Identity, Trust, and Discrimination in a Social Exchange Experiment

Ece Yagman and Malcolm Keswell *

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Abstract

There is a vast literature in experimental economics that has shown that the ascriptive characteristics of a subject in a strategic setting (like race and gender) is predictive of behaviour. However, the treatment in many of these experimental settings (by design) holds constant other traits in order to isolate the effect of the visual signal that subjects are exposed to. While this type of design has the advantage of detecting whether individuals discriminate according to skin colour and gender, the interpretation of these types of results, especially in a context where race might be non-linear in other types of signals, is less clear cut. Moreover, in real world social interactions, individuals receive signals as a "package". In this paper, we investigate whether visual and audial signals are non-linearly predictive of trust behaviour. Subjects were recruited to play a trust game when the only information they received was the race and linguistic background of their partners. Player As were randomly paired with player Bs of the same/different race, and asked to play the trust game, after looking at a photograph and hearing a 10 second audio clip of their player B partners. The audio clip was designed to reveal the extent to which the player B subject spoke with a discernible Black South African English (BSAE) accent. In estimating our treatment effects, we pay special attention to underlying distribution assumptions, which is especially important in our context since our response variable is bounded on the unit interval. To tackle this problem, we employ a variant Beta Regression that generalises to responses on the closed unit interval by employing a mixture of degenerate distributions to model the extreme values and the Beta distribution to model responses on the open unit interval. We find that a mother tongue English accent (our measure of BSAE) is a statistically significant predictor of trust and is strongly non-linear in the race of the paired subjects for males: offers decrease by 11.3% if player Bs have a mother-tongue English accent and do not share the same race as Player A, but increases by about 6.6% if they do share the same race as Player A. This effect is especially pronounced for black males who are paired with other black males: Player A trusts Player B about 19.5% more if Player B has a mother-tongue English accent. By contrast, females in general seem less sensitive to the signal package.

*Yagman: Southern Africa Labour and Development Research Unit, University of Cape Town, Rondebosch 7700, Cape Town (*email*: eceyagman@gmail.com); Keswell: Southern Africa Labour and Development Research Unit & School of Economics, University of Cape Town, Rondebosch 7700, Cape Town (*email*: malcolm.keswell@uct.ac.za). We are especially grateful to Justine Burns for helpful guidance and advice. We also thank seminar participants of the Research Unit in Behavioural and Neuroeconomics (Ruben) and the Southern Africa Labour and Development Research Unit (Saldru), especially Harold Kincaid and Murray Leibbrandt.

1 Introduction

A growing body of research has focused on the economics of language in recent years. In terms of the effects of language on economic outcomes, this area of research carries a particular importance in post-apartheid multilingual South Africa, where the constitution recognises and guarantees equal official status to each of its eleven official languages.[1] From a language policy and planning point of view, South Africa is uniquely positioned given the legacy of the colonial rule and the ensuing apartheid government's discriminatory language practises against the indigenous and minority language groups, particularly that of Black South Africans. Although only ten percent of the population speaks English as their home language, it still remains as the *lingua franca* in the post-apartheid South Africa (SSA 2011). Owing its global importance in commerce, technology and science, knowledge of standard English is unquestionably associated with upward social mobility and progress (Klerk 2003). To the extent that English is associated with higher status, one might expect the linguistic background of individuals to affect trust relationships.

Broadly speaking, every regional variety of English has a sociolinguistic continuum from 'standard' (educated, non-stigmatised, favoured by the schools, normal for public discourse) to 'vernacular' (non-standard and stigmatised by at least some of the standard-speaking community) (Lass 2002). In South Africa, these variations in English are particularly manifested in distinct ethnic varieties (ethnolects), such as Black South African, along with the traditional British English spoken by White communities that is considered as the standard English (SAE) (Gough 1996). Black South African English (BSAE), which can be briefly defined as the variety of English commonly used by mother-tongue speakers of South Africa's indigenous African languages, is characterised by clearly separate and distinguishable sound systems (Hundleby 1964, Lanham 1967, Adendorff and Savini-Beck 1993, van Rooy 2000, Van Rooy and Van Huyssteen 2000).

The roots of BSAE lie in the history of institutionalised segregation by the apartheid government depriving black South Africans free access to English. The 1953 Bantu Education Act effectively separated black South African learners from the native English speaking community and the mother-tongue English speaking teachers in the system were slowly phased out (Lanham 1996). This limited contact with native-speaker norms and deliberate under-provision of educational infrastructure gave rise to deviance from standard English, which, in time, became naturalised by the large numbers in successive generations (Wright 1996). In the post-apartheid South African context, the structural inequalities of the past do still play out: many black parents insist on English-medium instruction in former black primary schools; however, in reality most teachers are BSAE speakers as a product of 'Bantu Education' (De Klerk and Gough 2002). The deficient use of English as a medium of education bolsters the social divide between the black people who speak BSAE and those who have access to privileged education and thus can speak 'standard' English (Silva 1997). Although race and home language are highly correlated, being a black South African is not synonymous with being a BSAE speaker. These different and predominantly ethnically marked varieties of English become salient on the basis of accent – a combination of phonetic details and phonological properties – eliciting the social status, educational level, and the mother-tongue of the speakers (Lass 2002).

[1] The official languages of South Africa are Afrikaans, English, IsiNdebele, IsiXhosa, IsiZulu, Sespedi, Sesotho, Setswana, SiSwati, Tshivenda and Xitsonga. The following languages are also mentioned in the constitution despite not being official languages: Khoi, Nama and San languages, sign language, Arabic, German, Greek, Gujarti, Hebrew, Hindi, Portuguese, Sanskrit, Tamil, Telegu and Urdu.

While there has been some research in the economic value of English language proficiency among African mother tongue speakers in South Africa (Casale and Posel 2011), the attitudes towards speaking BSAE have not been examined thoroughly. Without information on the background or reputation of others, individuals may use an array of cues, ranging from the most apparent to very subtle, to form impressions of others. In that regard, sounding like a BSAE speaker may elicit some information and play a role in developing initial perceptions and shaping social biases. This paper examines the role that English language, and accent in particular, might play in strategic interactions characterised by asymmetric information. In particular, we investigate whether visual and audial signals are non-linearly predictive of trust behaviour. Subjects were recruited to play a trust game when the only information they received was the race and linguistic background of their partners. Employing a Trust Game is a fitting approach to test factors that increase/decrease the likelihood of trust in strategic interactions.

