$4/3.2 = 1.25$	$9/3.2 = 2.81$	$3/2.18 = 1.37$	$8/2.18 = 3.66$	R3
Tournament payment	$12/3.2 = 3.75$	$27/3.2 = 8.43$	$9/2.18 = 4.12$	$24/2.18 = 11.00$	R12
Guess rank payment (per rank)	$8/3.2 = 2.5$	$18/3.2 = 5.62$	$6/2.18 = 2.75$	$16/2.18 = 7.33$	R5
Show up fee	$24/3.2 = 7.5$	$54/3.2 = 16.87$	$60/2.18 = 27.52$	$150/2.18 = 68.80$	R25

Table 2: Values for pricing of experiment

For our experiment, we select an average whole number between the two benchmark studies using R3 per slider in Round 1 and R12 for Round 2. It is important to note that the tournament payment and the piece rate payments are designed so that the expected value is equal. For example, the experiment had groups of four with one winner, therefore we used a factor of 1/4 to calculate the payment for an individual to be indifferent between choices in expectation. Using the expected value factor, the Round 2 slider was calculated at R12 per slider for the winner. As shown in the table above participants were paid R5 for every correct guess they completed, with this personally predicted rank depending on beliefs. A R25 show up fee was paid to ensure that individuals come to the session and they need to be 10 minutes early to earn this show up fee.

4.5 Groups

From the tournament round and beyond, performance (or choice of payment scheme) was based on a decision contingent on the performance of other individuals in one's group. In this study, groups contained 4 people, which means there were approximately two groups in each session. The structure of four group members was based on Niederle et al. (2005). To increase control and to be consistent with much of the literature, at the appropriate time in the experiment, participants were told that their group members were those seated in their row in the computer labs. They could thus deduce the gender of their competitors without being explicitly told[42]. The participants therefore knew whom they were to compete against. This is significant because if they were not told this information, then participants may have imagined they were competing against certain individuals, but this information would have been unknown to the experimenter. By not informing the participants of their competitors, a control would have in essence been lost.

Groups were defined as mixed sex clusters of two men and two women[43]. The literature shows that who one competes against may influence performance and competitive choices. Gneezy et al. (2001) show that when looking at performance, its not that girls dont like competing, they just dont like to compete against boys. They demonstrate that, on average, performance decreases substantially for girls (relative to boys) when in a mixed sex environment compared with when they are performing in a single sex environment. A further study also looks at the importance of group composition on performance, with competing pairs (either in single sex or mixed-sex) in younger participants and finds that composition has an influence on performance (Gneezy et al., 2004). Booth et al. (2012) look at this with respect to the willingness to opt into competitive environments and display a consistent effect, with women

[42]Note participants can also observe race, which is the reason we control for race in our main regressions and look at the race/gender interactions.

[43]For the experiment we included only groups with the clustering of 2 men and 2 women, and did not have any single sex groups or groups with a 1:3 gender ratio. Gneezy et al. (2001) show that the gender of the individual whom with one competes can influence one's responsiveness to the competitive environment. Therefore to limit this possible confounding factor and reduce the possibility of an additional "moving part" in the experiment, we only examine groups with two men and two women. This ratio is selected as it is the most balanced and is also shown to display the strongest competitive response (Gneezy et al., 2001). However, this specification will limit the possible conclusions that could be drawn from the experiment.

who were randomly assigned an all-female group being significantly more likely to choose the competitive option. Note they look at groups of 4, with groups being either single sex or mixed-sex. In their study, the mixed group is a random composition of males and females to produce a group of 4. In our study, we had a set proportion of males and females in each group and only focused on mixed sex groups. Although this may have limited conclusions, for simplicity this was the only way we could limit confoundedness without including additional treatments with iterated group gender composition.

Some of the literature looks exclusively at two person groups (Gneezy et al. 2001; Gneezy et al., 2003; Gupta et al., 2005). This would have been a favourable number as there are no other iterations of group composition possible and would have made the experiment simpler in some regards. It also would have meant that the probability of winning the tournament round would be higher than if there were more individuals who were vying for first place. If there were 2 individuals competing then there would be a 50% expected probability of winning; this probability is far higher than the Niederle et al. (2008; 2013) papers that have a 25% and 33.33% expected probability of winning. We therefore kept the groups larger than 2 to be more in line with the literature that look specifically at choice to compete, rather than the papers that focus on performance differences (Gneezy et al. 2001; Gneezy et al., 2003). We also felt that although head to head challenges are experienced on occasion in the real world, a group competition is possibly more applicable to everyday life and a more consistent fit with the real world. The group of larger than two is still consistent with the literature (Booth et al.. 2012; Lee et al., 2014; Gunther et al., 2010) and thus was selected as the most favoured option.

5 Sample characteristics: Population representativeness and balance

In order to isolate the effect of the treatments, it is important to make sure that the effect measured is driven by the difference between the treatment and the control and is not driven by differences in other factors. We therefore look at a range of other factors to make sure that the sub-samples are as similar as possible. To ensure that the sample is truly balanced, and does not differ significantly across treatment/control, we run a simple statistical analysis to confirm that assignment to a treatment group does not significantly change the probability of a participant possessing a specific characteristic compared with the control group. Table 3 displays the demographic characteristics of the sample and the associated significance of characteristic unconditional difference between treatment and control[44]. In addition to the t-tests of the unconditional means, the statistical test of conditional means is also completed. These tests ensure that the treatments do no vary significantly compared with the treatment over a range of variables. The conditional mean regression results are shown in Table 18 of the Appendix[45]. These descriptive data show the sample is fairly balanced on average.

When looking at gender and population-groups, the samples are shown to be balanced. By design, there is a very even proportion of men and women in the sample. Approximately 50% of the sample are women and 50% of the sample are men. The population-group profile is fairly representative of a mix of the general South Africa population and the University of Cape Town population-group, with the majority of the sample being people of

[44]For the table displaying the p-values for the t-tests between the mean of each treatment compared with the control, which generates the significance stars on Table 3, see Table 16 in the Appendix. In addition, Table 17 displays the p-values for the comparison of Affirmative Action group and both Role Model groups and shows little significant difference. Further, Table 17 displays that there are not large significant differences between the two Role Model treatments.

[45]A binary comparison is made between treatment and control, with treatments equalling one and control equalling zero. This binary variable is used as the dependent variable in the controlled regressions. Variables are included to ensure that there is not a significantly higher proportion (or value) of one of these additional variables in the treatment group compared with the control group.

colour. The largest proportion of the sample is made up of African individuals and the white population-group is the smallest proportion of the overall sample[46]. This highlights that the samples and sub-samples within treatments are very balanced and any effects found are not due to the gender or racial composition of the treatment sub-samples.

The age profile indicates that the average participant in the sample was between the age of 20 and 21. This is in line with the participant recruitment strategy, which was more targeted to undergraduate students[47]. Previous studies have indicated that the gendered nature of school (either single sex or co-educational) may have an impact on the level of competitiveness (Lee et al., 2014). We therefore include this as part of the survey and show that the proportions of people who attended each of these types of primary and secondary school are balanced. Interestingly, there is a far higher proportion of individuals in the sample who attended a mixed-sex primary school, and a lower proportion of participants who attended a mixed-sex high school.

Fathers's socio-economic status has been shown to be an important factor for the willingness to compete (Almas et al.. 2015) and is therefore included in the descriptive statistics to show balance between treatments and control. Education is used as the proxy of socio-economic status (Gottfried, M et al., 2014). On average between 55 - 60% of the sample's fathers have some form of tertiary education. This is not significantly different between treatment and control. For completeness, mother's education is also included. The t-test of unconditional means displays that there is a significant difference between the average proportion of participants in the male role model group with mothers who had obtained tertiary education compared with the control. In addition, given the other characteristics of the joint test of significance, the Affirmative Action treatment (AA) is shown to contain participants with significantly lower educated mothers compared with the control group shown on Table 18 in the Appendix. Background characteristics have been shown to be important in determining competitiveness. However, the literature shows father's socio-economic status rather than mother's socio-economic status as the important driver of competitiveness (Almas et al.. 2015). These variables are included as controls in our main explanatory regressions. This ensures effects are not driven by baseline differences in the sub-samples.

Affirmative action opinions could also change the effectiveness of the policy intervention and the responsiveness of individuals to the intervention. Initially, a simple index out of 10 is constructed based on questions that distinguish the affirmative action attitudes of the individual, however, a dummy variable is constructed from this index. This index was based on two questions: (1) "Our society should do whatever is necessary to make sure that women have an equal opportunity to get ahead" and (2) "Gender-based affirmative action is a necessary policy choice in South Africa". It asked participants to identify if they strongly disagree, disagree, neutral, agree or strongly agree with these statements. We then construct a dummy variable that indicates if the individual stated agree or strongly agree for both of these questions. Table 3 shows a dummy variable for those who had selected agree or strongly agree for

[46]It is difficult to isolate the exact population proportions for UCT as they separate their data according to South African and international students before examining the population-group proportions. The international category would include a combination of students from the SADC region and the rest of the world. It is unclear the population-group proportions within this international category. There is a fairly large Other or Undisclosed category as well from the UCT statistics (University of Cape Town, 2014). Even if it were assumed that both the Other and International are part of the African population-group, our data would still display an oversampling of the African population-group and an unhderstampling of the White population-group. However, our data would be a closer description of the overall South African context and therefore we still regard the proportions of population-groups in our data as consistent with the representation of the South African context. Table 19 in the Appendix displayed the different proportions of population-group for the current sample, UCT and South African at large.

[47]Although not displayed on Table 3, the conditional test on Table 18 in the Appendix shows that the Female Role Model (RMF) treatment has a significantly younger group of participants, on average, compared with the control group. When looking at the average ages for the control group and the RMF treatment, they are 20.88 years and 20.43 years respectively. Although this is a statistically significant difference, it seems that there is approximately 4 months difference between treatment and control on average should not have a material effect on the overall outcome.

both of the above mentioned affirmative action questions. The data show that approximately 70% of the sample were in favour of affirmative action. There are no significant differences regarding affirmative action between the treatments and control group.

Sample included:	(1) All	(2) Control	(3) AA	(4) RMF	(5) RMM
Male (%)	49.54	50.41	49.55	48.00	50.00
	(0.501)	(0.502)	(0.502)	(0.502)	(0.502)
Female	50.46	49.59	50.45	52.00	50.00
	(0.501)	(0.502)	(0.502)	(0.502)	(0.502)
African (%)	63.93	66.94	57.66	68.00	63.21
	(0.481)	(0.472)	(0.496)	(0.469)	(0.485)
Indian/Asian/Coloured (%)	21.92	20.66	25.23	23.00	18.87
	(0.414)	(0.407)	(0.436)	(0.423)	(0.393)
White (%)	14.16	12.40	17.12	9.00	17.92
	(0.348)	(0.331)	(0.378)	(0.288)	(0.385)
Age (in years)	20.96	20.88	21.53	20.43	20.95
	(3.827)	(3.761)	(4.998)	(3.571)	(2.451)
Currently holds a part-time job (%)	6.16	9.09	6.31	3.00*	5.66
	(0.241)	(0.288)	(0.244)	(0.171)	(0.232)
Attended mixed-sex high school (%)	70.55	67.77	68.47	73.00	73.58
	(0.456)	(0.469)	(0.467)	(0.446)	(0.442)
Attended mixed-sex primary school (%)	87.44	87.60	86.49	86.00	89.62
	(0.332)	(0.332)	(0.343)	0.348)	(0.306)
Father has tertiary education (%)	57.99	59.50	59.46	54.00	58.49
	(0.494)	(0.493)	(0.493)	(0.501)	(0.495)
Mother has tertiary education (%)	54.79	63.64	54.05	55.00	45.28***
	(0.498)	(0.636)	(0.501)	(0.500)	(0.500)
AA opinion(%)†	70.3	71.07	66.67	69.00	74.52
	(0.457)	(0.455)	(0.473)	(0.464)	(0.437)
Number of obs	438	121	111	100	106

Note: Standard deviations in parentheses. Significance of difference: *** p<0.01, ** p<0.05, * p<0.1
For t-test p-vlaue output see Table 16 (Appendix). LPM are estimated.
Acronyms: AA = Affirmative Action, RMF = Role Model Female, RMM = Role Model Male
† AA opinion asks participants to identify if they strongly disagree, disagree, neutral, agree or strongly agree with the following statements: (1) "*Our society should do whatever is necessary to make sure that women have an equal opportunity to get ahead."* and (2) "*Gender-based affirmative action is a necessary policy choice in South Africa.*". Each question was therefore ranked out of 5, We create a dummy that combines both questions, and give a 1 if the individual ranked 4 or 5 on both the questions.

Table 3: Sample characteristics and the significance of difference with control variable

Overall the data shows that the sample is generally balanced on average[48] and the control variables discussed are included in further regressions to mitigate any differences in baseline characteristics between sub-samples. Therefore, any differences between treatment and control can be attributed to the impact of the treatment rather than any additional observable demographic characteristics. This suggests that the groups are similar enough so that one could compare control and treatment without the concern that other factors are driving the result.

6 Results

6.1 Baseline ability: Round 1 Performance

6.1.1 No significant differences in baseline ability across treatments

Round 1 Performance can be considered as the baseline ability of individuals. The payment in Round 1 is paid according to a piece rate incentive, which means the performance does not contain the possible confound of differences based on the way that an individual might respond to a competitive environment. Further, the treatments are only implemented in Round 2 and therefore difference across treatments are not expected in Round 1 performance. The piece rate performance in Round 1 therefore captures the base level performance of an individual.

	All	Control	AA	RMF	RMM
Average performance in Round 1:	12.89				
	(4,158)				
Average performance in Round 1, by treatment:		13.05	12.91	12.85	12.71
		(4,362)	(3,925)	(4,314)	(4,056)
Observations:	438	121	111	100	106

Acronyms: AA = Affirmative Action, RMF = Role Model Female, RMM = Role Model Male
No significant differences between treatments and control, using multiple individual t-tests.
Note: Standard deviations in parentheses.

Table 4: Average number of sliders completed in Round 1 over treatments

Table 4 shows that Round 1 performance does not differ significantly across treatments and control and the average performance of individuals in Round 1 is 12.89 sliders. This result indicates that there is similar baseline ability for the different treatments. The average performance for Round 1 is 12.91, 12.85 and 12.71 sliders for the Affirmative Action treatment, the Female Role Model treatment and the Male Role Model treatment respectively[49].

A simple Ordinary Least Squares (OLS) model[50] of the significance of the treatments, taking into account other baseline characteristics, is displayed in Table 5. Remember, each of the treatments is applied after the Round 1 performance is captured. We would therefore not expect to see any significant differences in performance between treatment and control groups. The results show the treatments do not have a differential effect on performance compared with the control group. The additional control variables do not influence the significance of the coefficients[51].

[48] Note these samples exclude any outliers, which may confound or drive an unexpected result. A brief outlier analysis was conducted before applying the analysis. This involved examining the performance variables in Round 1, 2 and 3. Any individuals who performed outside the threshold of a 3 standard deviation from the mean (in both the positive and negative direction) was excluded from the analysis, as it would be very rare for performance beyond to be present in the data. Individuals who performed outside of the threshold for any of the three performance rounds were excluded. Of the whole sample, there were 6 outliers in performance.