Player As were randomly paired with player Bs of the same/different race, and asked to play the trust game, after looking at a photograph and hearing a 10 second audio clip of their player B partners. The audio clip was designed to reveal the extent to which the player B subject spoke with a discernible Black South African English (BSAE) accent. In estimating our treatment effects, we pay special attention to underlying distribution assumptions, which is especially important in our context since our response variable is bounded on the unit interval. To tackle this problem, we employ a variant Beta Regression that generalises to responses on the closed unit interval by employing a mixture of degenerate distributions to model the extreme values and the Beta distribution to model responses on the open unit interval. We find that a mother tongue English accent (our measure of BSAE) is a statistically significant predictor of trust and is strongly non-linear in the race of the paired subjects for males: offers decrease by 11.3% if player Bs have a mother-tongue English accent and do not share the same race as Player A, but increases by about 6.6% if they do share the same race as Player A. This effect is especially pronounced for black males who are paired with other black males: Player A trusts Player B about 19.5% more if Player B has a mother-tongue English accent. By contrast, females in general seem less sensitive to the signal package.

2 Motivation

Individuals have multiple characteristics which may affect social and economic outcomes in different ways. Some of these characteristics are inherited and salient, such as gender and race; while others are more subtle, such as a variety of accent. These attributes can be used as heuristics to form impressions and reach decisions between two strangers, especially if the context entails them to be vulnerable to the actions of the other by trusting each other. Discrimination based on snap judgements that are very visceral in conception and vigorous in execution, can be revealing to examine how visual and audial cues interact together.

2.1 Accent Discrimination

It is now widely accepted that the acquisition of a second language after a certain age in early childhood inevitably leads to speech that differs from that of native speakers, mainly because established knowledge of the sound system of the first language impacts the perception and production of the phonetic patterns of the second language (Flege, Munro and MacKay 1995, Long 1990, Oyama 1976, Scovel 1988, Tahta, Wood and Loewenthal 1981). The human ability to detect different accents after receiving an audial cue is strong, even for phonetically untrained listeners. For instance, Flege (1984) has shown in a perceptual study that phonetically untrained listeners are able to detect a foreign accent in tiny segments of speech as short as .03 seconds.

Along with being easily distinguishable by individuals, accents also serve the listeners as immediate signals for assessing the character and background of the speakers (Giles 1970, Giles 1973, Ryan, Hewstone and Giles 1984). For example, Purnell, Idsardi and Baugh (1999) demonstrate that a group of untrained listeners hearing a voice over the telephone could guess the race of speakers after hearing them say only the word "hello". These assessments play a key role in determining listeners' perceptions of, and actions towards, the speakers. In other words, our speech reveals information beyond the message communicated for the listeners and it can play a major role in shaping the assessment of the speakers.

Given the evidence that the way we sound can serve as a signal to the listeners, do accents constitute a further dimension over which stereotyping can occur? Giles (1970) Giles and Sassoon (1983) and Stewart, Ryan and Giles (1985) provide evidence that an accented speech influences the listener's assessment of the speaker's personality, social status, social attractiveness, competence, and social distance. This influence might in turn stimulate negative or positive stereotypes and instigate discriminatory behaviour. Similarly, Ryan, Gallois and Forbes (1983) argue that speech accents can stimulate stereotypes and prompt illegal and discriminatory behaviour against accented speakers. To the extent that accents can be used as costless observable cues, they may also lead to negative group stereotypes. For instance, a study of the housing market by Purnell et al. (1999) found that callers who use standard American English versus African American vernacular English received significantly higher number of confirmed appointments to view apartments.

Brennan and Brennan (1981) and Lambert (1967) argue that an accent might be a trigger for a person to react negatively as a result of prejudices held against a particular group of people. For instance, an American study conducted with 730 undergraduate students revealed that an unseen speaker with a prominent non-English accent is rated as less interesting, less convincing, and even less physically attractive than another unseen speaker with a native English accent (Raisler 1976). Similarly, Ryan, Carranza and Moffie (1977) showed a positive correlation between the degree of accentedness and ratings of negative assessments on status, solidarity, and speech characteristics.[2] There is also some evidence that suggests that listeners adjudicate the credibility of statements made by accented speakers negatively. For example, Lev-Ari and Keysar (2010) found that individuals judged trivia statements such as "Ants don't sleep" as less true when spoken with a foreign accent rather than a native one.

While a high degree of accentedness may lead to more negative assessments, the opposite may hold true for standard accents. For instance, in the United States, it has been found that higher status ratings (i.e. intelligence, wealth, education, and success) are mostly given to speakers with native accents even by the listeners who are foreign and who speak with an accent (Abrams and Hogg 1987, Ryan and Carranza 1975, Ryan and Sebastian 1980). Similarly, according to the social-psychological concept of Accent Prestige Theory (APT), speakers in the United Kingdom who have an English accent that is categorized as "first-class", are generally granted better evaluations; not only on a competence dimension that centres on intelligence, education, social class, and success, but also on a solidarity dimension which entails friendliness, trustworthiness, and kindness (Giles 1970).

Moreover, the positive and negative connotations based on accents are such prevalent notions that

[2] The degree of accentedness in this study was measured by a group of undergraduate students evaluating taped readings of an English text by Spanish-English bilingual speakers. The degree of non-standardness of an accent was rated by employing a seven-point rating scale.

there is a growing business market that capitalizes on it. Internet courses that focus on reducing the "foreign" accent and offering customers a chance to sound like a first language English speaker remind us of the real world salience of accent discrimination. Blommaert (2009) analyses these courses and comes up with two main findings: (1) a rush towards English is a result of the global perception that English is the key to an upwardly mobile trajectory, and (2) the positive effect is even more prominent if the individuals sound American. According to the author, these courses capitalize on the idea that we live in a global system revolving around English, in a world where social effects of speech are very visible. Therefore, there is a natural incentive to sound more American as this is seen as an instrument for success, especially for people who are socio-linguistically different.

A study from Sweden by Rödin and Özcan (2011), which investigates the influence of accented speech in the dominant language, also finds strong negative beliefs about performance for candidates who speak Swedish with a foreign accent. When both looks and speech were presented for performance evaluation, they found a strong negative effect of speaking Swedish with an accent. In fact, their results indicate that these ethnic stereotypes associated with speech override stereotypes that are caused by appearances.

In essence, these studies highlight that (1) Accents can be easily and quickly discerned, (2) accents can be used as signals that can shape perception and behaviour, (3) negative stereotypes and auditory redlining can be based on accents, and (4) these accent stereotypes can even overpower other kinds of profiling. Evidently, accents do matter in everyday life, especially in contexts where informational asymmetries are present.

2.2 Trust & Discrimination

Much of the evidence is suggestive that the negative biases associated with accents might operate through a trust channel. In this study, we investigate this link directly: What is the causal effect of accent on trust? In economic theory, trust is generally regarded as a social lubricant that curtails the cost of exchange in daily market or non-market environments (Lupia and McCubbins 1998, Sztompka 1999, Knight 2001). It has also been considered as a form of social capital that may enhance economic growth and performance (Knack and Keefer 1997, Porta, Lopez-De-Silane, Shleifer and Vishny 1996, Sapienza, Zingales and Guiso 2006).

There is a vast literature connecting trust to discrimination. In this literature, when individuals differentially trust others based on inherited characteristics alone, this is considered as a form of discrimination. For instance, Fershtman and Gneezy (2001b) highlight the dynamics of ethnic discrimination by showing systematic mistrust towards men of Eastern origin in Israeli Jewish society. Similarly, Wilson and Eckel (2006) find that minority groups in the United States are trusted less in studies designed to reveal trusting behaviour in strategic settings. In fact, a growing number of studies highlight some evidence on higher rates of trust towards lighter-skinned individuals (Fershtman and Gneezy 2001b, Haile, Sadrieh and Verbon 2008, Simpson, McGrimmon and Irwin 2007, Naef and Schupp 2009).

Other types of ascriptive characteristics, such as gender, can also play an influential role in terms of trusting behaviour and discrimination. One of the most compelling studies focusing on this aspect is perhaps Goldin and Rouse (1997). They showed that when the top US orchestras use blind auditions of musicians, the likelihood of female contestants being the winners in a final round increases significantly. Linguistic background can also play a role in terms of discrimination. For instance, Fershtman, Gneezy and Verboven (2005) ran a Trust Game in Belgium, where the linguistic segmentation between the

Flemish and the Walloons is very pronounced. Their results indicate that these linguistic groups discriminate against each other by offering significantly lower amounts if they are paired with a player who does not speak the same language, while both Walloon and Flemish students transfer significantly higher amounts to partners of their own ethnic group.

Very few studies have investigated the link between trust and discrimination for South Africa, but the two that have find that Black individuals trust less and they are trusted less compared to White South Africans. Ashraf, Bohnet and Piankov (2006) ran a combination of dictator and trust games with South African university students as a part of an experimental study that took place in three different countries. The biggest difference they found was between White and Black South Africans with the latter making significantly lower offers. A more recent and comprehensive study by Burns (2006) used photographs of participants to transmit information about race. By using pictures, she could examine how the racial identity of proposers and trustees might impact behaviour in a strategic setting. Findings from this study point towards a systematic distrust towards Black partners, by both Black and White proposers, and this is mostly due to mistaken expectations. These findings feed into the literature which suggests that costless and visible cues, such as race and gender, might exacerbate the differences between groups, especially for segmented societies (Zak and Knack 2001, Bouckaert and Dhaene 2004, Akerlof 1997).

Taken together, this experimental evidence on trust and discrimination and the linguistic studies on accent discrimination collectively tell us that visual and audial signals can be salient for the receiver of the signal, and the resulting assessments made by the receiver, in turn, influences their evaluations of the status, background and social similarity of the person giving the signal. However, in real world day to day interactions, these signals are packaged together as individuals see and hear each other simultaneously in most of the cases. Is there any evidence to suggest that accents hinder or amplify the race effect, especially when it comes to trust? In order to answer this question, we set up a Trust Game incorporating visual and audial cues.

3 Research Design

As indicated before, the key question is the causal effect of accent on trust. In this section, we outline how we measure trust and accent in the study.

3.1 Trust Game

Over the last two decades laboratory experiments with monetary rewards have been gaining popularity for measuring trust and trustworthiness. The Trust Game, first devised by Berg, Dickhaut and McCabe (1995), is a standard approach to measuring trust in a dyadic exchange transaction. In this decision making task, two individuals (most often strangers) need to make a snap decision to interact with each other in order to increase their individual and collective welfare. This experimental design more or less simulates a type of market exchange where asymmetric information and contractual incompleteness leads people to make strategic decisions on whether to trust a stranger or not (Kollock 1994, Zak and Knack 2001).[3]

[3]Although, the game is a popular choice among trust researchers, there has been some research on the limitations of this design, arguing that the amount sent in the game confounds trust with specific preferences of the sender such as altruism (Cox 2004); betrayal aversion (Bohnet, Greig, Herrmann and Zeckhauser 2008, Fehr 2009); and other important

The standard Trust Game is a two-person (Player A and Player B) sequential experiment that examines how individuals make snap judgments of whether to trust each other or not. The interaction consists of two stages: during the first stage, both of the players are given the same endowment by the experimenter, after which Player A is asked whether he or she would like to send any of their money to Player B. Should player A choose to do so, the experimenter subsequently doubles the amount sent by Player A, and Player B receives this multiplied amount.[4] The second stage of the game involves Player B making a decision about transferring money back to Player A. Although the sub-game perfect equilibrium dictates that Player A should send zero, the Pareto and socially optimal outcome that maximizes the total pie requires Player A to transfer all of the initial endowment to Player B and for the latter to return 50% of the doubled amount. Of course, Player A would only make a transfer if he/she has an expectation of getting at least half of the doubled amount in return. As the name suggests, the amount that Player A sends is indicative of trusting behaviour that would maximise the overall pie, whilst the money Player B transfers back is considered as trustworthiness/reciprocity.

The experiment was conducted with undergraduate students at the University of Cape Town (UCT) in two separate sessions between May and October 2012. The students were invited to participate in a "decision-making" study and told that they had an opportunity to earn extra cash based on the decisions they made during these tasks. Students, who were interested in being a part of the study, completed a short questionnaire designed to elicit demographic as well as linguistic background. This information was later used to create a binary self-report measure which indicates if the subjects identify themselves as a first language English speaker or not. Given that BSAE is defined as the variety of English commonly used by mother-tongue speakers of indigenous African languages, our way to measure this variable is to use the propensity to speak English as a mother-tongue. As mentioned before, while it is true that having an African mother-tongue is highly correlated with the variety of English spoken, socioeconomic status and privileged education are also significant contributors. In that regard, Black South Africans who speak an indigenous African language at home can still be regarded as first-language English speakers if they were able to master its linguistic and communicative aspects during the critical stages of language acquisition (cf. Johnson and Newport (1989) and Pokorn (2005)).