[49] The t-test p-values for the significance comparison between treatment and control are 0.862, 0.731 and 0.543 for AA, RMF and RMM treatments respectively. On average, performance in each of the treatments is not significantly different from the control group.

[50] Note all additional models that analyse performance also are based on the OLS statistical framework.

[51] Controls are added to the regressions and include the background characteristics that may have an impact on performance.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Dependent variable:	Round 1 Perform.	Round 1 Perform.	Round 1 Perform.	Round 1 Perform.	Round 1 Perform.	Round 1 Perform.	Round 1 Perform.	Round 1 Perform.
Sample:	*All*	*All*	*Cont. & AA*	*Cont. & AA*	*Cont. & RMF*	*Cont. & RMF*	*Cont. & RMM*	*Cont. & RMM*
AA treatment	-0.140	-0.130	-0.140	-0.0783				
	(0.544)	(0.520)	(0.544)	(0.525)				
RMF treatment	-0.200	-0.158			-0.200	0.00957		
	(0.586)	(0.539)			(0.586)	(0.544)		
RMM treatment	-0.342	-0.397					-0.342	-0.604
	(0.559)	(0.541)					(0.559)	(0.577)
Male dummy		1.528***		1.435***		1.945***		1.627***
		(0.372)		(0.543)		(0.538)		(0.540)
African dummy		-2.477***		-1.804***		-2.806***		-2.479***
		(0.376)		(0.550)		(0.541)		(0.556)
Age		-0.259		-0.469**		0.298		-0.256
		(0.206)		(0.213)		(0.565)		(0.501)
Age x Age		0.00227		0.00588*		-0.00822		0.00438
		(0.00368)		(0.00304)		(0.0115)		(0.00955)
Part time job		1.160*		1.271		2.057*		1.145
		(0.696)		(0.957)		(1.055)		(0.842)
Father educ.		0.208		0.351		-0.451		0.889
		(0.446)		(0.701)		(0.609)		(0.587)
Mother educ.		0.927**		0.796		1.619**		0.515
		(0.446)		(0.706)		(0.624)		(0.611)
Prior exp. in task		1.164*		1.204		0.799		1.982**
		(0.629)		(1.427)		(0.985)		(0.824)
Constant	13.05***	17.40***	13.05***	19.75***	13.05***	10.41	13.05***	16.13***
	(0.397)	(2.796)	(0.397)	(3.161)	(0.397)	(6.773)	(0.397)	(6.155)
Observations	438	438	232	232	221	221	227	227
R-squared	0.001	0.163	0.000	0.119	0.001	0.182	0.002	0.187

Acronyms: Cont. = Control group, AA = Affirmative Action, RMF = Role Model Female, RMM = Role Model Male, Perform. = Performance, educ. = has tertiary degree, Prior exp. in task = Prior experience in task, dummy = indicator variable of 1 or 0, Robust standard errors in parentheses, *** p<0.01, ** p<0.05, * p<0.1

Table 5: Influence of treatments on Round 1 performance, for all and for treatment sub-categories

Interestingly a dominant feature of Table 5 is that there are persistently significant effects found on the Male variable and the African variable. The positive sign on the male variable indicates that males have a higher baseline performance in Round 1 compared with women. The negative sign indicates that Africans have a lower performance compared with Non-Africans. The result is robust over the different treatments and seems to be a robust finding within these data. This is an unexpected result given that Gill and Prowse (2012) find no gender differences in their sample when implementing the same game with piece rate incentives. Further investigation into the differences in baseline ability by identity type are therefore explored.

6.1.2 Men solve more sliders than women

Consistent with the previous regression result, men are shown to have a far higher average performance in Round 1 compared with women. The performance overall is 12.14 sliders and 13.64 sliders for women and men respectively. Therefore men, on average, complete over 1 additional slider compared with women within the same 2 minute period of time. This result holds for all of the treatments, as expected, with the implementation of the treatment occurring only after the Round 1 performance was captured. For the full table of average sliders completed over treatment and gender see Table 20 in the Appendix.

The gender difference in performance holds when the additional controls are implemented, as shown in Table 6[52]. The coefficient on male does not differ materially when the controls are included in column (3). This indicates that the male variable does not contain any of the omitted effect, which is controlled for by the additional control variables. The African variable is negative and significant for all the regressions, including the full sample of observations. This indicates that the population-group dimension has an effect, along with the male and female categories. In addition, it also highlights the importance of controlling for baseline ability.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Dependent variable:	Round 1 Perform.	Round 1 Perform.	Round 1 Perform.	Round 1 Perform.	Round 1 Perform.	Round 1 Perform.	Round 1 Perform.
Sample:	*All*	*All*	*All*	*Male*	*Male*	*Female*	*Female*
Male dummy		1.495***	1.528***				
		(0.394)	(0.372)				
African dummy			-2.477***		-3.066***		-1.972***
			(0.376)		(0.557)		(0.485)
AA treatment	-0.140	-0.127	-0.130	-0.522	-0.763	0.264	0.479
	(0.544)	(0.539)	(0.520)	(0.782)	(0.742)	(0.743)	(0.744)
RMF treatment	-0.200	-0.164	-0.158	0.0106	-0.244	-0.315	-0.0279
	(0.586)	(0.574)	(0.539)	(0.896)	(0.824)	(0.731)	(0.727)
RMM treatment	-0.342	-0.336	-0.397	-0.470	-0.829	-0.200	-0.0361
	(0.559)	(0.550)	(0.541)	(0.826)	(0.830)	(0.732)	(0.750)
Observations	438	438	438	221	221	217	217
Controls:	No	No	Yes	No	Yes	No	Yes
R-squared	0.001	0.033	0.163	0.003	0.091	0.003	0.209

Dummy = indicator variable of 1 or 0. Robust standard errors in parentheses, *** p<0.01, ** p<0.05, * p<0.1. No impact of treatments on Round 1 performance. See Table 21 in Appendix for the full table output. *Acronyms:* Perform. = Performance, AA = Affirmative Action, RMF = Role Model Female, RMM = Role Model. *Controls:* Age, Age squared, Father has tertiary degree, Mother has tertiary degree, Part time job, Prior experience in task

Table 6: Influence of treatments on Round 1 performance, for all and Male/Female

As highlighted in the previous table, the dimensions of population-group and gender have a significant impact on performance. When examining the intersection of population-group, a hierarchy of performance emerges for these different sub-categories[53]. Population-group coefficients show Non-Africans perform better than Africans on average in Round 1. Within population-group, the gender dimension emerges, with males performing better than females on average at baseline Round 1. The hierarchy of Round 1 performance highlights the following relationship: *African Female performance < African Male performance < Non-African Female performance < Non-African Male performance*. This result suggests that both gender and race are important factors in determining performance and therefore should be considered carefully as the analysis progresses.

6.2 Willingness to compete: Evaluating competitive choice

6.2.1 Men choose to compete more than women

Niederle et al. (2007), one of the benchmark papers of our experimental design, examine the choice to compete as the key indicator of competitiveness. Choice to compete is therefore examined as our first key measure of competitiveness. Approximately 50% of the sample chooses to compete in the choice round (Round 3). In the

[52]See Table 21 for the full output including the control coefficient displayed.
[53]Note this result is not displayed, but was checked separately.

control group, 53.72% of the sample selected the tournament choice in Round 3 on average. A similar percentage of the sample selected the tournament in Round 3 for each of the treatments. Panel (a) of Figure 6 displays the propensity to compete for the different treatments and control, and panel (b) of the figure disaggregates by gender. However, when disaggregated by gender then there is a clear differentiation of the propensity to compete between men and women, with approximately 68% of the men and 38% of the women choosing the competitive choice in the control group. The treatments have no significant effect on the propensity to choose the competitive payment, both on average overall and when disaggregated by gender.

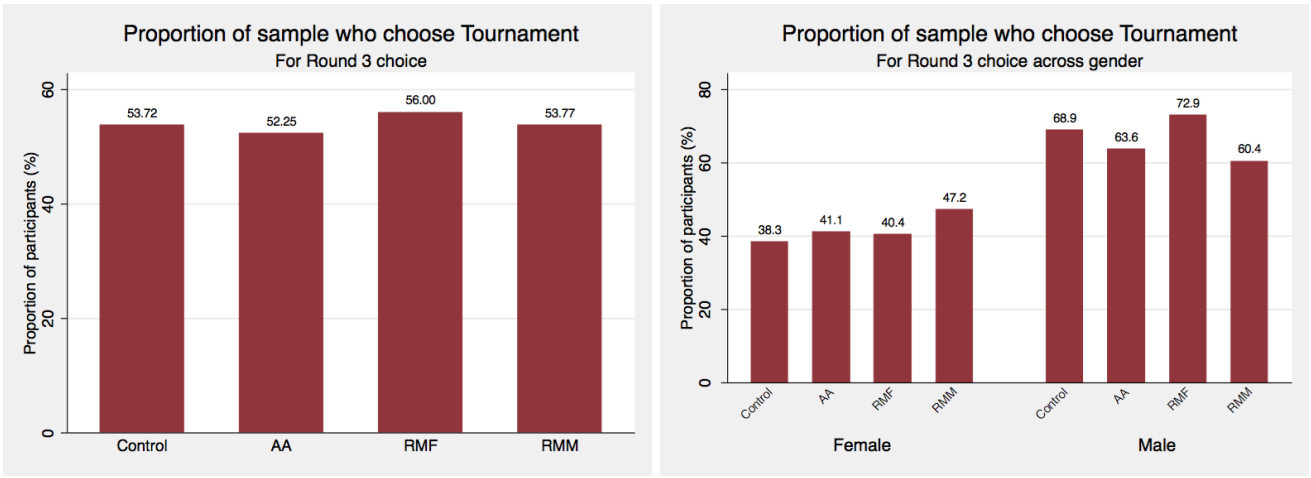

Figure 6: (a) Proportion who make the competitive choice, (b) Proportion who make competitive choice by gender

The significance of the gender difference in choice is displayed in Table 7. This shows that men are significantly more likely to choose to compete compared with women on average. The coefficient on the male variable only decreases slightly with the inclusion of the treatment fixed effects and the controls, which suggests the estimation on the male variable is robust to additional variables in the model, and that gender is a prominent explanatory factor in determining the choice to compete in Round 3[54]

[54]The table displaying the coefficients on the control variables is included as Table 22 in the Appendix. In addition, Table 23 in the Appendix displays the differential effect of women's choice to compete, when considering high versus lower performing women. We look at the top 20% and 30% of women in the sample based on Round 1 performance. This Round 1 proxies for baseline ability. On average, the choice to compete does not vary significantly when comparing the choice to compete for the best 20% of women compared with the latter 80% of women in the sample. A similar result is shown for the top 30% of women in the sample and the corresponding latter 70% of women. High ability women in the sample don't seem to choose to compete significantly differently compared with the rest of the sample of women. This is contrasted to the Niederle et al. (2007) finding, where they found that high ability women *specifically* didn't choose the competitive choice, even though they could win. This does not seem to be the case in our sample.

Dependent variable:	(1) Choice to Compete	(2) Choice to Compete	(3) Choice to Compete
Male dummy	0.239***	0.234***	0.231***
	(0.0416)	(0.0417)	(0.0418)
African dummy		-0.0806*	-0.0680
		(0.0482)	(0.0481)
Observations	438	438	438
Treatment Fixed Effects:	No	Yes	Yes
Controls:	No	No	Yes

Robust standard errors in parentheses. *** p<0.01, ** p<0.05,* p<0.1
Controls: Age (/100), Age squared (/100), father's education, mother's education, part time job, prior experience in task, Round 1 baseline ability.

Table 7: Impacts of gender on choice to compete in Round 3

Other factors may be important in driving this average gender choice separation and therefore other explanations, such as (i) **performance**, (ii) **beliefs** and (iii) **choice using past performance** (Niederle et al., 2007), are explored in the following sections. We discuss each of these aspects in turn and then present a summary table of the results.

Note for all these models of competitive choice, additional controls are used[55]. These include:

- Age is included in the model, as Mayr, Wozniak, et al. (2011) highlight that competitiveness increased across the lifespan until the age of 50 and then declined.
- Father's education is included as a proxy for father's socio-economic status. Almas et al. (2015) highlight in their sample of children that father's socio-economic status is an important predictor of competitive choice.
- During the data collection process for our experiment, there was an experiment from a different study in session (Monteiro, S et al., 2017). It was a study unrelated to this experiment, but did involve a similar real effort task. To ensure prior experience does not confound the analysis, the prior experience in task is included as an additional control in our model.
- Further, differences between treatment groups and controls outlined in the section on 'balance' highlight that mother's education and part time job should also be included in these regressions to eliminate any possible baseline differences between the sub-samples.

These factors could explain competitive behaviour. They are therefore included as the standard grouping of controls used in all further regressions, which model competitive choice.

6.2.2 Performance as a driver of competitive choice

Performance is proposed as a possible driver of choice to compete (Niederle et al., 2007). A higher performer has a higher probability of winning and therefore there should be a positive relationship between performance and choice to compete. The results are consistent with this hypothesis, there is a positive relationship being displayed between performance and the probability of choosing to compete[56]. Table 8 shows there is a positive coefficient for Round

[55]There are additional controls used to improve the fit of the model and to control for any additional variation between samples generated by background characteristics. The controls include age, father's education and prior experience in the task.

[56]A simple probit model is applied to the choice to compete data. Since the choice is a binary variable, the probit model is the most appropriate statistical method to estimate the regressions.

2 performance and a positive sign on Round 1 performance, when Round 2 performance is not included in the model. The Round 2 performance is a stronger predictor of choice to compete compared with Round 1 performance. Considering that Round 2 was the competitive tournament round, it is unsurprising that this would have stronger predictive power.

Given the baseline differences in ability in Round 1, the performance in Round 1 is included in the model to ensure that baseline differences in ability are not driving any of the additional effects found. Both Round 1 and Round 2 performance are included in any further models. A strong gender result is consistently displayed. Even when differences in baseline ability (Round 1 performance) are controlled for, men are still significantly more likely to select the competitive outcome in Round 3 compared with women on average[57].

Dependent variable:	(1) Choice to Compete	(2) Choice to Compete	(3) Choice to Compete	(4) Choice to Compete	(5) Choice to Compete	(6) Choice to Compete
Round 1 Performance	0.0128**	0.00442			-0.00557	-0.0117
	(0.00564)	(0.00607)			(0.00782)	(0.00777)
Round 2 Performance			0.0226***	0.0175***	0.0265***	0.0252***
			(0.00550)	(0.00591)	(0.00762)	(0.00747)
Male dummy		0.224***		0.216***		0.227***
		(0.0427)		(0.0419)		(0.0420)
Treatment Fixed Effects:	No	Yes	No	Yes	No	Yes
Controls:	No	Yes	No	Yes	No	Yes
Observations	438	438	438	438	438	438

Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1
Controls include: African dummy, Age, Age squared, Father's education, prior experience in task. Mother's education, part time job.
Treatment Fixed Effects: Affirmative Action treatment, Female Role Model treatment, Male Role Model treatment

Table 8: Impacts of performance on choice to compete in Round 3

6.2.3 Beliefs as a driver of competitive choice

Beliefs could also affect the choice to compete. Beliefs relate to the thoughts of winning, because if you think you won in Round 2, then you may be more likely to select compete in Round 3. As such, where an individual thinks she places within her group may influence the choice she makes. To capture this, the relative ranking is analysed. As part of the experimental design, participants were asked to rank where they thought they placed within their group in Round 1 and Round 2[58]. Consistent with previous studies (Niederle et al., 2007; Balafoutas et al., 2011), there is an overconfidence in the sample, with few participants thinking that they placed 3rd or 4th in their group. Given the small samples in the latter categories, we create a binary variable for beliefs called Think Win in Round 2. This is an indicator variable, with a one if the participants thought they placed first and zero otherwise. This construction of beliefs is consistent with Balafoutas et al. (2011).