Prior to the experiment, the participants were invited to a pre-study session by the experimenter. The main purpose of these one-on-one sessions was to record the voice of each of the subjects whilst also probing questions about the linguistic background. This way, the experimenter could clarify the concept of first-language English and correct for any misreporting. In these sessions, each of the participants read the same standard script aloud and their voices were recorded by the same recording device.[5] In other words, all participants were asked to read grammatically correct English in order to diminish the effect of language proficiency while highlighting varying degrees of standardness. In addition to the voice clips, we also obtained subjects' permissions to retrieve their student identification photos from the university intranet. These photos were used to reveal the subjects' racial identities. The treatment package then constituted a 10 second voice clip alongside the photo of each participant. These clips were uploaded to an online video-sharing website called Vimeo, and each participant was given a unique

aspects of trust (Ben-Ner and Halldorsson 2010, Ermisch, Gambetta, Laurie, Siedler and Noah Uhrig 2009)

[4]The original game by Berg et al. (1995) triples the money passed to the receiver. While many replications of the Trust Game across numerous countries kept the convention of tripling the amount sent by Player A, it is also common to find studies where the quantity sent is doubled to lower the cost of conducting the study. For further discussion on the effect of rate of return on trusting behaviour see (Coleman and Coleman 1994).

[5]While the script is contextually meaningful, it doesn't allow for any revelation of personal information.

link which allowed them access to their pair's clip in the decision task.[6]

Once all the videos were uploaded to Vimeo, the experimenter divided the sample pool into two groups along two parameters: race and language. The gender of participants in a given pairing was held constant for possible confounding cross-gender effects that might arise. Following the pair-up process, Player A's received their decision tasks in their emails. The instructions stated that they were endowed with 50 South African Rand and they now had a chance to send any amount from this R50 to their partner, Player B.[7] They were also told that any amount that they decide to send would be doubled by the experimenter. The decision could only take place after watching the video that allowed them to see and hear Player B, who was also endowed with R50. The instructions also provided a private link and password so that Player A's could gain access to their specific partner's clip. A similar process was also followed for all Player B's, whereby they saw and heard their partners before making a decision on the amount they were going to send back, if any.

3.2 3rd Party Evaluations

The treatment package that was used in the Trust Game includes a combination of self-reported variables on race and accent. While this is the main instrument to measure the causal effect of accent on trust, we cannot rule out the possibility that subjects may be responding to a different set of attributes when they see a picture and hear a voice clip. There are several studies suggesting that physical appearance may affect how a person is perceived and treated by others. For instance, Mobius and Rosenblat (2006) found a positive relationship between attractiveness and beliefs about productivity while Biddle and Hamermesh (1995) showed a positive correlation between earnings and beauty. Other than attractiveness, there may be more confounding factors that are unobserved. While it is not possible to distinguish between all the factors that influence perceptions, controlling for trustworthiness and nationality can also help partial out the effect of accent on trust.

To obtain an objective assessment on personal attributes of the Trust Game participants, a new group of students (called "evaluators") were asked to rate each participant's picture and voice recording in a non-strategic setting. These evaluations include assessments of trustworthiness and linguistic background of the subjects. As the subjects participating in the Trust Game and evaluators are all undergraduate students at the same university and recruited the same way, how the subjects are perceived by the evaluators would be a good approximation of how they are perceived by their pairs in the Trust Game.

In order to incentivise the evaluators to offer honest assessments (instead of randomly ticking boxes), each evaluator was told that the experimenter already had data on the subjects for these attributes based on self-report measures from the survey interviews, experimental decisions and psychometric testing. Evaluators only had to guess what these scores would be and the closer their assessment was to the data, the more money they would receive. Put simply, an evaluator's compensation was directly linked to how many correct answers they could get.

A total of 72 UCT students were recruited as picture and voice evaluators. The evaluators had

[6]One of the biggest advantages of using an online video-sharing website is that it provides detailed statistics on how many times the videos get watched and if the viewers watch the entire clip. Since the links are designed to be private, only the students with the right link address and password can watch the clip that has been assigned to them. By using Vimeo, we could monitor the online procedure closely and check if the subjects followed the instructions properly – that is, if they saw the photo and heard the voice of their partners before making a decision.

[7]At the time of the experiment, R50 was equal to $9.52 using the 2012 purchasing power parity (PPP) conversion factor developed by the World Bank. http://data.worldbank.org/indicator/PA.NUS.PRVT.PP/countries?display=default

not participated in the Trust Game and therefore had no interaction with the participants. Each of these evaluators received an assessment task that included an online private link which directed users to a playlist of videos. These videos contained the pictures and voice clips of 21-22 Trust Game participants who are randomly selected. The link also included a set of evaluation questions on a range of characteristics about these subjects. They were asked to make their best assessment on a host of attributes regarding the candidate they were assessing, including our main variables of interest. For instance, evaluators were asked to rate the candidates on characteristics such as trustworthiness, confidence, attractiveness and timidity, as well as on linguistic features, i.e.: speaking English as a first language, after they watched their clips. In total, there were 8 different attribute questions with a rating scale from 1 to 10 for each clip (10 being "very likely" to exhibit the trait, 1 being "very unlikely"). Assessments were then done by the evaluators who watched a set the clips and then answered the assessment questions. In order to make sure that the assessments were as objective as possible, we assigned 6 evaluators – 3 White and 3 Black – per voice clip. Similar to the Trust Game design, the gender of the evaluators and candidates in the clips was held constant. In total, we collected 1572 unique observations for these picture and voice evaluations.

4 Econometric Approach

4.1 Modeling fractional responses

In this section we turn our attention issues of estimation. Our data structure poses several challenges that requires a departure from the normal distribution. Figure 1 below shows the distributions of offers in the Trust Game as a fraction and also as a rand amount. There are two issues that we clearly need to contend with. Firstly, the dependant variable (in levels) is clearly truncated from below (at zero) and from above (at 50). Specifically, about 30% of the responses in our experiment fall into one of these extremes.

An obvious choice in this instance would a two-limit Tobit model. However as Figure 1 makes clear, in our case even for values of the dependant variable falling in (0,50), merely eyeballing the distribution suggests that the data is not normally distributed, so one would need to log-transform the data before applying the Tobit estimator. Of course this raises the issue of how to handle the zeros. A standard practice would be to make an arbitrary adjustment to the zeros thereby shifting the lower limit point to something slightly less than the smallest non-limit observation (see Cameron and Trivedi (2010) for an example) but this in effect compounds the problem.[8] An alternative approach would be to transform the dependant variable into a fraction and then run a Two-limit Tobit model. Since our dependent variable has a pile-up at both 0 and 1, a Two-limit Tobit model would seem logically consistent (since the limit points can be seen as corner solutions). However, even in this instance, as Wooldridge (2010) has pointed out, if one is interested in the effects on the conditional mean – as we are – the two-limit Tobit will generally produce inconsistent estimates of the conditional mean function.