The average proportions of participants who believed they placed first is 38.88%, as shown in Table 9. Given that there were 4 participants per group, only 25% of the participants should have beliefs of placing first. This highlights the over confidence in beliefs of placing first. On average, the proportion of people who thought they placed first differs, with the RMF treatment displaying higher proportions of those thought they placed first, but these differences are not significantly different[59]. A comparison can also be made between treatments. When looking at both men

[57]The full output with the coefficients of the control variables in Table 8 is displayed in Table 24 in the Appendix.
[58]The participants therefore assigned themselves as 1st, 2nd, 3rd, and 4th.
[59]Using unconditional t-tests , the p-values for the Affirmative action, Female Role Models and Male Role Models compared with the control group are 0.3027, 0.1364 and 0.9188 respectively.

and women, there are also no significant differences in beliefs *between* the two role model treatments[60]. However, there are significantly lower beliefs on average in the Affirmative Action treatment compared with both the Role model treatments[61].

	All	Control	AA	RMF	RMM
Proportion of sample who thought they won Round 2:	38.88% (0.487)				
Proportion of sample who thought won Round 2, by treatment:		38.02% (0.487)	31.53% (0.466)	48.00% (0.502)	38.67% (0.489)
Proportion of **women** who thought they won Round 2:	24.43% (0.431)				
Proportion of **women** who thought won Round 2, by treatment:		25.00% (0.437)	12.50%* (0.334)	32.70% (0.474)	28.30% (0.455)
Proportion of **men** who thought they won Round 2:	53.45% (0.535)				
Proportion of **men** who thought won Round 2, by treatment:		50.80% (0.504)	50.90% (0.504)	64.60% (0.483)	49.10% (0.505)

Note: Standard deviations in parentheses. Acronyms: AA = Affirmative Action, RMF = Role Model Female, RMM = Role Model Male

Table 9: Proportion of sample who thought won Round 2 over treatments

Men think they win the tournament far more than women

There is a strong gender component to the overconfidence in thoughts of placing first within a group. Males have a far stronger propensity to think they placed first compared with women. This is true for the control group and is a consistent result found across treatments. As shown in Table 9, 25% of the females in the control group thought they placed first within their group. This is a fairly accurate approximation of the real proportion of individuals who would have placed first in the sample. However for men, approximately half of the sample thought they would win. In the control group 50.8% of men in the sample thought they placed first in their group. This highlights the gender differences in the confidence levels in ability. The gender effect is displayed when applying a statistical test. Table 10 shows that men are significantly more likely to think they won compared with women from a statistical perspective[62]. This is shown in column (1) and (2).

Further, one could look at the average beliefs of winning within gender sub-groups for the different treatments, as displayed on Table 9. When a simple t-test of significance is applied, the data show that women in the Affirmative Action treatment have a significantly lower belief of winning compared to women in the control group[63]. None of the other treatments have a significant effect on women. For the men, there are no significant differences between any of the treatments and the control group.

As expected, there is a strong positive effect of beliefs on choice to compete. The regression analysis on Table 10 shows that there is a positive effect of the beliefs of winning in Round 2 on the choice to compete in Round 3. Moving from not-thinking-you-won to thinking-you-won in Round 2, produces a 36.6 percentage point change in the probability that the individual will choose tournament in Round 3, on average. This magnitude does not differ to a great extent when controls are added and decreases to a 31.3% point change. Both of these effects of the change of beliefs, with and without controls, are strongly statistically significant.

[60]The p-value for the t-test is 0.178.
[61]The p-value is 0.042 using a simple t-test.
[62]To see the table with all the control variable and treatment coefficients, see Table 26 in the Appendix
[63]Note a simple unconditional t-test was completed. The results of the p-values are shown in Table 25 of the Appendix.

Dependent variable:	(1) Think win in Round 2	(2) Think win in Round 2	(3) Choice to Compete	(4) Choice to Compete
Think win in Round 2			0.366***	0.313***
			(0.0352)	(0.0399)
Male dummy	0.277***	0.268***		0.139***
	(0.0383)	(0.0382)		(0.0431)
African dummy		-0.132***		-0.0252
		(0.0441)		(0.0463)
Treatment Fixed Effects:	No	Yes	No	Yes
Controls:	No	Yes	No	Yes
Observations	438	438	438	438

Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1. Acronyms: AA = Affirmative Action, RMF = Female Role Model, RMM = Male Role Model. Treatment Fixed Effects: AA, RMF and RMM. Controls: Age, Age squared, Father tertiary education, Mother education, Prior experience in task, Part time job.

Table 10: Impacts on beliefs of winning in Round 2 (1)(2); Impacts of beliefs on choice to compete in Round 3 (3)(4)

6.2.4 Choice in Round 4 as a driver of competitive choice

The choice in Round 4 is hypothesised to be predictive of the competitive choice in Round 3. The choice in Round 4 is similar to the choice in Round 3, but is made on past performance behaviour in Round 1 and therefore it eliminates the possibility of having to physically participate in the round. In the Round 4 choice, the average propensity to compete in Round 4 was 50.41% on average in the control group. This is slightly lower than the propensity for Round 3 choice, which was 53.72%. This decrease in average propensity to compete in Round 4 compared with Round 3 choice is driven by men. Figure 7 panel (b) shows that when disaggregating the choice in Round 4 by gender, 38.3% of women selected tournament and 62.3% of men selected tournament in Round 4. Recall for the Round 3 choice, the average propensities to compete in Round 4 in the control group were 38.3% for women and 68.9% for men. This indicates that women were more indifferent between the two choices, where as men decrease their propensity to choose tournament when they are not able to physically play the game. Figure 7 displays the propensities for each of the groups to choose the more competitive tournament choice in Round 4.

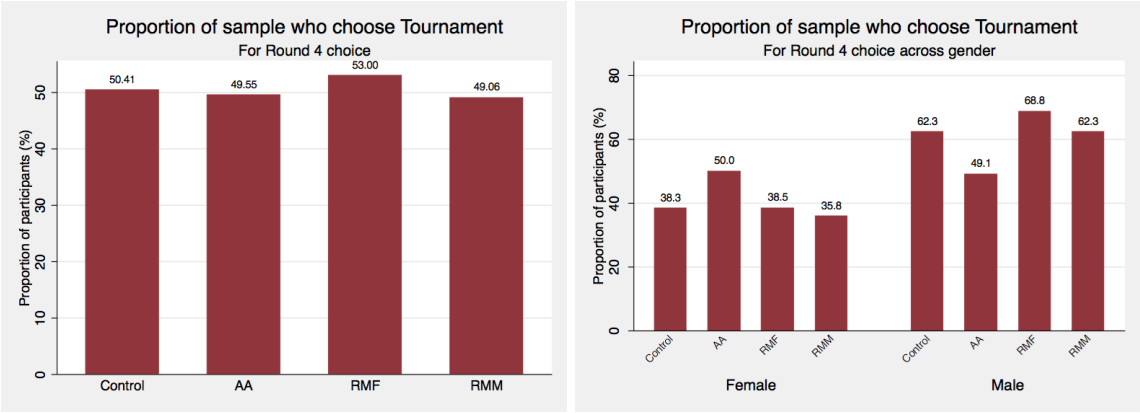

Figure 7: (a) Proportion of sample who make the competitive choice in Round 4, (b) Disaggregation of proportions of sample who make competitive choice in Round 4 by gender

Table 11 display the impacts on our main variable of interest, the choice to compete in Round 3. The Round 4 choice is used as a control variable for this Round 3 regression[64]. The choice in Round 4 is shown to be statistically significant and have a positive effect on choice to compete in Round 3. Moving from piece rate to tournament in Round 4, is associated with a 29.4 percentage point increase probability that the individual would choose tournament

[64]Table 27 in the Appendix displays the coefficients of the treatments and the controls, not shown on Table 11.

in Round 3. This value decreases to 24.9 percentage points when controls are included. The positive sign on the coefficient is consistent with expectations and the literature. In addition, there are still strong gender differences in the choice to compete in Round 3. This suggests that even when we control for the person specific effects, such as risk aversion and related characteristics through the Round 4 choice, there are still strong gender differences in the choice to compete in Round 3.

	(1)	(2)
Dependent variable:	Choice to compete	Choice to compete
Round 4 choice	0.294***	0.249***
	(0.0381)	(0.0392)
Male dummy		0.178***
		(0.0418)
African dummy		-0.0426
		(0.0463)
Observations:	438	438
Controls:	No	Yes

Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1.
Acronyms: R3 = Round 3, R4 = Round 4, AA = Affirmative Action, RMF = Role Model Female, RMM = Role Model Male, educ. = education, exp. = experience.
Controls: Round 1 and 2 performance, Think win in Round 2, Age, Age squared, Father's education, prior exp. in task, Mother's education, part time job.

Table 11: Impacts of choice in Round 4 on choice to compete in Round 3

The difference in choice between Round 3 and 4 is suggestive evidence of men's preference for performing in the competitive environment. For the Round 4 choice, there may be the additional confound of learning/improvement effects. By design, the Round 4 choice happens at the end of the experiment and therefore within-ability (comparison of performance within the individual between rounds) could influence the Round 4 choice. Remember that the choice in Round 4 is based on the performance completed in Round 1. The participant is asked to think back to Round 1 and he/she may compare this performance with the Round 2 and Round 3 recently played. This perception of improvement between rounds therefore may impact on the choice in Round 4.

Any changes in gender differences in Round 4 compared with Round 3 could therefore be driven by men having a higher perception of improvement between rounds compared with women. If learning between rounds is high, Round 1 performance would be viewed as relatively lower performance compared with Round 2 or 3 performance. Because of the anchors to their performance in Round 2 or 3, which were more recently played in the flow of the experiment, an improvement between rounds could convince individuals that they are not high performers in Round 1. This could discourage choice to compete in Round 4. This hypothesis would be consistent with the proportional decrease of men who selected compete in Round 4 compared with Round 3, as high learning would discourage choice to compete in Round 4 compared with Round 3 on average.

However, evidence to support the learning hypothesis is not observed in the data. When looking at actual performance the data show that men exhibit a decrease in performance between Round 1 and Round 2, not an increase in performance, which would be required to be consistent with this theory. On average, men's change in performance between Round 1 and 2 is a decrease of 0.819 sliders[65]. This suggests that an individual evaluates their own relative

[65]Note we examine men only as the decrease in propensity to compete between Round 3 and Round 4 is driven by the behaviour of men.

performance between rounds, the progression between rounds would not induce a belief of being a poor performer in Round 1. We therefore don't believe the change in beliefs, which occurs through the within-person comparison of performance between rounds, is associated with the decrease in the propensity to choose tournament in Round 4 compared with Round 3. This is indirect support that the gender differences in the perceptions of learning are not driving the lower proportion of men who chose to compete in Round 4 compared with Round 3. Thus, a taste for competitive environment is a more likely argument.

6.2.5 No impacts of gender-based treatments on the choice to compete in Round 3

Table 12 displays all the different models already discussed and reviews them in one table. This model includes the treatments, the control variables, and the three key explanations for choice to compete: (i) past performance, (ii) beliefs and (iii) choice based on past performance. These are included in a cumulative step fashion, with the final model displayed in column (5).

In line with the literature, there is a strong gender effect when it comes to the choice to compete. Men are significantly more likely to choose the tournament option compared with women. This is the result found consistently in Niederle et al. (2007) and indicates that even when one controls for additional explanations for competitiveness, there are still strong gender differences in the choice to compete. This highlights the persistence of the gender gap in competitiveness and that even in a developing country this gap in competitive behaviour is persistent. In addition, we can note that this gap in competitive choice is only found along the gender dimension of identity, with the African dummy not shown to have a significant impact on the choice to compete.

A comparison of the influence of the different key additional explanatory channels (performance, beliefs and choice in Round 4) is displayed in Table 12. A higher Round 2 performance is associated with a higher likelihood to choose the tournament payment in Round 3. Both thinking that you placed first and the choice in Round 4 are positively related with the choice to compete in Round 3. These explanatory variables are shown to be of varying importance depending on the other controls. However, when all of the explanatory variables are included, they are all shown to be significant and therefore are important in driving competitive choice. This is consistent with Niederle et al. (2007).

The treatments have no impact on the choice to compete[66] . We can see that none of the coefficients are shown to be significant and therefore we interpret this as the effects not being significantly different from zero[67]. This means that, on average, the treatments were not able to significantly shift individual decision making. This result is surprising, especially given the effects found in Balafoutas et al. (2011) for a similar Affirmative Action intervention on competitiveness. This inconsistent result may be due to context differences or relate to the strength of the Affirmative Action incentive. Given that the outcome is a binary variable, the treatments were not able to shift decision making past the threshold level of the latent variable to change from zero to one. It is unclear if there may have been marginal changes that would not reflect in this binary measure of competitiveness. To look at more marginal impacts of the treatments on competitiveness, we now look at performance in Round 2. Round 2 performance would be considered a more competitive environment compared with Round 1 performance. We therefore focus the analysis on performance in Round 2 and evaluate if the treatments may have a marginal change on competitiveness when it is defined in terms of performance.

[66]Note we have also run the regression with the following specification and find no treatment effects: $Choice\ to\ compete = Male + AA * male + RMF * male + RMM * Male + AA + RMF + RMM + Cntrols.$

[67]Note the coefficients are also not significantly different from each other, as shown by the Wald tests in the table.