Another approach, also suggested by Wooldridge (2010), would be to take a log-odds transform of the dependent variable. The idea here is that since a fraction is mathematically equivalent to a

[8] For example, with a mass point at zero and 50, what would result is a further mass-point at $\ln(0.99) = -0.01005034$ and $\ln(50) = 3.912023$. One option if one were wedded to the idea of a Two-limit Tobit, would be to apply an inverse hyperbolic sine transformation to the data. We indeed experimented with both of these options, but both approaches generated a non-trivial number of predictions lying outside the support of the dependant variable.

probability, one can view $y/(1-y)$ as an odds-ratio. Thus log-transforming this pseudo odds ratio will map the result back into the reals and then one can apply OLS. Again however, the problem lies with the fact that this quantity will be undefined for the limit observations.[9] A further concern is that even if $0 < y < 1$, interpretation is not straightforward.

Given the above considerations, there are two options. Firstly, one can employ what Wooldridge (2010) has called "fractional logit" (or probit). This approach is a straightforward extension of the binary logit or probit model but essentially the log-likehood function as applied to a Bernoulli distributed random variable will take on exactly the same structure for a fractional response and has the added benefit of mapping predictions into (0,1) (see Papke and Wooldridge (1996) for the details). The key limitation however is that the zeros and ones a not treated any differently. A further limitation is that one is forced to assume either the logistic or normal distribution for responses on $0 < y < 1$.

A further limitation is that even though the Bernoulli log-likelihood belongs to the linear exponential family, fractional logit or probit do not directly handle the fact that the conditional variance is a function of the mean. On the other hand, the beta distribution exhibits this attractive feature. In a series of papers Ferrari and Cribari-Neto (2004) and Simas, Barreto-Souza and Rocha (2010) developed regression models for beta distributed random variables using a parameterization of the beta law that is indexed by the mean and dispersion parameters. Ospina and Ferrari (2012) extended this original framework to handle fractional responses involving limit mass points. This new approach, which they dub zero-or-one inflated beta regression forms the basis of our approach, albeit with some slight differences.[10]

4.2 Zero-One Inflated Beta Regression

We first outline the basic framework for the case where there are no mass points at 0 or 1. Our dependent variable is the fraction of the endowment offered by player A in the trust game. For the moment, let us restrict this response to $0 < y < 1$. As is well known, the beta distribution can take on a variety of shapes. Let a and b define these two shape parameters, with increases in a pulling the density toward zero and b pulling the density towards 1. Under the assumption that y follows a beta distribution, its density will be

$$f(y; a, b) = \frac{1}{\mathcal{B}(a, b)} y^{a-1}(1-y)^{b-1}, \qquad 0 < y < 1$$

and zero otherwise, where the normalizing factor $\mathcal{B}(a, b)$ can be written is terms of the gamma function

$$\mathcal{B}(a, b) = \frac{\Gamma(a)\Gamma(b)}{\Gamma(a+b)}$$

which then implies

$$f(y; a, b) = \frac{\Gamma(a+b)}{\Gamma(a)\Gamma(b)} y^{a-1}(1-y)^{b-1}, \qquad 0 < y < 1$$

[9] Applying OLS to the untransformed fractional data obviously will also not do the trick as the conditional expectation function will be clearly non-linear and the variance will decline as a function of the mean (as either limit point is approached).

[10] See also Kieschnick and McCullough (2003) for an early applications of this approach and more recently Cook, Kieschnick and McCullough (2008) for Beta regression in a self-selection framework.

It can then be shown that

$$\begin{aligned} \mathrm{E}(y) &= \frac{a}{a+b} \\ \mathrm{Var}(y) &= \frac{ab}{(a+b)^2(a+b+1)} \end{aligned}$$

The goal now is to define a regression model for this beta-distributed random variable y. Following Ferrari and Cribari-Neto (2004), we sketch the framework using a different paramterization of the beta density. Since interest in a regression context centres on modelling the conditional mean, it makes sense to set

$$\begin{aligned} \mathrm{E}(y) &= \frac{a}{a+b} = \mu \\ \mathrm{Var}(y) &= \frac{\mathrm{Var}(\mu)}{1+\phi} \end{aligned}$$

where μ is a location parameter and $\phi = a + b$ is a "precision" parameter. Note that this definition now implies that $\mu\phi = a$, $(1-\mu)\phi = b$ and $\mathrm{Var}(\mu) = \mu(1-\mu)$. This therefore means that the density of y can now be written using this new parameterization:

$$f(y;\mu,\phi) = \frac{\Gamma(\phi)}{\Gamma(\mu\phi)\Gamma((1-\mu)\phi)} y^{\mu\phi-1}(1-y)^{(1-\mu)\phi-1}, \qquad 0 < y < 1$$

where $0 < \mu < 1$ and $\phi > 0$

This density is very flexible: it accommodates bell-shaped, left or right skewed as well as the uniform distribution (as is the case when $\mu = 1/2$ and $\phi = 2$). To use these distributional features in a regression context, it is standard to employ a GLM framework. Let $y_1 \ldots, y_n$ be independent random variables such that $y_i \sim \mathcal{B}(\mu,\phi)$, $i,\ldots,n$. We can then define the beta regression model as

$$g(\mu_i) = \mathbf{x}_i\boldsymbol{\beta} = \eta_i$$

where η is a linear predictor. In this formulation $g(\cdot)$ is a link function that maps the conditional mean into the reals. In our specifications, we choose a logit link function.[11] Up to this point, estimation would procede more or less in the same way as does fractional regression, with the exception that instead of using the binomial distribution in setting up the likelihood function, we use the beta distribution, and we model the zeros and ones as discrete choices. Since we in fact are dealing with a choice problem, where the outcome is observed after an experimentally induced treatment, a discrete choice approach for the limit points makes more sense, as opposed to assuming that the zeros and ones result purely because of sampling variability.

In this unbounded context, estimation of μ and ϕ would proceed by maximum likelihood. Taking the log of the above likelihood function (suppressing subscripts for notational convenience) we have:

$$l(\mu,\theta) = \log\Gamma(\theta) - \log\Gamma(\theta\mu) - \log\Gamma((1-\mu)\theta) + (\mu\theta - 1)y^* + (\theta-2)y^\dagger$$

where, as already stated we are using the logit link function, so $y^* = \log[y/(1-y)]$ and $y^\dagger = \log(1-y)$ if $y \in (0,1)$ and $y^* = 0$ and $y^\dagger = 0$ otherwise.

[11]The link function is always necessary as we want to avoid predictions outside of the unit interval.