Dependent variable:	(1) Choice to Compete	(2) Choice to Compete	(3) Choice to Compete	(4) Choice to Compete	(5) Choice to Compete
AA treatment	-0.0147	-0.0178	-0.0222	0.0102	0.00658
	(0.0657)	(0.0624)	(0.0617)	(0.0591)	(0.0559)
RMF treatment	0.0228	0.0455	0.0271	0.00237	-0.00696
	(0.0673)	(0.0641)	(0.0637)	(0.0618)	(0.0615)
RMM treatment	0.000546	-0.00163	-0.00989	0.00366	0.00391
	(0.0664)	(0.0654)	(0.0645)	(0.0618)	(0.0606)
Male dummy		0.231***	0.227***	0.142***	0.126***
		(0.0418)	(0.0420)	(0.0437)	(0.0429)
African dummy		-0.0680	-0.0211	-0.00320	0.00557
		(0.0481)	(0.0511)	(0.0496)	(0.0474)
Round 1 performance			-0.0117	-0.00471	-0.0158**
			(0.00777)	(0.00739)	(0.00741)
Round 2 performance			0.0252***	0.0120	0.0191***
			(0.00747)	(0.00746)	(0.00722)
Think win in Round 2				0.292***	0.227***
				(0.0421)	(0.0445)
Round 4 Choice					0.216***
					(0.0416)
Age		-1.291	-1.985	-2.956	-3.547
		(3.147)	(3.939)	(4.125)	(3.857)
Age x Age		0.0410	0.0548	0.0747	0.0861
		(0.0588)	(0.0778)	(0.0815)	(0.0754)
Part time job		0.143	0.148	0.145*	0.135*
		(0.0928)	(0.0903)	(0.0835)	(0.0759)
Father educ.		0.140***	0.121**	0.100*	0.0924*
		(0.0537)	(0.0531)	(0.0517)	(0.0500)
Mother educ.		-0.0120	-0.00323	0.0157	0.0291
		(0.0550)	(0.0545)	(0.0534)	(0.0512)
Prior exp. in task		0.0361	0.0395	0.0134	0.0299
		(0.0681)	(0.0667)	(0.0655)	(0.0642)
H_0: $AA = RMF$	χ^2 =0.3, p=0.585	χ^2 =0.91, p=0.340	χ^2 =0.56, p=0.455	χ^2 =0.01, p=0.903	χ^2 =0.05, p=0.826
H_0: $AA = RMM$	χ^2 =0.05, p=0.822	χ^2 =0.06, p=0.810	χ^2 =0.03, p=0.852	χ^2 =0.01, p=0.917	χ^2 =0.00, p=0.964
H_0: $RMF = RMM$	χ^2 =0.10, p=0.784	χ^2 =0.49, p=0.486	χ^2 =0.31, p=0.580	χ^2 =0.00, p=0.984	χ^2 =0.03, p=0.866
Observations	438	438	438	438	438

Robust standard errors in parentheses, *** p<0.01, ** p<0.05, * p<0.1.
Dummy = indicator variable of 1 or 0, AA = Affirmative Action, RMF = Female Role Model, RMM = Male Role Model, educ. = education, exp. = experience.

Table 12: Impacts on choice to compete in Round 3

6.3 Responsiveness to competitive environment: Evaluate performance in Round 2

In addition to the choice to compete in Round 3, the Round 2 performance can also be evaluated as a measure of competitiveness. By design, Round 2 has a more competitive incentive scheme compared with Round 1 and therefore, changes in performance can be examined in Round 2 relative to Round 1 to understand the responsiveness to a competitive environment. In Round 2, players compete against their own group members, with the winner of the group receiving payment and all other group members receiving nothing in this round. This change in incentive scheme may stimulate or discourage performance, as individuals may respond differently to the more competitive environment. Round 1 performance is included as a control variable to ensure that baseline ability is controlled for and that the effect displayed is the additional responsiveness to the competitive environment.

(i) Population-group heterogeneity in responsiveness to competitive environment

Table 13 shows the impacts of the different treatments on the Round 2 performance[68]. The gender and population-group controls are included in the regression. When examining the full sample in column (1) and (2) we see that the coefficient on male is significant when additional controls, such as the performance in round 1 and prior experience in the task, are excluded from the model. Gender differences in the responsiveness to competition are observed when controls are not included, however, this gender effect is completely mitigated when controls are included. The full regression with controls as shown in regression (2) highlights the importance of the baseline performance in Round 1 in determining the gender difference in performance and suggests that on average there is limited evidence for identifiable gender differences in the responsiveness to a competitive environment.

Through evolution and social conditioning-based ideas, the literature argues for gender differences in competitiveness. The main theory: men are more competitive than women. Most of the research looks at the gender dimension as the determining factor of competitive differences and assumes a homogenous response based on other characteristics. However, in our sample we find that population-group also has a significant effect on the responsiveness to a competitive environment, with African and Non-African individuals responding in different ways to the competitive setting. African participants have a lower Round 2 slider performance relative to Non-African individuals, on average. Column (1) in Table 13 displays the strong population-group differential, with Africans having a significantly lower responsiveness of performance in Round 2. Even though there was a difference in baseline Round 1 ability for Africans and Non-Africans, the inclusion of Round 1 performance does not remove the impact of population-group on Round 2 performance. This suggests that even when baseline Round 1 ability is controlled for, Africans respond less to the competitive environment compared with Non-African individuals. Note the author is not suggesting innate differences between groups, but rather that there is possibly something about the social context that evokes a differential response between groups. The result also holds when we examine the sub-sample of men and women separately.

(ii) Female Role Models encourage competitive spirit

The female role model treatment has a positive effect of inducing an increase in competitive performance compared with the control group on average, as shown on Table 13. When the controls are added, the female role model treatment has a significant and positive effect on Round 2 performance. On average, individuals in the female role model group scored 0.784 more sliders in round 2 compared with the control group, given that independent variables were included in the model. This may suggest that something about the female role model inspired an increase in

[68] See Table 28 for the table displaying all control coefficients. Note a simple OLS model is used in these regression, with robust standard errors.

competitive performance of the individuals in that group.

The precise mechanism for why the female role model had an effect for all individuals not the male role model, would need to be explored further. However, the direction of the sign indicates that the presence of a female role model has a inspiration effect for women and a provocation effect for men, on average overall. This suggests that the presence of a female role model can instil a positive effect for both genders, with both groups increasing performance on average.

	(1)	(2)	(3)	(4)	(5)	(6)
Dependent variable:	Round 2 Perform.	Round 2 Perform.	Round 2 Perform.	Round 2 Perform.	Round 2 Perform.	Round 2 Perform.
Sample:	*All*	*All*	*Male*	*Male*	*Female*	*Female*
AA treatment	0.0265	0.215	-0.601	-0.0372	0.683	0.738
	(0.504)	(0.375)	(0.742)	(0.506)	(0.672)	(0.540)
RMF treatment	0.622	0.740*	0.787	0.863	0.505	0.720
	(0.505)	(0.386)	(0.757)	(0.531)	(0.674)	(0.567)
RMM treatment	0.200	0.442	0.0265	0.536	0.410	0.586
	(0.521)	(0.424)	(0.807)	(0.584)	(0.682)	(0.622)
Male dummy	0.727*	-0.126				
	(0.372)	(0.285)				
African dummy	-3.129***	-1.371***	-3.957***	-1.468***	-2.233***	-1.436***
	(0.381)	(0.321)	(0.562)	(0.453)	(0.505)	(0.446)
Observations	438	438	217	217	221	221
Controls:	No	Yes	No	Yes	No	Yes
R-squared	0.146	0.517	0.187	0.606	0.090	0.419

Acronyms: Perform. = Performance, AA = Affirmative Action, RMF = Role Model Female, RMM = Role Model Male, Controls: Father has tertiary degree, Prior experience in task, Round 1 performance, age, age squared, mother has tertiary degree, part time job.
Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1

Table 13: Impact of treatments and controls on the performance in Round 2

Given the suggestion of the heterogeneity within other areas of identity, such as population-group, the model is adapted to look at the responsiveness across both gender and population-group for the different treatments. These results are displayed in Table 14. Consistent with the previous model in Table 13, when looking at the full sample in column (1) men perform significantly better in Round 2 compared with women, without controlling for past performance, age, father education and prior experience in the task. However, there is no significant effect presented when these independent variables are included in the model. As discussed in Table 13, this result emphasises the importance of including Round 1 performance in the regression, as this is the main driver for the change in the male dummy coefficient between model (1) and model (2) in Table 14[69].

The strong heterogeneity between African and non-African population-groups on average, as shown on Table 13, is not seen when examining the population-group effects among each of the treatments on average. Table 14 displays the responsiveness to the competitive environment for the African and non-African groups within each treatment, and examines the effect relative to the control group. However, there are heterogeneities among women. Column (6)

[69]See Table 29 for the table displaying all control coefficients, including the Round 1 performance coefficient.

shows that African women solve fewer sliders than non-African women, on average. This is displayed through the -1.659 coefficient. This indicates that when there are no additional confounding treatment present (such as a role model picture or distorted returns through an affirmative action policy), an heterogenous effect between African and non-African women is present, whereas an equivalent heterogenous effect is not displayed for young men.

Table 14: Impacts on Round 2 performance by treatment, population-group and gender

	(1)	(2)	(3)	(4)	(5)	(6)
Dependent variable:	Round 2 Perf.	Round 2 Perf.	Round 2 Perf.	Round 2 Perf.	Round 2 Perf.	Round 2 Perf.
Sample:	*All*	*All*	*Male*	*Male*	*Female*	*Female*
Male dummy	0.732**	-0.121				
	(0.372)	(0.285)				
African dummy	-2.464***	-0.828	-1.851*	-0.697	-3.101***	-1.659*
	(0.693)	(0.559)	(0.945)	(0.719)	(1.048)	(0.963)
AA treatment	0.224	0.761	1.283	1.083	-1.024	0.189
	(0.780)	(0.541)	(1.011)	(0.699)	(1.200)	(0.892)
RMF treatment	1.526**	1.036	3.102***	1.379	-0.306	0.0804
	(0.772)	(0.698)	(0.976)	(0.872)	(1.112)	(1.154)
RMM treatment	1.023	1.020	1.282	0.713	0.683	1.131
	(0.872)	(0.775)	(1.266)	(1.082)	(1.206)	(1.201)
AA x African	-0.236	-0.857	-3.155**	-1.955*	2.655*	0.828
	(1.018)	(0.750)	(1.440)	(1.021)	(1.435)	(1.154)
RMF x African	-1.339	-0.434	-3.659**	-0.856	1.134	0.889
	(1.008)	(0.834)	(1.415)	(1.134)	(1.391)	(1.302)
RMM x African	-1.263	-0.865	-2.012	-0.294	-0.488	-0.867
	(1.086)	(0.919)	(1.633)	(1.305)	(1.458)	(1.378)
Constant	14.43***	3.853*	14.96***	0.402	14.71***	1.280
	(0.574)	(2.118)	(0.673)	(2.643)	(0.855)	(5.363)
Observations	438	438	217	217	221	221
Controls:	No	Yes	No	Yes	No	Yes
R-squared	0.151	0.519	0.211	0.612	0.116	0.426

Acronyms: AA = Affirmative Action, RMF = Role Model Female, RMM = Role Model Male, Controls: Performance in Round 1, Father has tertiary degree, Prior experience in task, age and age squared, mother has tertiary education, part time job. Robust standard errors in parentheses, *** p<0.01, ** p<0.05, * p<0.1

(iii) Affirmative Action generates demoralisation effects for African men

When examining the sub-sample of male individuals, as shown in column (4) of Table 14, the Affirmative Action treatment induces a demoralisation response among African men. This result holds when controls are included in the model. We can look at the partial effect of being in the Affirmative Action treatment for men[70]. For Africans, those who are in the Affirmative Action treatment have a 1.955 lower slider performance, compared with the control group. This highlights that gender-based Affirmative Action induces a response of lower effort for African men. The Affirmative Action treatment therefore increases the gap in Round 2 performance among men.

[70] $\frac{\partial Perform.}{\partial AA} = 0 - 1.955 African$

6.4 Explanations for impacts on competitive behaviour: Beliefs channel

Beliefs about relative performance are a possible channel through which the treatments have an effect on competitive-response. The Role Models and Affirmative Action treatments can have an effect on self-perception of performance or the beliefs of others' performance, which in turn can have an effect on competitiveness behaviour. This is one of the main theoretical channels through which the treatments could have an impact on performance. However, the beliefs channel is not the only mechanism through which behaviour may change, and there are other scenarios that may be present. For example, (1) there could be an unexpected change in beliefs but without a material change in performance, or (2) there could be changes in performance but not beliefs. The first alternative scenario indicates there are changes in belief, which don't generate a physical change in performance. The second scenario would imply that change in beliefs is not the channel through which performance is impacted.

We examine how the treatments have an effect on beliefs about relative performance to understand if this could be a possible channel of support for the shifts in competitive behaviour. We look in turn at the possibility of an association of changes in beliefs with the changes in competitiveness, as well as the changes in beliefs that are not associated with any changes in competitive performance. All results from the beliefs channel are drawn from Table 15. See Table 30 in the Appendix for the table including control variable coefficient output[71].

6.4.1 Changes in beliefs correspond with changes in performance

(i) Heterogeneity of beliefs among women

Table 15 shows that the beliefs are affected by the identity of the individual. Specifically, African women are shown to have lower beliefs compared with Non-African women on average. This is displayed in column (6) where all else equal, a movement from being an non-African woman to and African woman is associated with a 36.6 percentage point decrease in the beliefs of winning in Round 2, on average. This implies that the propensity for African women to believe that she placed first is far lower than the other female participants, when considering the identity categories of gender and race. Note this result includes Round 1 performance and therefore even given performance, African women still have significantly lower propensities to believe that she placed first compared with other women[72].

(ii) Men's beliefs of winning inflate when presented with a female role model

Within the sub-sample of men as shown by column (4) in Table 15, the data show the RMF treatment induces a higher belief of winning for men. When calculating the effect for men in the female role model group compared with the control group men, we see a positive increase in beliefs for men, on average. For men, a movement from the control group to the female role model treatment is associated with a 29.0 percentage point increase in the beliefs of winning, on average. An effect on beliefs is not found when the men are presented with a male role model. This suggests the female gender of the role model creates an environment where the beliefs of men are especially inflated. This translates into performance, with individuals having a higher performance in Round 2 in the female role model treatment compared with the control group.

[71] Note that the dependent variable in this table is a dummy variable; with 1 = think win in Round 2, and 0 = did not think win in Round 2.

[72] Remember the individual does not receive feedback as to the other players performance until the end of the experiment, which is after this belief measure is captured. The beliefs are therefore formed on the perception of performance of others and not the actual performance of others.

6.4.2 Unexpected changes in beliefs

(i) Male role models induce both demoralisation of beliefs in non-African women and provocation of beliefs in African women

The male role model invokes a heterogeneous response of beliefs within women. On average there is no effect on beliefs of women in the male role model group compared with the control group[73], but when examining the model with the population-group interaction term, we see that there are some differences between population-groups and male role model. These effects are displayed in column (6) on Table 15. The table with the coefficients of the control variables shown can be found in Table 30 of the Appendix.

We examine the overall effect of the treatment for the different groups of women. In the model presented, the non-African women in the control is the base case for comparison. For non-African women, those who were in the male role model treatment had a 34.8% lower probability of thinking they won compared with the control group[74]. This highlights a demoralisation effect for non-African women, when the male role model is presented. There is something about the male role model, which decreases non-African women's beliefs and therefore is interpreted as a demoralisation effect.

When examining the African women sub-sample, we see that the African women in the male role model group had a 0.08% higher probability of thinking that they won in Round 2, compared with the control group, on average[75]. This results shows an improvement in beliefs for African women and is interpreted as a provocation effect in beliefs. The effect is not shown when the female role model is presented to the sample. Therefore some characteristic in the male role model only instills a heterogeneous effect in beliefs among women.

(ii) Demoralisation of beliefs for women in the Affirmative Action treatment

Similar to the male role model treatment, we see heterogeneities among the beliefs of women when the Affirmative Action treatment is applied. This is shown through column (6) of Table 15[76]. For non-African women, those who were in the Affirmative Action treatment were 40.9% less likely to think that they won compared with the control group, on average[77]. The Affirmative Action treatment therefore creates a discouragement effect for non-African women in terms of their beliefs of winning in their group. This highlights that even when the system was designed to improve outcomes for women, the particular structure can have negative effects on beliefs for a specific sub-sample of the recipients.