Ospina and Ferrari (2012) showed that this model can be generalised to a context involving extreme values on the closed unit interval.[12] Their extension of the GLM framework to cover this case requires degenerate probability statements that produce a mixture density, which in turn effectively boils down to an additive term to the log-likehood function given above. Specifically, one can think of 3 possible cases: (a) the case of zero-inflation (which is the case covered by Ospina and Ferrari (2012)) where a new parameter is added to account for the probability of observing values at zero. This leads to the mixture density of the form:

$$f(y; p_0, \mu, \phi) = \begin{cases} p_0 & \text{if } y = 0 \\ (1 - p_0)f(y; \mu, \phi) & \text{if } 0 < y < 1 \end{cases}$$

or, (b) the case of one-inflation (which is also a case covered by Ospina and Ferrari (2012)) where a new parameter is added to account for the probability of observing values at one. This leads to the mixture density of the form:

$$f(y; p_1, \mu, \phi) = \begin{cases} (1 - p_1)f(y; \mu, \phi) & \text{if } 0 < y < 1 \\ p_1 & \text{if } y = 1 \end{cases}$$

or, (c) the case of zero-one inflated Beta Regression giving the following mixture density:

$$f(y; p_0, \mu, \phi) = \begin{cases} p_0 & \text{if } y = 0 \\ (1 - p_0)(1 - p_1 f(y; \mu, \phi) & \text{if } 0 < y < 1 \\ p_1 & \text{if } y = 1 \end{cases}$$

Although adding in both zero and one inflation complicates the likelihood function, this complication is merely additive (in the sense that two new terms are added to the likelihood function). As Ospina and Ferrari (2012) show, this estimator can be operationalised by separately fitting logit/probit regression for the binary outcomes p_0 and p_1 and then using the resulting predicted probabilities for $y = 0$ and $y = 1$ to construct the terms $(1 - p_0)$ and $(1 - p_1)$. The product of these terms is then used to "inflate" the Beta density.

5 Results

5.1 Descriptive Statistics

Table 1 shows the summary statistics on the key demographic characteristics and offers of the participants who took part in the experiment. The 262 students who participated in the experiment are on average 20 years old and the majority of them are South Africans. The average offer is R21.16 which amounts to 42% of the initial endowment. Out of the total 131 pairs, 57 of them are non co-ethnic (Black-White or White-Black) and 74 are co-ethnic (White-White or Black-Black) pairings. Table 2 shows that there are virtually no statistically significant differences between co-ethnic and non co-ethnic pairs.[13] So without conditioning on any other variables, there appears to be no in/out group differences. However, our hypothesis is that the effect of co-ethnicity could be non-linear in accent. We now turn to

[12] See their paper for further details regarding inference and diagnostics.

[13] It is interesting to note that the likelihood of co-ethnic pairs to know each other is 10% higher than non co-ethnic pairs.

investigating this hypothesis. In all the regressions that follow, our dependent variable y is the fraction of the endowment offered by Player A to Player B, after receiving a signal package.

5.2 Empirical Estimates

Much of the international and local evidence cited above suggests that experimental subjects are responsive to visual cues of race and gender. A hitherto understudied question is whether discrimination in response to visual cues is moderated by audial cues. As discussed in section 2, we are especially interested in the impact of audial cues in the context of South Africa because of the information that an accent can reveal about socio-economic background, including educational background. There is now an emerging heterogeneity in accept types among Black South Africans, and as already discussed, there is a strong connection between accents corresponding (linguistically) to the concept of "standard" English and access to better schooling opportunities. So to the extent that discrimination matters in social exchange settings, a central question that arises is: could discrimination in trust be non-linear in the accent of the trustee? More precisely, if Player A and Player B are of different races, and this leads Player A to trust Player B less, is this effect muted or amplified if Player B presents with a distinctive English sounding accent.

As already outlined, subjects responded to visual and audial cues which revealed race, gender and an indicator for whether or not Player B (the trustee) is a Black South African English (BSAE) speaker. Our measure of whether Player B is a BSAE speaker is given by the variable *Mother Tongue is English*, which we abbreviate to *MTE* in all of our regression tables.

We report two different kinds of marginal effects. The first marginal effect, labelled AME, corresponds to the mixture model. These effects therefore take into account the mass points at zero and one. The second type of marginal effect, labelled, AMEno01, corresponds to the Beta regression estimated for responses that excludes the extreme values. It is instructive to compute these additional marginal effects to get a sense of the extent to which the extreme values matter for interpretation purposes. In general, we find that these magnitudes are about twice as large as the marginal effects for the mixture model. This suggests two things. Firstly, it illustrates the importance of correcting for the bounded nature of our response variable. Secondly, it evidences the need to employ a flexible enough distribution that is capable of correcting for the skewness evident in our data and better handling the heteroscedasticity that naturally arises in data bounded on the unit interval.

We begin by reporting our most basic specifications in Table 3. In these specifications, we do not control for the other ways in which audial and visual cues might have an impact. In the first set of regressions, there are no significant differences in the offers conditional on the gender, race, co-ethnicity, and mother-tongue English variables. The last two columns include an interaction term between co-ethnicity and mother-tongue English; in other words measuring the effect of Black-Black and White-White pairings where Player B's are mother-tongue English speakers. Here too the interaction effects are not statistically significant. However, in these specifications we ignore the possibility that the signal package might be endogenous due to omitted variables. However this assumption is quite strong. For instance, *MTE* could reflect other things as well as accent since the subjects saw a photograph and listened to a voice clip simultaneously. Since visual and audial cues are packaged together, it might be confounded with other effects. In addition to race, gender and accent, we hypothesise three additional factors that could also be perceived by Player A when processing the signal package: attractiveness, trustworthiness, and citizenship. In order to isolate the non-linearity between race and accent, we need to control for these other potential ways in which the signal package could be perceived.

The estimates presented in Table 4 controls for these potential confounding factors. Our measures of attractiveness, trustworthiness and citizenship are taken from third party evaluations of these attributes of the Player Bs.[14] When we control for these confounds, we see that neither *Coethnic-pair* (which is our measure of the race effect) nor *Player B is MTE* (our measure of BSAE), are individually statistically significant. However when we include the interaction term (shown in the last two columns in the table), it is clear that race and accent affect trust non-linearly. Column 3 of the table, which shows the average marginal effects of the mixture model, shows that offers decrease by about 6% if player Bs share the same race but do not have a mother tongue English accent. However, although not statistically significant, the inclusion of the interaction term suggests that offers *increase* by about 7% if Player Bs are mother tongue English speakers. This suggests that initially, the effect of co-ethnicity is negative (suggesting an out-group bias); however, this result is reversed when co-ethnicity and mother-tongue English is interacted. In other words, a mother-tongue English accent has some advantage to negate the out-group bias.