In addition, the Affirmative Action treatment creates a demoralisation of beliefs for African women compared with the control group of African women, on average. For African women, being in the Affirmative Action treatment means that these women are 3.6% less likely to think they placed first compared with the group, on average[78]. The Affirmative Action treatment, therefore creates demoralisation of beliefs for women, although it has a more substantial negative effect on the beliefs of non-African women. The reason for this population-group heterogeneity is unclear. In this context population-group has been used as the defining characteristic for Affirmative Action benefits. This existing structure in South Africa may generate the population-group heterogeneity in changes in beliefs and

[73] Note this estimation is not shown on the table, but calculated separately.
[74] $\frac{\partial Beliefs}{\partial RMM} = -0.348 + 0.435African = -0.348 + 0.435(0) = -0.348$
[75] $\frac{\partial Beliefs}{\partial RMM} = -0.348 + 0.435African = -0.348 + 0.435(1) = 0.08$
[76] The full table with the coefficients of the control variables is displayed in Table 30 of the Appendix.
[77] $\frac{\partial Beliefs}{\partial AA} = -0.409 + 0.373African = -0.348 + 0.373(0) = 0.409$
[78] $\frac{\partial Beliefs}{\partial AA} = -0.409 + 0.373African = -0.348 + 0.373(1) = -0.036$

the way that they respond to the treatment.

The exact mechanism for why we see this effect is unclear, however, we can speculate the reason for this effect given the data presented and the context of the study. This experiment was conducted in South Africa, where race-based Affirmative Action is an important part of the social policy of the country. Given the history of the country, Affirmative Action has been in place for African individuals. In the South African context, this would mean an African advantage is given. In this experiment, the Affirmative Action treatment increases the salience of Affirmative Action advantages in general. The gender-based Affirmative Action decreases the beliefs of women, as this highlights to them that they are poor performers by virtue of the fact that they require the Affirmative Action advantage. This effect is accentuated for the sub-group of women (non-Africans) who, in this context, are not usually a recipient of Affirmative Action. Since this group of non-African women are not usually receiving Affirmative Action, when it is applied the feeling of inadequacy is amplified and this may cause the heterogenous effects among women. The specific environment where the pro-female Affirmative Action is applied therefore has the ability to create different effects for sub-samples of women.

	(1)	(2)	(3)	(4)	(5)	(6)
Dependent variable:	Think win Round 2	Think win Round 2	Think win Round 2	Think win Round 2	Think win Round 2	Think win Round 2
Sample:	*All*	*All*	*Male*	*Male*	*Female*	*Female*
Male dummy	0.278***	0.279***				
	(0.0437)	(0.0438)				
African dummy	-0.0675	-0.107	-0.0469	0.0559	-0.0851	-0.366***
	(0.0489)	(0.0947)	(0.0731)	(0.131)	(0.0689)	(0.138)
AA treatment	-0.0884	-0.119	-0.00506	0.0789	-0.154**	-0.409***
	(0.0567)	(0.102)	(0.0905)	(0.140)	(0.0686)	(0.145)
RMF treatment	0.0714	0.104	0.118	0.290**	0.0222	-0.199
	(0.0629)	(0.114)	(0.0915)	(0.135)	(0.0866)	(0.181)
RMM treatment	-0.0390	-0.137	-0.0168	0.00956	-0.0441	-0.348**
	(0.0637)	(0.120)	(0.0960)	(0.164)	(0.0840)	(0.170)
AA x African		0.0490		-0.141		0.373**
		(0.121)		(0.188)		(0.164)
RMF x African		-0.0495		-0.273		0.296
		(0.135)		(0.183)		(0.203)
RMM x African		0.151		-0.0438		0.435**
		(0.137)		(0.200)		(0.188)
Observations	438	438	217	217	221	221
Controls:	Yes	Yes	Yes	Yes	Yes	Yes
R-squared	0.195	0.199	0.130	0.139	0.147	0.178

Acronyms: AA = Affirmative Action, RMF = Role Model Female, RMM = Role Model Male,
Controls: Performance in Round 1, Performance in Round 2, Father has tertiary degree,
Mother has tertiary degree, part time job, prior experience in task, age and age squared.
Robust standard errors in parentheses, *** p<0.01, ** p<0.05, * p<0.1

Table 15: Impact on thinking win in Round 2, by gender and race

6.4.3 Change in performance, but no change in beliefs

(i) No changes in beliefs for men in Affirmative Action group

Interestingly, we see no significant change in the beliefs of the men in the Affirmative Action group relative to the control group. Although the coefficients are fairly large and in the same direction as the change in performance, the large variance results in the effect not being significant and is therefore interpreted as no change in beliefs for this treatment group. This is displayed in the coefficients bearing no significant effect in column (4) of Table 15. Table 30 of the Appendix displays the same table, but with the coefficients on the control variable. Recall that the Affirmative Action treatment instilled a decrease in Round 2 competitive performance in African men. It is unclear why there may be heterogenous changes in performance by population-group that do no correspond to any changes in beliefs. Seeing as men are not the recipients of the Affirmative Action advantage, they are not stimulated by increased incentives.

A similar argument of the context interacting with Affirmative Action, as with the beliefs of women, can be applied for the effects found for men. African men interpret the treatment as Affirmative Action, but aren't as encouraged to apply effort because they are not receiving the advantage that is usually presented in their usual particular context, South Africa. This is consistent with the decrease in performance for African men in the Affirmative Action treatment compared with the control group. This effect does not effect perceptions of ability and therefore does not mean the beliefs would change. This is consistent with what is seen in the data when it comes to beliefs, and highlights the importance of context when applying such preferential treatment.

6.4.4 Dis-entangling effects?

Shifts in beliefs are a channel through which the treatments have an effect on outcomes. The information, inspiration, demoralisation or incentives effects could have an impact on beliefs. These effects could have a differential effect on the competitive behaviour depending on treatment. The information channel is associated with an increase of personal beliefs, but also has the broader scope of also providing information about *other players* which could induce a personal response. Therefore for this channel, personal beliefs could stay the same or change, but the beliefs about others would also be shifted. The shift in beliefs about others could then induce a response in personal behaviour. This effect is contrasted to the inspiration channel, where personal beliefs only would be improved with the inclusion of the Role Model of a similar identity; the provocation channel where beliefs increase with the Role Model of the alternative gender; or the demoralisation channel which would be associated with a decrease in beliefs with the inclusion of the role model. Since all the channels involve shifts in personal beliefs, we are unable to disentangle information effects with these channels given the data collected.

7 Discussion

We now look at the discussion of the various effects found. Namely we examine way that race can impact on a gender-based policy choice, we explore how pro-female affirmative action may be confounded in a context where race-based affirmative is so prominent, and we highlight some of the validity issues of the study.

7.1 Heterogeneities across other identity dimensions

A substantial part of the literature has focused only on gender as the key difference in competitive behaviour (Gneezy et al., 2001; Niederle el. al 2007; Balafoutas et al. 2011). The underlying mechanism these papers implicitly or

explicitly cite for examining only the gender differences in competitiveness relates to evolutionary biology and socio-biological reasoning, with males evolving to exhibit higher degrees of competitiveness compared with women from an evolutionary perspective (Knight et al. 2002). However, this literature assumes competitiveness is homogenous across other identity dimensions and doesn't take into account other forms of identity that may shape the way competitiveness may be interpreted or developed within that individual.

Given that gender is experienced differently depending on other identities (Yuval-Davis, 2006; Hooks, 1981), an additional dimension of identity is also incorporated into our analysis. An intersectional approach (Crenshaw, 1989) that acknowledges vastly different experiences based on the intersection of race and gender is applied[79]. Interestingly very few studies have analysed the effects of other forms of identity, such as race, in the competitiveness framework. To our knowledge only one study can be found as an example, and examined the effect of caste on competitiveness with no gender component (Banerjee et al., 2017). Therefore an analysis that looks at gender and race from more of an intersectional perspective is an additional novel contribution to the literature. This complexity is especially relevant in a context where racial issues are particularly loaded. South Africa provides the ideal context to evaluate these more nuanced outcomes. We show that there are heterogeneities across population-group and gender dimensions, and therefore prominent identity dimensions specific to the context should be considered carefully when designing further experiments that examine competitiveness.

When examining the different dimensions of identity on competitiveness, we also found that there were some baseline differences in performance in Round 1. It is unclear why there is such a consistently strong hierarchical baseline Round 1 performance founded on identity. One explanation could be the game used in the experiment. Further research would be needed to test the sensitivity of the result to the choice of game. These strong gender effects in Round 1 performance were not found in Niederle et al. (2007) and Balafoutas et al. (2011), who used the summing of two digit number game, which is a different game to the one applied in the study. This suggests that the game itself could be the source of the heterogeneity. Another explanation is that the sample is different and the context facilitates these specific differences in baseline performance. Given that this is the first time this competitiveness framework has been conducted in South Africa, any specific effects of context are still unknown. We are only able to speculate as to the possible explanations for these differences; further research would be required to interrogate why such effects are present.

7.2 Affirmative Action treatment doesn't create female representation in our sample

It is curious that the Affirmative Action treatment has no effect on the choice to compete. Niederle et al. (2007) find that high performing women fail to choose to compete, and the Affirmative Action treatment in their study encourages women to the choose the competitive option. Our data does not show that there are many high ability women who don't choose to compete, and therefore the efficiency gains seen in Nierderle et al. (2007) cannot be displayed in our study. Looking at the the literature, Balafoutas et al. (2011) where a similar Affirmative Action treatment was applied, there were strong gender differences in the choice to compete when preferential treatment

[79]The intersectionality approach has been critiqued in the Sociology literature for structuring the analysis with too many social divisions, which opens the analysis to which identities should be included in the study. For example, Lutz (2002) attempts to include 14 'lines of difference' which include the categories such as gender, sexuality, skin colour, ethnicity, nation, class, culture, ability, age, origin, wealth, North-South, religion, stage of social development. It is noted in this work that this list is 'by no means complete, other categories should be added or re-defined'. Some scholars have responded to the critique of limitless social divisions by saying that all social divisions are important, but the specific historical context means that certain social divisions are more important in constructing social positioning (Yuval-Davis, 2006). Our study selects a context (South Africa) where race has a prominent historical importance in determining power within the society. Race is therefore used as the dominant intersectional identity category in our gender difference in competitiveness analysis. Note for this study, race and population-group are used interchangeably.

was applied.

One hypothesis for the lack of consistency with Balafoutas et al. (2011) may be due to the strength of the incentive. In our experiment, one slider advantage was given to women, which is consistent with Balafoutas et al. (2011). Given that the real effort task was different, and yielded different average performance outcomes, this could have diluted the effect of the treatment in our study compared with Balafoutas et al. (2011). The average performance of number of sliders performed was higher than the average performance of the summing-of-digits task. This means that the one additional slider would have a higher value in the task with a lower number of completed items in the task. This structure of the game change and the associated decrease in the incentive of the additional slider, could in hindsight be a reason for the lack of effect found in the Affirmative Action treatment.

In addition, there is also the possibility that given the social context of South Africa, where this study is implemented, the environment for Affirmative Action is already quite saturated. In this context, the Affirmative Action treatment may need to be stronger that other countries in order to be interpreted as a actual advantage. As outlined in the previous section, the context may be driving the decrease in performance in men and the decrease in beliefs for women. The type of Affirmative Action implemented and where such policy interacts with the local context is therefore important. This findings has important Employment Equity implications, with policy makers needing to be very careful about the other possible effects that certain Affirmative Action policies may have in the specific context which such policy is applied.

7.3 Internal and external validity

Salience or believability of the Role model is also worth discussing. Our study only represents a temporary peer-based role model. This definition doesn't include the celebrity role models or individuals in places of authority. In addition the peer-based selection of the Role Model may be a reason why stronger provocation effects are displayed in the data. The role model may not be interpreted as a role model, but rather as a competitor. The exact mechanism for this channel is difficult to examine, but from the evidence that we have shown we see that female role models inspire a competitive spirit among everyone, where as the male role model has a particularly negative effect on beliefs of winning for non-African women. How the role model is interpreted and the salience of the role model would need to be interrogated in further research.

Another possible route for ensuring the validity of these results would be to examine the variation of groupings. Gneezy et al. (2001) show that whom you compete against in terms of gender can have an influence on your competitive behaviour. Our experiment only examines the equal gender-mix of groups to ensure that the gender of the competing participants was even. In our study, population-group assignment to the four person groups was fairly random. It is unknown if population-group elicits a differential performance depending on group composition. This could be a possible confound to the analysis and is therefore an avenue for further research.
Sample representativeness of the broader population and the appropriateness of sample can also be questioned. We are looking at a very specific sample, as this is a university setting. The participants therefore are highly educated and are therefore not representative of the broader South African population. Conclusions should therefore only be considered for this specific age group and with these specific education characteristics. The age category selected is appropriate since this study is relevant for young men and women entering the labour force after university. While recruiting participants from a broader sample of participants in South Africa may be more representative of the whole South African labour market, young people are of particular importance in shaping the future and therefore

focusing on such a sub-population is beneficial. Further, recruiting participants of a similar age bracket and from the same university allowed for the standardisation of education and experience. The comparison of a more similar sample may provide more precise conclusions to be drawn about the particular sub-population.

8 Conclusion

The study examines gender differences in competitiveness in the South African setting. We show that in a developing countries, men have a higher competitive choice compared with women. This is are a pervasive feature and is consistent with the literature. The gendered institutions, through Affirmative Action and Role Models, are also interrogated. The data show competitive behaviour is affected by the treatments when looking at performance in Round 2. In addition, we see the population-group and gender of the participants significantly affect competitive behaviour. One should include different identities as explanatory factors, when estimating the effects of competitiveness.

The results show that the treatments have no effect on competitive choice, but there are effects when looking at the responsiveness of performance to a competitive environment. Using female peer Role Models increases the competitive response for everyone. In addition, gender institutions can increase the divide in performance when looking across heterogenous populations groups. For example, the gender-based Affirmative Action decreases competitive performance for African men. This displays how a gender-based institution can have indirect effects of changing responsiveness of performance to a competitive behaviour within population-group categories. This is important for the employment equity policy of South Africa, as a policy designed to benefit a sub-population of South Africa (for example Affirmative Action for women), may have an inadvertent effect of creating more negative effects across other identity dimensions.

Beliefs are regarded as one of the channels through which the treatment have an effect on competitive behaviour. There is partial support for changes in beliefs influencing competitive choice. This is seen through the provocation effects for men in general and the increase in beliefs for men with the Female Role Model treatment. However, there are effects on beliefs that do not result in changes in competitive behaviour, such as the change in beliefs for women in Affirmative Action treatment or the change in beliefs for women in the Male Role Model treatment. This highlights that the effects of the treatments can have an effect on mindsets that may not translate into direct physical change in the short run. Since this experiment captures only short run effects, it is not clear how these changes in beliefs may effect performance in the longer term.

Overall this study shows that there are significant gender effects in competitive behaviour and that Role Models and Affirmative Action can be used to mitigate or reinforce such gaps in behaviour. It also supports the idea that individuals in both gender and population-group experience differing effects, and therefore it should therefore not be assumed that there are homogenous effects across population-groups. These different dimensions need to be considered carefully when designing the incentive or policies that promote women, as there may be inadvertent effects affecting individuals of the intersecting identities. The main effects displayed from the treatment, that result in tangible output, are based on the behaviour change of men. For women, the treatments change beliefs, but this doesn't result in changes in performance. Treatments designed to improve competitiveness of women result in either no change (when looking at choice) or incentivise men (when looking at performance) which reinforces an already large gap in competitiveness. Given the tenacity of the effect one has to wonder, will the gap *always* persist? Could changes in beliefs for girls result in longer term changes in performance that reduce gender gaps? Or will boys always

be boys?

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10 Appendix A

10.1 Sample balance

	Control - AA	Control - RMF	Control - RMM
Male	0.896	0.722	0.951
Female	0.896	0.722	0.951
African	0.145	0.868	0.557
Indian/Asian/Coloured	0.410	0.676	0.737
White	0.312	0.422	0.246
Age	0.257	0.370	0.858
Currently holds a part-time job	0.431	0.064*	0.329
Attended a mixed-sex high school	0.910	0.400	0.340
Attended mixed-sex primary school	0.801	0.727	0.635
Father has tertiary education	0.995	0.413	0.878
Mother has tertiary education	0.139	0.194	0.005***
Affirmative Action opinion	0.471	0.739	0.562
Observations:	232	221	227

Table 16: P-values for the unconditional differences between treatment variable and control

	AA - (RMF and RMM)	RMM - RMF
Male	0.929	0.775
Female	0.929	0.775
African	0.167	0.471
Indian/Asian/Coloured	0.377	0.478
White	0.401	0.622
Age	0.066*	0.219
Currently holds a part-time job	0.453	0.352
Attended a mixed-sex high school	0.364	0.924
Attended mixed-sex primary school	0.725	0.428
Father has tertiary education	0.590	0.518
Mother has tertiary education	0.493	0.164
Affirmative Action opinion	0.338	0.380
Observations:	317	206

Table 17: P-values for the unconditional differences between treatments

Dependent variable (with control):	(1) AA treatment	(2) RMF treatment	(3) RMM treatment
Male	-0.0595	-0.0195	-0.0431
	(0.0678)	(0.0706)	(0.0686)
White	0.169	-0.0202	0.185*
	(0.106)	(0.130)	(0.0979)
Indian, Asian or Coloured	0.0665	0.0296	0.0520
	(0.0833)	(0.0837)	(0.0862)
Age	0.00455	-0.0173*	-0.00121
	(0.00747)	(0.0104)	(0.0104)
Currently holds a part-time job	-0.136	-0.221	-0.140
	(0.134)	(0.161)	(0.135)
Attended mixed high school	0.0133	0.0997	0.0408
	(0.0779)	(0.0856)	(0.0833)
Attended mixed primary school	0.0149	-0.107	0.0285
	(0.110)	(0.115)	(0.121)
Father has secondary education	-0.0724	-0.194	-0.173
	(0.154)	(0.175)	(0.177)
Father has tertiary education	0.0480	-0.188	-0.0408
	(0.165)	(0.178)	(0.181)
Mother has secondary education	-0.198	0.0318	0.0466
	(0.127)	(0.162)	(0.171)
Mother has tertiary education	-0.317**	-0.0373	-0.195
	(0.135)	(0.165)	(0.177)
AA opinion dummy	-0.0434	-0.0314	0.0511
	(0.0764)	(0.0750)	(0.0760)
Observations	232	221	227
R-squared	0.052	0.058	0.081

Robust standard errors in parentheses. Significance of differences: *** p<0.01, ** p<0.05, * p<0.1.
All dependent variables are binary with control (0) and specific treatment (1). Marginal effect are displayed. Acronyms: AA = Affirmative Action, RMF = Role Model Female, RMM = Role Model Male
† AA opinion asks participants to identify if they strongly disagree, disagree, neutral, agree or strongly agree with the following statements: (1) "*Our society should do whatever is necessary to make* sure that women have an equal opportunity to get ahead." and (2) "*Gender-based affirmative action is a necessary policy choice in South Africa.*". Each question was therefore ranked out of 5,
We create a dummy that combines both questions, and give a 1 if the individual ranked 4 or 5 on both the questions.

Table 18: Balance and significance of the differences between treatment and control

10.2 Sample characteristics

Table 19: Representation of different population-groups

	Our data	UCT	South Africa
African	63,93%	23,72%	79,20%
Coloured/Indian/Asian	21,92%	20,66%	11,40%
White	14,16%	30,92%	8,90%
Other		17,84%	0,50%
International		6,86%	

Data source : *Own data*; *University of Cape Town* (2014); *Statistics South Africa* (2011)

10.3 Baseline Ability: Performance in Round 1

Average performance in Round 1	(1)	(2)	(3)
Sample:	*All*	*Female*	*Male*
All	12.89	12.14	13.64
	(4.158)	(3.812)	(4.364)
Control	13.05	12.20	13.89
	(4.362)	(4.128)	(4.457)
AA treatment	12.91	12.46	13.36
	(3.925)	(3.870)	(3.964)
RMF treatment	12.85	11.88	13.90
	(4.314)	(3.606)	(4.790)
RMM treatment	12.71	12.00	13.42
	(4.056)	(3.653)	(4.343)
Observations	438	221	217

Note: Standard deviations in parentheses. Acronyms: AA = Affirmative Action, RMF = Role Model Female, RMM = Role Model Male

Table 20: Average number of sliders completed in Round 1 over treatments and gender

Dependent variable:	(1) Round 1 Perform.	(2) Round 1 Perform.	(3) Round 1 Perform.	(4) Round 1 Perform.	(5) Round 1 Perform.	(6) Round 1 Perform.	(7) Round 1 Perform.
Sample:	*All*	*All*	*All*	*Male*	*Male*	*Female*	*Female*
Male dummy		1.495***	1.528***				
		(0.394)	(0.372)				
African dummy			-2.477***		-3.066***		-1.972***
			(0.376)		(0.557)		(0.485)
AA treatment	-0.140	-0.127	-0.130	-0.522	-0.763	0.264	0.479
	(0.544)	(0.539)	(0.520)	(0.782)	(0.742)	(0.743)	(0.744)
RMF treatment	-0.200	-0.164	-0.158	0.0106	-0.244	-0.315	-0.0279
	(0.586)	(0.574)	(0.539)	(0.896)	(0.824)	(0.731)	(0.727)
RMM treatment	-0.342	-0.336	-0.397	-0.470	-0.829	-0.200	-0.0361
	(0.559)	(0.550)	(0.541)	(0.826)	(0.830)	(0.732)	(0.750)
Age			-0.259		-0.350*		0.945*
			(0.206)		(0.212)		(0.518)
Age x Age			0.00227		0.00388		-0.0240**
			(0.00368)		(0.00330)		(0.0104)
Part time job			1.160*		1.111		1.117
			(0.696)		(1.006)		(0.991)
Father educ.			0.208		0.174		0.0725
			(0.446)		(0.677)		(0.610)
Mother educ.			0.927**		0.878		0.963
			(0.446)		(0.669)		(0.640)
Prior exp. in task			1.164*		2.134**		0.330
			(0.629)		(0.989)		(0.763)
Constant	13.05***	12.30***	17.40***	13.89***	20.67***	12.20***	3.546
	(0.397)	(0.430)	(2.796)	(0.571)	(3.189)	(0.533)	(6.261)
Observations	438	438	438	221	221	217	217
R-squared	0.001	0.033	0.163	0.003	0.091	0.003	0.209

Acronyms: Perform. = Performance, AA = Affirmative Action, RMF = Role Model Female,
RMM = Role Model Male, educ. = has tertiary degree,
Prior exp. in task = Prior experience in task, dummy = indicator variable of 1 or 0
Robust standard errors in parentheses, *** p<0.01, ** p<0.05, * p<0.1

Table 21: Impact of treatments on Round 1 performance, for all and Male/Female

10.4 Willingness to compete: competitive choice

Dependent variable:	(1) Choice to Compete	(2) Choice to Compete	(3) Choice to Compete
Male dummy	0.239***	0.234***	0.231***
	(0.0416)	(0.0417)	(0.0418)
African dummy		-0.0806*	-0.0680
		(0.0482)	(0.0481)
AA treatment		-0.0195	-0.0178
		(0.0634)	(0.0624)
RMF treatment		0.0305	0.0455
		(0.0641)	(0.0641)
RMM treatment		-0.00176	-0.00163
		(0.0647)	(0.0654)
Age			-1.291
			(3.147)
Age x Age			0.0410
			(0.0588)
Part time job			0.143
			(0.0928)
Father educ.			0.140***
			(0.0537)
Mother educ.			-0.0120
			(0.0550)
Prior exp. in task			0.0361
			(0.0681)
Observations	438	438	438

Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1. Acronyms: AA = Affirmative Action, RMF = Role Model Female, RMM = Role Model Male.

Table 22: Impacts of gender on choice to compete in Round 3, with controls displayed

Dependent variable:	(1) Choice to Compete	(2) Choice to Compete
Sample:	*Females*	*Females*
Top 30% of women in Round 1	0.139	
	(0.103)	
Top 20% of women in Round 1		0.113
		(0.103)
AA treatment	0.0262	0.0263
	(0.0865)	(0.0860)
RMF treatment	0.00463	0.00729
	(0.0886)	(0.0891)
RMM treatment	0.0694	0.0658
	(0.0902)	(0.0901)
African dummy	-0.0887	-0.0897
	(0.0657)	(0.0655)
Round 1 performance	-0.00472	-0.0101
	(0.0140)	(0.0125)
Rund 2 performance	0.0215**	0.0223**
	(0.0105)	(0.0105)
Think win in Round 2	0.269***	0.263***
	(0.0687)	(0.0698)
Choice in Round 4	0.223***	0.230***
	(0.0585)	(0.0587)
Age	3.342	3.939
	(6.417)	(6.291)
Age x Age	-0.0653	-0.0755
	(0.131)	(0.128)
Part time job	0.0251	0.0338
	(0.0985)	(0.101)
Father education	0.0893	0.0899
	(0.0670)	(0.0680)
Mother education	0.0286	0.0241
	(0.0702)	(0.0708)
Prior experience in task	0.0506	0.0537
	(0.0957)	(0.0950)
Observations	221	221

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 23: Impacts of gender on choice to compete in Round 3 and top performers in Round 1

10.4.1 Performance as a driver of competitive choice

Dependent variable:	(1) Choice to Compete	(2) Choice to Compete	(3) Choice to Compete	(4) Choice to Compete	(5) Choice to Compete	(6) Choice to Compete
Round 1 Performance	0.0128**	0.00442			-0.00557	-0.0117
	(0.00564)	(0.00607)			(0.00782)	(0.00777)
Round 2 Performance			0.0226***	0.0175***	0.0265***	0.0252***
			(0.00550)	(0.00591)	(0.00762)	(0.00747)
Male dummy		0.224***		0.216***		0.227***
		(0.0427)		(0.0419)		(0.0420)
African		-0.0574		-0.0156		-0.0211
		(0.0506)		(0.0510)		(0.0511)
AA treatment		-0.0173		-0.0199		-0.0222
		(0.0623)		(0.0617)		(0.0617)
RMF treatment		0.0461		0.0341		0.0271
		(0.0642)		(0.0640)		(0.0637)
RMM treatment		0.000319		-0.00351		-0.00989
		(0.0654)		(0.0646)		(0.0645)
Age		-1.294		-1.825		-1.985
		(3.328)		(4.080)		(3.939)
Age x Age		0.0423		0.0540		0.0548
		(0.0631)		(0.0809)		(0.0778)
Part time job		0.139		0.139		0.148
		(0.0929)		(0.0903)		(0.0903)
Father educ.		0.139***		0.126**		0.121**
		(0.0538)		(0.0535)		(0.0531)
Mother educ.		-0.0158		-0.0133		-0.00323
		(0.0553)		(0.0544)		(0.0545)
Prior exp. in task		0.0308		0.0286		0.0395
		(0.0684)		(0.0676)		(0.0667)
Treatment Fixed Effects:	No	Yes	No	Yes	No	Yes
Controls:	No	Yes	No	Yes	No	Yes
Observations	438	438	438	438	438	438

Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1
Controls include: African dummy, Age, Age squared, Father's education, prior experience in task. Mother's education, part time job.
Treatment Fixed Effects: Affirmative Action treatment, Female Role Model treatment, Male Role Model treatment

Table 24: Impacts of performance on choice to compete in Round 3 with controls

10.4.2 Beliefs as a driver of competitive choice

	(1) Control - AA	(2) Control - RMF	(3) Control - RMM
All			
	0.3027	0.1364	0.9188
Female			
	0.0876*	0.3733	0.6948
Male			
	0.9924	0.1525	0.8527

Table 25: P-value output from unconditional t-tests comparing the average proportion of the sample who thought won Round 2 in the control versus the treatment specified

Dependent variable:	(1) Think win in Round 2	(2) Think win in Round 2	(3) Choice to Compete	(4) Choice to Compete
Think win in Round 2			0.366***	0.313***
			(0.0352)	(0.0399)
Male dummy	0.277***	0.268***		0.139***
	(0.0383)	(0.0382)		(0.0431)
African dummy		-0.132***		-0.0252
		(0.0441)		(0.0463)
AA treatment		-0.0799		0.0149
		(0.0582)		(0.0591)
RMF treatment		0.105*		0.00959
		(0.0634)		(0.0620)
RMM treatment		-0.0176		0.00830
		(0.0635)		(0.0619)
Age		-0.615		-2.504
		(2.232)		(3.990)
Age x Age		0.0128		0.0655
		(0.0366)		(0.0778)
Part time job		0.0426		0.143*
		(0.0854)		(0.0844)
Father educ.		0.0913*		0.109**
		(0.0516)		(0.0521)
Mother educ.		-0.0730		0.0137
		(0.0515)		(0.0533)
Prior exp. in task		0.0850		0.0105
		(0.0681)		(0.0651)
Observations	438	438	438	438

Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1. Acronyms: AA = Affirmative Action, RMF = Female Role Model, RMM = Male Role Model. Treatment Fixed Effects: AA, RMF and RMM. Controls: Age, Age squared, Father tertiary education, Mother education, Prior experience in task, Part time job.

Table 26: Impacts on beliefs of winning in 2nd Round (1) and (2); Impacts of beliefs on choice to compete in 3rd Round (3) and (4), with control coefficients displayed

10.4.3 Round 4 choice as a driver of competitive choice

	(1)	(2)
Dependent variable:	Choice to compete	Choice to compete
Round 4 choice	0.294***	0.249***
	(0.0381)	(0.0392)
Male dummy		0.178***
		(0.0418)
African dummy		-0.0426
		(0.0463)
AA treatment		-0.0149
		(0.0584)
RMF treatment		0.0347
		(0.0631)
RMM treatment		0.00311
		(0.0641)
Age		-1.983
		(3.403)
Age x Age		0.0570
		(0.0646)
Part time job		0.120
		(0.0826)
Father educ.		0.129**
		(0.0516)
Mother educ.		-0.00427
		(0.0526)
Prior exp. in task		0.0355
		(0.0672)

Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1.
Acronyms: R3 = Round 3, R4 = Round 4, AA = Affirmative Action, RMF = Role Model Female, RMM = Role Model Male, educ. = education, exp. = experience.
Controls: Round 1 and 2 performance, Think win in Round 2, Age, Age squared, Father's education, prior exp. in task, Mother's education, part time job.