Next, we estimate the models separately by gender. This is justifiable because there were no cross-gender pairings in the experiment (in other words females only interacted with females and males only with males).[15] Tables 5 and 6 shows the gender-differentiated models. Again we focus on the average marginal effects of the mixture model. Looking at the column labelled "AME" in Table 5, we see very strong non-linearities at work for males. Offers are 17.8% *higher* if Player B is of the same race as Player A (*Co-ethinic pair = 1*) and Player B is also mother-tongue English speaking. By contrast offers are 11.3% *lower* if Player B is mother-tongue English speaking, but not of the same race as Player A (*Co-ethinic pair = 0*). On the other hand, Table 6 shows that females make about 9% lower offers in co-ethnic pairs and this does not appear to depend on whether or not Player B is mother-tongue English. In other words, females always have negative in-group bias and this effect is not mediated by accent. This finding is consistent with several studies on discrimination by gender. For example, (Fershtman and Gneezy 2001a) also find that discrimination is driven by males in their study.

Finally we split the sample further to focus only on the behaviour of Black Player Bs. While being White and speaking English as a mother tongue is almost synonymous, this is not true for Black Player Bs.[16] Thus, if the race effect is non-linear in accent, this would manifest itself most sharply among Black Player Bs. Table 7 confirms this hypothesis. Specifically, Black Player As make significantly lower offers to Black Player Bs (*Co-ethinic pair* = 1), compared to White Player As offers to Black Player Bs (*Co-ethinic pair* = 0). This result by itself suggests that Blacks exhibit negative in-group bias relative to White Player Bs who are paired with Black Player Bs. However, this apparent in-group bias of Black Player As is attenuated if the Black Player B has a mother-tongue English accent. Again the interaction term is not significant in the model when we pool both genders but restrict the sample to Black Player Bs. However the non-linearity of race in accent becomes much more evident when we

[14] Citizenship score is a binary variable. If the average score is less than 0.5 then it takes the value of 0 indicating that the subject was not rated as a South African citizen by the third-party evaluators. Attractiveness and trustworthiness are measured on a scale of 1-10, and is taken as an average of the scores provided for each Player B from six-distinct evaluators who did not participate in the experiment.

[15] Although it is an open question of whether it is appropriate to assume separate error processes for males and females, this assumption greatly simplifies the analysis since we are also interested in gender-differentiated effects, which in a pooled model would require the inclusion of the three main effects, and four interaction effects. Clearly that many interaction effects would greatly complicate interpretation. Estimating the models separately by gender therefore has the added benefit of parsimony.

[16] 93% of White students are mother-tongue English speaking, whereas only 38% of Black students are mother-tongue English speakers in our sample.

estimate the models separately by gender, as is shown in Tables 8–9: accent is an important mediator for Black males but not so much for females. For black males who are paired with other black males, Table 8 shows that Player A trusts Player B about 11.5% *more* if Player B has a mother tongue English accent. By contrast (and consistent with the results of Table 6), females seem less sensitive to the signal package. Table 9 shows that female Player As trust female Player Bs about 9% *less* if Player B has a mother tongue English accent.

Evidently, the insignificant interaction term shown in the pooled results of Table 7 reflects the fact that men and women respond differentially (and in different directions) to the signal package. Men are much more sensitive to the audial signal than women. In short these findings suggest that men discriminate on at least one more salient dimension (accent) than women. For men, hearing an accent can change the direction of discrimination in trust (from negative to positive) if similarity is higher in both race and accent, whereas, on average a female Player A distrusts a female player Player B if they share the same race as they do, irrespective of their accent.

6 Conclusion

Race stereotyping based on visual cues may result in different types of discrimination. Adding an extra dimension by incorporating audial cues reveals how behaviour is updated in the face of the new information. This paper focused on how mother-tongue English accent interacts with the race effect especially for Black subjects. The results suggest that accents do matter and this result is especially pronounced for Black males.

We speculate that this is a systematic pattern of high-status vs. low-status language legacy that still reverberates in contemporary South Africa. More specifically, for reasons connected with colonial history, English has widespread use in the high-status domains of politics, media and education. Barkhuizen & Gough (1996) assert that during the apartheid era, colonial languages such as English were endorsed with a perception of "power" by being sanctioned as the sole means to education and societal mobility. The other side of the coin is that African languages were given a "lower-status" as they were merely categorized as a method of interaction within "native" communities. Our results suggests that in non-market interactions characterised by asymmetric information where trust is vital, this fragmentation along high-status/low-status language remains salient in the post-apartheid context of South Africa.

References

Abrams, Dominic and Michael A Hogg, "Language attitudes, frames of reference, and social identity: A Scottish dimension," *Journal of Language and Social Psychology*, 1987, *6* (3-4), 201–213.

Adendorff, Ralph and Marina Savini-Beck, "The teaching of English vowels and consonants in the new South Africa," *Journal of language teaching*, 1993, *27* (3), 232–48.

Akerlof, George A, "Social distance and social decisions," *Econometrica: Journal of the Econometric Society*, 1997, pp. 1005–1027.

Ashraf, Nava, Iris Bohnet, and Nikita Piankov, "Decomposing trust and trustworthiness," *Experimental economics*, 2006, *9* (3), 193–208.

Ben-Ner, Avner and Freyr Halldorsson, "Trusting and trustworthiness: What are they, how to measure them, and what affects them," *Journal of Economic Psychology*, 2010, *31* (1), 64–79.

Berg, Joyce, John Dickhaut, and Kevin McCabe, "Trust, reciprocity, and social history," *Games and economic behavior*, 1995, *10* (1), 122–142.

Biddle, Jeff E and Daniel S Hamermesh, "Beauty, productivity and discrimination: lawyers' looks and lucre," Technical Report, National Bureau of Economic Research 1995.

Blommaert, Jan, "A market of accents," *Language Policy*, 2009, *8* (3), 243–259.

Bohnet, Iris, Fiona Greig, Benedikt Herrmann, and Richard Zeckhauser, "Betrayal aversion: Evidence from brazil, china, oman, switzerland, turkey, and the united states," *The American Economic Review*, 2008, pp. 294–310.

Bouckaert, Jan and Geert Dhaene, "Inter-ethnic trust and reciprocity: results of an experiment with small businessmen," *European Journal of Political Economy*, 2004, *20* (4), 869–886.

Brennan, Eileen M and John S Brennan, "Measurements of accent and attitude toward Mexican-American speech," *Journal of Psycholinguistic Research*, 1981, *10* (5), 487–501.

Burns, Justine, "Racial stereotypes, stigma and trust in post-apartheid South Africa," *Economic Modelling*, 2006, *23* (5), 805–821.

Cameron, A. Colin and Pravin K. Trivedi, *Microeconometrics Using Stata, Revised Edition* number musr. In 'Stata Press books.', StataCorp LP, November 2010.