Table 27: Impacts of choice in Round 4 on choice to compete in 3rd Round, with controls displayed

10.5 Round 2 performance as a measure of competitive behaviour

	(1)	(2)	(3)	(4)	(5)	(6)
Dependent variable:	Round 2 Perform.	Round 2 Perform.	Round 2 Perform.	Round 2 Perform.	Round 2 Perform.	Round 2 Perform.
Sample:	*All*	*All*	*Male*	*Male*	*Female*	*Female*
AA treatment	0.0265	0.215	-0.601	-0.0372	0.683	0.738
	(0.504)	(0.375)	(0.742)	(0.506)	(0.672)	(0.540)
RMF treatment	0.622	0.740*	0.787	0.863	0.505	0.720
	(0.505)	(0.386)	(0.757)	(0.531)	(0.674)	(0.567)
RMM treatment	0.200	0.442	0.0265	0.536	0.410	0.586
	(0.521)	(0.424)	(0.807)	(0.584)	(0.682)	(0.622)
Male dummy	0.727*	-0.126				
	(0.372)	(0.285)				
African dummy	-3.129***	-1.371***	-3.957***	-1.468***	-2.233***	-1.436***
	(0.381)	(0.321)	(0.562)	(0.453)	(0.505)	(0.446)
Round 1 performance		0.650***		0.747***		0.527***
		(0.0388)		(0.0466)		(0.0565)
Age		0.110		0.284*		0.627
		(0.135)		(0.170)		(0.436)
Age x Age		-0.00192		-0.00384		-0.0155*
		(0.00205)		(0.00242)		(0.00898)
Part time job		-0.237		-0.0254		-0.443
		(0.586)		(0.705)		(0.941)
Father educ.		0.676**		1.065**		0.369
		(0.342)		(0.530)		(0.448)
Mother educ.		-0.481		-1.156**		0.115
		(0.339)		(0.537)		(0.445)
Prior exp. in task		-0.358		-0.877		-0.120
		(0.469)		(0.705)		(0.624)
Constant	14.88***	4.164*	16.27***	0.182	14.08***	0.574
	(0.468)	(2.124)	(0.586)	(2.667)	(0.600)	(5.323)
Observations	438	438	217	217	221	221
R-squared	0.146	0.517	0.187	0.606	0.090	0.419

Acronyms: Perform. = Performance, AA = Affirmative Action, RMF = Role Model Female, RMM = Role Model Male, Controls: Father has tertiary degree, Prior experience in task, Round 1 performance, age, age squared, mother has tertiary degree, part time job.
Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1

Table 28: Impact of treatments and controls on the performance in Round 2 displaying controls

Dependent variable:	(1) Round 2 Perf.	(2) Round 2 Perf.	(3) Round 2 Perf.	(4) Round 2 Perf.	(5) Round 2 Perf.	(6) Round 2 Perf.
Sample:	*All*	*All*	*Male*	*Male*	*Female*	*Female*
Male dummy	0.732**	-0.121				
	(0.372)	(0.285)				
African dummy	-2.464***	-0.828	-1.851*	-0.697	-3.101***	-1.659*
	(0.693)	(0.559)	(0.945)	(0.719)	(1.048)	(0.963)
AA treatment	0.224	0.761	1.283	1.083	-1.024	0.189
	(0.780)	(0.541)	(1.011)	(0.699)	(1.200)	(0.892)
RMF treatment	1.526**	1.036	3.102***	1.379	-0.306	0.0804
	(0.772)	(0.698)	(0.976)	(0.872)	(1.112)	(1.154)
RMM treatment	1.023	1.020	1.282	0.713	0.683	1.131
	(0.872)	(0.775)	(1.266)	(1.082)	(1.206)	(1.201)
AA x African	-0.236	-0.857	-3.155**	-1.955*	2.655*	0.828
	(1.018)	(0.750)	(1.440)	(1.021)	(1.435)	(1.154)
RMF x African	-1.339	-0.434	-3.659**	-0.856	1.134	0.889
	(1.008)	(0.834)	(1.415)	(1.134)	(1.391)	(1.302)
RMM x African	-1.263	-0.865	-2.012	-0.294	-0.488	-0.867
	(1.086)	(0.919)	(1.633)	(1.305)	(1.458)	(1.378)
Round 1 Performance		0.651***		0.742***		0.522***
		(0.0391)		(0.0473)		(0.0568)
Age		0.105		0.237		0.590
		(0.137)		(0.173)		(0.429)
Age x Age		-0.00185		-0.00312		-0.0147*
		(0.00210)		(0.00247)		(0.00878)
Part time job		-0.189		-0.0429		-0.417
		(0.588)		(0.754)		(0.961)
Father educ.		0.674*		0.987*		0.431
		(0.346)		(0.538)		(0.453)
Mother educ.		-0.486		-1.045*		0.0129
		(0.346)		(0.543)		(0.456)
Prior exp. in task		-0.410		-0.759		-0.233
		(0.480)		(0.719)		(0.651)
Constant	14.43***	3.853*	14.96***	0.402	14.71***	1.280
	(0.574)	(2.118)	(0.673)	(2.643)	(0.855)	(5.363)
Observations	438	438	217	217	221	221
R-squared	0.151	0.519	0.211	0.612	0.116	0.426

Acronyms: AA = Affirmative Action, RMF = Role Model Female, RMM = Role Model Male, Controls: Performance in Round 1, Father has tertiary degree, Prior experience in task, age and age squared, mother has tertiary education, part time job. Robust standard errors in parentheses, *** p<0.01, ** p<0.05, * p<0.1

Table 29: Impacts on Round 2 performance by treatment, population-group and gender displaying controls

10.6 Beliefs as a channel associated with changes in competitive behaviour

Dependent variable:	(1) Think win Round 2	(2) Think win Round 2	(3) Think win Round 2	(4) Think win Round 2	(5) Think win Round 2	(6) Think win Round 2
Sample:	*All*	*All*	*Male*	*Male*	*Female*	*Female*
Male dummy	0.278***	0.279***				
	(0.0437)	(0.0438)				
African dummy	-0.0675	-0.107	-0.0469	0.0559	-0.0851	-0.366***
	(0.0489)	(0.0947)	(0.0731)	(0.131)	(0.0689)	(0.138)
AA treatment	-0.0884	-0.119	-0.00506	0.0789	-0.154**	-0.409***
	(0.0567)	(0.102)	(0.0905)	(0.140)	(0.0686)	(0.145)
RMF treatment	0.0714	0.104	0.118	0.290**	0.0222	-0.199
	(0.0629)	(0.114)	(0.0915)	(0.135)	(0.0866)	(0.181)
RMM treatment	-0.0390	-0.137	-0.0168	0.00956	-0.0441	-0.348**
	(0.0637)	(0.120)	(0.0960)	(0.164)	(0.0840)	(0.170)
AA x African		0.0490		-0.141		0.373**
		(0.121)		(0.188)		(0.164)
RMF x African		-0.0495		-0.273		0.296
		(0.135)		(0.183)		(0.203)
RMM x African		0.151		-0.0438		0.435**
		(0.137)		(0.200)		(0.188)
Round 1 performance	-0.0218***	-0.0224***	-0.0195*	-0.0205*	-0.0198**	-0.0214**
	(0.00720)	(0.00728)	(0.0118)	(0.0119)	(0.00847)	(0.00844)
Round 2 performance	0.0412***	0.0416***	0.0433***	0.0422***	0.0368***	0.0370***
	(0.00725)	(0.00725)	(0.0113)	(0.0114)	(0.00955)	(0.00960)
Age	-0.961	-1.094	0.829	0.0254	-4.051	-5.031
	(2.138)	(2.107)	(3.022)	(3.066)	(4.892)	(4.726)
Age x Age	0.0200	0.0221	-0.00243	0.00863	0.0783	0.0974
	(0.0339)	(0.0330)	(0.0465)	(0.0463)	(0.0928)	(0.0891)
Part time job	0.0478	0.0415	0.0640	0.0634	0.00369	-0.0439
	(0.0848)	(0.0844)	(0.118)	(0.118)	(0.122)	(0.120)
Father educ.	0.0666	0.0632	0.110	0.0996	0.0338	0.0126
	(0.0505)	(0.0511)	(0.0777)	(0.0797)	(0.0673)	(0.0677)
Mother educ.	-0.0591	-0.0498	-0.0812	-0.0627	-0.0435	-0.0322
	(0.0509)	(0.0517)	(0.0764)	(0.0783)	(0.0689)	(0.0692)
Prior exp. in task	0.0938	0.110*	-0.0655	-0.0478	0.222**	0.246***
	(0.0649)	(0.0664)	(0.0941)	(0.0966)	(0.0891)	(0.0916)
Constant	0.124	0.166	0.0252	0.105	0.577	0.923
	(0.328)	(0.331)	(0.474)	(0.480)	(0.606)	(0.626)
Observations	438	438	217	217	221	221
R-squared	0.195	0.199	0.130	0.139	0.147	0.178

Acronyms: AA = Affirmative Action, RMF = Role Model Female, RMM = Role Model Male,
Controls: Performance in Round 1, Performance in Round 2, Father has tertiary degree,
Mother has tertiary degree, part time job, prior experience in task, age and age squared.
Robust standard errors in parentheses, *** p<0.01, ** p<0.05, * p<0.1

Table 30: Impact on thinking win in Round 2, by gender and race displaying controls

11 Appendix B: Experimental set-up

For this project we used the computer labs at the University of Cape Town, assisted by Commerce IT. The layout of the session is shown in the images below. All of the session had the same setup to ensure consistency across sessions.

Figure 8: Lab set-up for all sessions

12 Appendix C: Control Group Instructions

Note for the experiment different scripts were used for the various treatments. For succinctness of this write up we merge the scripts together into one script, with the small variations of the script dependent on treatment inserted at the appropriate part of the script.

University of Cape Town
Masters Research Project 2016
Aimee Hare (HRXAIM001)

Instructor's Script: CONTROL GROUP

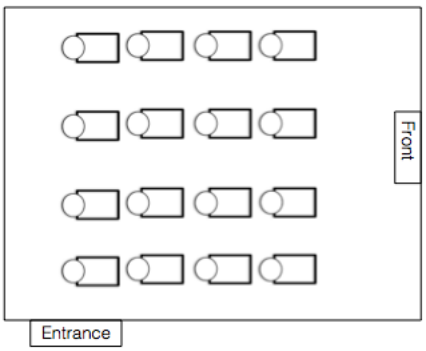
These are the script that the instructor would follow to carry out the experiment. Note for ease of reading and so that all the appropriate actions are carried out, I have colour coded the instructions. The red colour indicates an action that the instructor needs to implement, and the blue colour is text that the instructor is required to speak. The spear-head bullet ($>$) indicates there is an action that needs to occur that does not need to be directly facilitated by the instructor. The remainder of the text is explanations to justify actions and instructions to the instructor. Thank you to Niederle et al. (2008), as we included large parts of their instructions in our experimental instructions.

12.1 Before the experiment

Before participants arrive, a certain classroom setup needs to be established. This includes some core features:

(i) Computer room setup:

- Formation of rows of 4 players. Allocate at least 1 computer between each player in the row.



(ii) Equipment check list

- Booths
- Computers working
- Main ztree computers working
- Projector, extension, double adapter
- Backup hardcopy consent forms and hard copy questionnaires
- Pen
- Registers
- Laminated numbers
- Booth numbers
- White board marker

(iii) Projector working

(iv) All devices working

12.2 Once participants have arrived, but before the beginning of the experiment

> All the participants wait outside for the experiment to begin.

When the participants come into the computer lab each person signs the register to identify that they are present in the experiment and they are allocated a card with an identification number. This identification number is pre-assigned. The ID numbers are the same in each session; they range from 1 to 16. This number is then concatenated with the session number to form a unique player identification number (PID) for each individual in the experiment. Therefore the players PID from the first session will range from 101 to 116, the players PID from the second session will range from 201 to 216, and so on. This arrangement allows sessions to be easily replicated.

Main actions the start of the experiment:

- Participants sign register and is given a laminated number
- Each participant is told to enter computer lab and to sit at the booth number that corresponds to the number on his or her laminated number.
- Each participant is told that there is no talking or communicating in the lab, but to please sit quietly.

12.3 Spoken text of experiment

Instructor: Welcome and thank you for participating in the Activity Task today.

- Next slide: To give just some background, this is a study that will form part of a Masters Research Project in the School of Economics here at UCT. The aim of the study is to look at the way that behaviour changes in varying environments.
- Next slide: Some ground rules, please turn off your cell phones now and make sure that they are in your bag (not on your persons). You are not allowed to use your cell phone during this activity task. We also do not allow talking, in this space you may not speak or communicate with any of the other participants. If we do find that you are talking we will ask all of the parties involved to leave the experiment and they will not be paid for their time. Please let me know if you cannot hear me, or if your computer is shutting down etc. Is this clear? Can you please press OK. Note that you are consenting to participate in this task. Due to the nature of the study, you will need to provide the researchers with some form of identifiable information however, all responses will be kept confidential. AND your decisions and performance will not be publicly identifiable to you as a person. Note that you have also given us permission to use your student ID photograph from VULA. We promise to preserve the integrity of the picture, will only use it as a tool to add value to the research and we have ethical approval from the UCT ethics board, which ensures a respectful use of your picture. If you agree, please press yes and then OK. If you do not agree you may leave now.
- Next slide: The process for this session includes 4 main payable activity rounds. The nature of each task will be explained as the session continues. Its important to remember that these activities do not require any preparation, and are simple in nature. Just relax and do the best that you can. At the end of the session we will ask you to fill in a short questionnaire and then we will proceed with the payment process. Please follow my instructions carefully and only proceed with an action when I tell you to do so explicitly. Note that there will be a payment of real money for the activities today. The amount will vary according to the decision that you make during the session. Let me just emphasise this: you will receive actual money, cold hard cash, for your time spent in this session. This amount will be dependent on your effort and your decisions, but you will receive something. At the end of the session, you will need to take your receipt to the Cashiers on Middle campus to claim your earnings the following day. You can then spend it on what ever you wish. The only further thing you need to take note of for now, is that because our research funds are limited, at the end of the session (when we are working out the payment amount) the computer will randomly select one of the 4 main activities for payment. This means you would need to work just as hard in all of the activities, as any one of the activities may be selected for payment. To re-emphasise, at the end of the session the computer will randomly select one of the 4 payable rounds and that will determine which round will be used to calculate earnings. Note the method we use to determine your earnings varies across rounds. Before each round we will describe in detail how your payment is determined.
- Next slide: Please press OK. Your total earnings from the session will be the sum of your payment for the randomly selected task, additional bonus payments and a R25 show up fee. At the end of the experiment you will be asked to come to sign a receipt form and then you will be able to collect your earnings from the Cashiers on campus.
- Next slide: Please press OK. For this session we will be using a main activity, which we will use for the different rounds, so I will first explain the activity and then we can move onto the payable rounds. In this activity you

will play a game, which has a set time limit, and the goal of the activity is to complete as much of the task as possible within the specific time period.

- Next slide: Please press OK. The task itself is a computer-based slider game, where there are many adjustable sliders on the screen and your role is to set as many of the slides into the centre of the scale. You know the slider is in the centre of the scale when the number along side the scale is set at 50%. This is what your screen will look like (indicate to screen). Notice that there are many of these line-looking things on your screen. Ill refer to each of these as slider, so the aim is to complete as many sliders in a set time. To complete a slider correctly you would need to make sure that it is centred on the scale, i.e. that it is placed on the 50% mark. If you look at the front for a moment. To physically complete a slider, you would take your mouse and pull the tag to the centre of the scale. Note you are not allowed to use the keyboard. (TAKE MOUSE AND SHOW). As you can see the first 9 sliders have been completed in this example, because they are centred in the middle of the slider. Please note, and this is important, we have randomly selected 9 as the number of sliders completed and does not necessarily reflect a good or a bad performance. It is just so you can see how this works.

- Next slide: I have zoomed in on the board just so that you can see more clearly. You can see there are a number of 50 along side of the slider, which indicates that the slider is in the middle, it is at that 50% mark and therefore it is considered complete. The 11th slider is at 38, which means that it is incomplete. Once a slider is completed then you would move onto another slider and you can complete which every sliders you please on the page within the round i.e. it doesnt have to go in this order. The aim is to complete as many sliders in the time period. I am going to refer to the whole screen of sliders as one round. All sliders would be 1 Round.

- Next slide: We will have some practice rounds before we begin the 4 payable rounds. But Im just emphasising that this whole screen with all of these sliders would be one round and the goal would be to complete as many sliders in a certain time period. You will get a fresh screen of sliders at the beginning of the next round. I will tell you the amount of time you have to complete the round before starting each round.

- Next slide: Please press OK. Other information that you will be able to see on the screen: there is a timer in the top right hand corner, which shows the remaining time of that round. You will also be able to see if the round is a paying round (from the top left hand corner in case you forget). The payment for that round will be displayed in the middle area and the number of correct sliders will be tallied as you play (which is shown just below the payment information). Please press OK.

- Refer to different parts of the screen to highlight where they should be looking for this information.

Practice Round

- Next slide: We will play two practice rounds to ensure that you will know how this works. For these practice round you will complete the activity, but this will NOT contribute as a payable round. So this result will not be going into the draw of performance for payment at the end of the session. You will have 2 minutes to complete as many sliders as possible in this practice round. Once the time is up you will not be allowed to complete more sliders and your results will be tallied. Note it is important that you keep your results private, so please keep any exclamations of glee or disappointment to yourself. Is this clear? The practice round will start when everyone presses OK. Please press ok on your screen.

> They will have two minutes to complete the practice round. Results will come to your main computer. Make sure that everyone has completed some activities. If anyone is clearly lagging go and help that person specifically.

Instructor: Well done on completing your first PRACTICE round.

- Next slide: We will now proceed to the second practice round. This works in the exact same way as the previous round. There are many sliders in this round. Make sure that you complete as many sliders as possible in the two-minute time limit. Note this round also will NOT contribute to the payable rounds. Is this clear? The next practice round will start when everyone has pressed OK. Please press OK.

Round 1: Piece Rate

- Next slide: Now that we have completed the practice rounds we will continue to the PAYABLE rounds. This round is very similar to the practice rounds, except now this performance will be part of the PAYABLE rounds, and therefore the may be selected for payment at the end of the session. Round 1: You will be playing the same game as in the practice round. This round will be paid according to a piece-rate scheme. This means that each slider will be worth a certain set amount of money and you will earn a value directly based on the number of sliders that you successfully complete in this round. So there is a set amount that each slider is valued at. In this round this value is R3.00. Therefore by successfully placing a slider at the centre of the line (at that 50% mark), you will earn R3.00.

- Next slide: Please press OK. A correct slider is worth R3.00 as you can see at in this toolbar (show slide with slider being worth R3.00). Your job is therefore to complete as many sliders as you can within a 2-minute period to maximise your earnings for this round.

- Next slide: Please press OK. Using the previous example of performance with piece rate payment scheme applied. You can see each of the completed sliders are worth R3.00 and the incomplete sliders are not worth anything (show slide). You can see this in the picture. Note that since each correct slide is worth R3.00 and because there are 4 sliders correctly completed, in this round we would earn R27.00. Remember Round 1 is a payable round. So if Round 1 is the one randomly selected for payment at the end of the session, then you get R3.00 per problem you solve correctly in the 2 minutes. Therefore in this example the payment for this round would be R27 if it were selected for payment. Note your payment does not decrease if you provide an incorrect position of a slider. So for example, the fact that we have placed one of the sliders at point 38 does not decrease the earnings. We refer to this payment as the piece rate payment. Please press OK. Remember please do not talk with one another. If you have any questions, please raise your hand. ARE THERE ANY QUESTIONS BEFORE WE BEGIN?

- Next slide: We are about to begin round 1, please press OK.

> They will have two minutes to complete round 1. Results will come to your main computer.

Round 2: Tournament

- Next slide: We are now moving onto round 2, which is the second payable round. This round follows a similar task as the previous round and practice rounds. You are required to complete as many sliders within a 2 minute time period. Now, however, you are playing in a tournament. So unlike the previous round, where you were paid per slider, you will now in this round be playing against some of the other players in the room. You

have been assigned a group of 4 and in this round the person who completes the most sliders in this group of 4 will be the winner. That is, the top performer in the group (the person who completed the most sliders) will be the winner. The winners will earn money proportional to the number of sliders completed, but it will be paid at a higher value than in Round 1. So instead of each slider being worth R3.00 as we have done before, they are now worth R12.00 each. The winner will receive the number of sliders that they completed correctly multiplied by the price for a tournament round which is R12.00. The group members who did not receive the highest score will receive R0.00 for this round. We call this a tournament round, as you will be playing in a group, which will result in 1 winner per group. Please press OK. Therefore in our previous slider example, of performance 9.

- Next slide: If this Round was chosen for payment at the end of the session and this performance is of the top performer in their group, i.e. this individual is a winner. Then
- Next slide: This person would therefore earn R12.00 x 9 = R108 for this round, as they have completed 4 sliders and each slider is worth R12.00 for a winner. The other 3 players in the group receive R0.00 as they are not the winner of the round. Please press OK.
- Next slide: Now thinking about your group. If we imagine your group of 4, as shown from bird eye view. Seen in this picture.
- Next slide: There will be one winner. In this example, the winner has performed 9 sliders and has completed the most sliders relative to the other I members of their group.
- Next slide: This means that the winner will receive R108 and all the other players in the group will receive R0. In the event of a tie, we will randomly select the winner from the top participants to ensure that there is only 1 winner in each group. Please note, and this is important, we have randomly selected 9 as the number of sliders completed and does not necessarily reflect a good or a bad performance. It is just so you can see how this works.
- Next slide: Please press OK. Remember each group consists of 4 people. The three other members of your group are located in the same row as you, that is, you are paired with the people sitting on either side of you. You are not allowed to communicate with them, but spend a moment to look at your group members now. Please press OK. Just a reminder, you are not allowed to communicate with each other. Again please try to minimise even any subtle communication while playing the task. Note you will only find out your group members performance at the end of the session. So you will only be informed of how well you did in the tournament after all the main activities have been completed. Note we refer to this type of payment as the tournament payment. If you have any questions, please raise your hand. ARE THERE ANY QUESTIONS BEFORE WE BEGIN?
- Next slide: We will now play round 2. Please press Ok for the Round to start.

> They will have two minutes to complete round 2. Results will come to your main computer.

Round 3: Choice and play

- Next slide: We now move onto the third payable round.

- Next slide: Please press OK. As in the previous round, you will have 2 minutes to complete the slider task. However, you now have to choose which payment scheme you want applied to your performance in the 3rd Round. You can either choose to be paid according to the piece rate (as we did in Round 1), or according to the tournament (as we did in Round 2).
- Next slide: Please press OK. If Round 3 is the one randomly selected rounds for payment at the end of the session, then your earnings for this task are determined as follows. If you choose piece rate you receive R3.00 per slider you solve correctly. If you choose tournament your performance will be evaluated relative to the other three group members performance in Round 2. If this round is selected for payment at the end of the session and you are the winner in the group, you will receive R12 per correct slider. If you are not the winner, you will receive R0 for this round.
- Next slide: Please press OK. I will re-emphasise, if you choose tournament you will be playing against your group members Round 2 performance. Round 2- tournament is the task you just completed. If you correctly solve more sliders in this round than your the 3 group members did in the Round 2, then you receive will receive R12.00 per correct slider. Otherwise, you receive no earnings for this task. So if you choose tournament, you will be comparing your current Round 3 performance with your group members Round 2 performance. The payment is then determined according to the normal tournament payment rule. This allows this to be an individual decision, and does not rely on all of your group members also choosing the tournament in order for the tournament to take place. Please press OK.
- Next slide: So you have this choice: do you want to play this round with the payment method to be (1) piece rate OR (2) tournament. If there are ties, then the ranking is determined randomly between the tied individuals. Remember, your group consists of all individuals that sit in the same row as yourself. Every group has 4 individuals. You will not be informed of how your group members did in the tournament until all rounds have been completed. Is this clear? Remember please do not talk with one another. If you have any questions, please raise your hand. We will first go through a screen that gives the choice option, then we will start the Round 3 slider task all together.
- Next slide: Please press OK. On the next screen will see something that looks like this. We ask you to choose whether you want the piece rate or the tournament applied to your performance. So you can choose and mark off either piece rate or tournament. Note that once you make your choice you cannot go back and change your mind, so please choose carefully.
- Next slide: I have zoomed in on the decision. So you would take your mouse and click on the chosen outcome.
- Next slide: Please press OK and fill it in now. Then press the red OK button to get back to the waiting screen.

> There will be 1 minute to make the choice if the participant wants to choose piece rate or tournament.

- Next slide (Play Round 3): Now that everyone has made his or her choice. We now proceed with the task. You will have 2 minutes to complete as many sliders as possible, ARE THERE ANY QUESTIONS BEFORE WE BEGIN? Please press OK to begin the activity

> They will have two minutes to complete round 2. Results will come to your main computer.

Round 4: Choice using past performance

- Next slide: We now move onto the final round. You do not have to physically play the activity for this round. Instead you may be paid one more time for the number of sliders you solved in Round 1 (the first payable round you completed). However, you now have to choose which payment scheme you want applied to the number of sliders you solved in Round 1 (the original Piece Rate round). You can either choose to be paid according to the piece rate, or according to the tournament. Please press OK.

- Next slide: If this Round 4 task is the one selected for payment at the end of the session, then your earnings for this task are determined as follows. If you choose the piece rate you receive R3.00 per slider you solved in Round1. If you choose the tournament your performance will be evaluated relative to the performance of the other three participants of your group in Round 1. If you correctly solved more problems than your 3 group members in the Round 1, then you receive R12.00 per correct slider and if do not win you receive no earnings for this Round. Please press OK.

- Next slide: Note for this tournament choice, it will involve your Round 1 performance against group members Round 1 performance. Remember in this Round we only ask you for your choice, as this relies on your past performance. So no physical slider game will be played for this round. Please press OK.

- Next slide: If there are ties, then the ranking is determined randomly between the tied individuals. Remember, your group consists of all individuals who sit in the same row as yourself. Every group has 4 people. You will not be informed of how they did in the tournament until all rounds have been completed. Please press OK.

- Next slide: The next screen will display something that looks like this. It will tell you how many problems you correctly solved in Round 1, and will ask you to choose whether you want the piece rate or the tournament applied to your performance. Note that once you make your choice you cannot go back and change your mind, so please choose carefully.

- Next slide: I have zoomed into the picture so that you can see better. You would use your mouse and click on your choice. Please do not talk with one another. If you have any questions, please raise your hand. ARE THERE ANY QUESTIONS BEFORE WE BEGIN? Please press OK and enter your choice now. Then press the red OK button.

Round 5: Ranking

- Next slide: We have completed the main activity rounds. We now ask that you complete one more task, which will be for payment. This round will NOT be included in the 4 main activity rounds that will be randomly selected for payment at the end of the session. It will be included in addition to the 4 main payable activity rounds.

- Next slide: We ask you to rank where you feel you placed in your group of 4 in Round 2 the tournament round. We therefore want to know if you think you placed 1st, 2nd, 3rd or 4th within your group. Where do you think you placed? We also want to know where you think you placed within your group, as well as your gender in Round 2 the tournament round. Of the people in your group who have the same gender as you, where do you think you placed? Did you place first or second? Please press OK.

- Next slide: The following screen will look like this. It will give you two different spaces for you to indicate your expected rank. The first space is for your ranking within your WHOLE group and the second space is for your placement within your own gender within your group. We have reminded you what your Round 2 performance was, just for ease of reference.

- Next slide: I have zoomed into the picture so that you can see better. You would use your mouse and click on your choice. Note you will also be paid if you make a correct guess. You will receive an additional R5 for every correct ranking. You could therefore potentially receive an additional R10 to add to your winnings. So if you guessed that you placed 1st in your group and you did place first you would receive R5 in addition to the show up fee and the randomly selected Round from the last 4 payable rounds. If you guessed you came 3rd and you did not come 3rd then you will receive R0 for these additional payments. Is that clear? Please raise your hand if it is not. Please press Ok and fill this in now. Then press the red OK button.

> They will fill in rank now.

- Next slide: We now ask you to do the same ranking, but based on your Round 1 performance the original piece rate round. We ask you to rank where you feel you placed in your group of 4 in Round 1 the piece rate round. We therefore want to know if you think you placed 1st, 2nd, 3rd or 4th within your group. Where do you think you placed? We also want to know where you think you placed within your group, as well as your gender in Round 1 the piece rate round. Of the people in your group who have the same gender as you, where do you think you placed? Did you place first or second?
- Next slide: The following screen will give you two different spaces for you to indicate your expected rank. The first space is for your ranking within your WHOLE group and the second space is for your placement within your own gender within your group. We have reminded you what your Round 1 performance was, just for ease of reference.
- Next slide: I have zoomed into the picture so that you can see better. You would use your mouse and click on your choice. Note you will also be paid if you make a correct guess. You will receive an additional R5 for every correct ranking. You could therefore potentially receive an additional R10 to add to your winnings. So if you guessed that you placed 1st in your group and you did place first you would receive R5 in addition to the show up fee and the randomly selected Round from the last 4 payable rounds and any money gained from the last ranking activity. If you guessed you came 3rd and you did not come 3rd then you will receive R0. This earnings is in addition to the previous ranking. Therefore from these additional rounds there is a possibility of earning an extra R20. Is that clear? Please raise your hand if it is not. Please press OK, then fill this in now. After this press the red ok button.

> They will fill in rank now.

- Next slide: You can now examine your performance for the different rounds. You can then press draw a number to pick your randomly selected round for payment, not including the practice round.

Round 6: Questionnaire and final output

- Next slide: We are now nearing the end of the session. You can see your earnings and the earnings for your guessed ranks. We now ask you to complete fill in your details for this session with a brief questionnaire. Please press continue. Then fill in your details and once you are finished please raise your hand and we will proceed with payments. Do not press the final END button before you have signed your receipt. You will sign your receipt now and then you can take it to the cashiers on Middle Campus to claim your earnings.

Note a brief explanation about each of the values on the output score board was explained at this part of the experiment. Participants signed their payment receipt form and then left the labs.