Casale, Daniela and Dorrit Posel, "English language proficiency and earnings in a developing country: The case of South Africa," *The Journal of Socio-Economics*, 2011, *40* (4), 385–393.

Coleman, James S and James Samuel Coleman, *Foundations of social theory*, Harvard university press, 1994.

Cook, Douglas O., Robert Kieschnick, and B.D. McCullough, "Regression analysis of proportions in finance with self selection," *Journal of Empirical Finance*, 2008, *15* (5), 860 – 867.

Cox, James C, "How to identify trust and reciprocity," *Games and economic behavior*, 2004, *46* (2), 260–281.

Ermisch, John, Diego Gambetta, Heather Laurie, Thomas Siedler, and SC Noah Uhrig, "Measuring people's trust," *Journal of the Royal Statistical Society: Series A (Statistics in Society)*, 2009, *172* (4), 749–769.

Fehr, Ernst, "On the economics and biology of trust," *Journal of the European Economic Association*, 2009, *7* (2-3), 235–266.

Ferrari, Silvia and Francisco Cribari-Neto, "Beta Regression for Modelling Rates and Proportions," *Journal of Applied Statistics*, 2004, *31* (7), 799–815.

Fershtman, C. and U. Gneezy, "Discrimination in a Segmented Society: An Experimental Approach," *Quarterly Journal of Economics*, 2001, *116* (1), 351–377.

Fershtman, Chaim and Uri Gneezy, "Discrimination in a segmented society: An experimental approach," *Quarterly Journal of Economics*, 2001, pp. 351–377.

____, ____, and Frank Verboven, "Discrimination and nepotism: the efficiency of the anonymity rule," *The Journal of Legal Studies*, 2005, *34* (2), 371–396.

Flege, James Emil, "The detection of French accent by American listeners," *The Journal of the Acoustical Society of America*, 1984, *76* (3), 692–707.

____, Murray J Munro, and Ian RA MacKay, "Factors affecting strength of perceived foreign accent in a second language," *The Journal of the Acoustical Society of America*, 1995, *97* (5), 3125–3134.

Giles, Howard, "Evaluative reactions to accents," *Educational review*, 1970, *22* (3), 211–227.

____, "Accent mobility: A model and some data," *Anthropological linguistics*, 1973, pp. 87–105.

____ and Caroline Sassoon, "The effect of speaker's accent, social class background and message style on British listeners' social judgements," *Language & Communication*, 1983, *3* (3), 305–313.

Goldin, Claudia and Cecilia Rouse, "Orchestrating impartiality: The impact of" blind" auditions on female musicians," Technical Report, National bureau of economic research 1997.

Gough, David, "Black English in South Africa," *Focus on South Africa*, 1996, pp. 53–77.

Haile, Daniel, Abdolkarim Sadrieh, and Harrie AA Verbon, "Self-serving dictators and economic growth," *Journal of Economic Behavior & Organization*, 2008, *67* (3), 573–586.

Hundleby, C.E., "Xhosa-English Pronounciation in the South-East Cape." PhD dissertation, Rhodes University 1964.

Johnson, Jacqueline S and Elissa L Newport, "Critical period effects in second language learning: The influence of maturational state on the acquisition of English as a second language," *Cognitive psychology*, 1989, *21* (1), 60–99.

Kieschnick, Robert and B D McCullough, "Regression analysis of variates observed on (0, 1): percentages, proportions and fractions," *Statistical Modelling*, 2003, *3* (3), 193–213.

Klerk, Vivian De, "Towards A Norm in South African Englishes: The Case for Xhosa English," *World Englishes*, 2003, *22* (4), 463–481.

Klerk, Vivian De and David Gough, "Black South African English," in Rajend Mesthrie, ed., *Language in South Africa*, Cambridge: Cambridge University Press, 2002, pp. 356–78.

Knack, Stephen and Philip Keefer, "Does social capital have an economic payoff? A cross-country investigation," *The Quarterly journal of economics*, 1997, pp. 1251–1288.

Knight, Jack, "Social norms and the rule of law: Fostering trust in a socially diverse society," *Trust in society*, 2001, *2*, 354–73.

Kollock, Peter, "The emergence of exchange structures: An experimental study of uncertainty, commitment, and trust," *American Journal of sociology*, 1994, pp. 313–345.

Lambert, Wallace E, "A social psychology of bilingualism," *Journal of social issues*, 1967, *23* (2), 91–109.

Lanham, Len W, *Teaching English in Bantu primary schools: final report on research in Johannesburg schools*, University of the Witwatersrand, Department of Phonetics and Linguistics, 1967.

____ , "A history of English in South Africa," in Vivian de Klerk, ed., *English around the World: Focus on South Africa*, Amsterdam: Benjamins, 1996, pp. 19–34.

Lass, Roger, "South African English," in Rajend Mesthrie, ed., *Language in South Africa*, Cambridge: Cambridge University Press, 2002, pp. 104–126.

Lev-Ari, Shiri and Boaz Keysar, "Why don't we believe non-native speakers? The influence of accent on credibility," *Journal of Experimental Social Psychology*, 2010, *46* (6), 1093–1096.

Long, Michael H, "Maturational constraints on language development," *Studies in second language acquisition*, 1990, *12* (03), 251–285.

Lupia, Arthur and Mathew D McCubbins, *The democratic dilemma: Can citizens learn what they need to know?*, Cambridge University Press, 1998.

Mobius, Markus M and Tanya S Rosenblat, "Why beauty matters," *The American Economic Review*, 2006, pp. 222–235.

Naef, Michael and Jürgen Schupp, "Measuring trust: Experiments and surveys in contrast and combination," 2009.

Ospina, Raydonal and Silvia L.P. Ferrari, "A general class of zero-or-one inflated beta regression models," *Computational Statistics & Data Analysis*, 2012, *56* (6), 1609 – 1623.

Oyama, Susan, "A sensitive period for the acquisition of a nonnative phonological system," *Journal of Psycholinguistic Research*, 1976, *5* (3), 261–283.

Papke, Leslie E and Jeffrey M Wooldridge, "Econometric Methods for Fractional Response Variables with an Application to 401(K) Plan Participation Rates," *Journal of Applied Econometrics*, Nov.-Dec. 1996, *11* (6), 619–32.

Pokorn, Nike K, *Challenging the traditional axioms: Translation into a non-mother tongue*, Vol. 62, John Benjamins Publishing, 2005.

Porta, Rafael La, Florencio Lopez-De-Silane, Andrei Shleifer, and Robert W Vishny, "Trust in large organizations," Technical Report, National Bureau of Economic Research 1996.

Purnell, Thomas, William Idsardi, and John Baugh, "Perceptual and phonetic experiments on American English dialect identification," *Journal of Language and Social Psychology*, 1999, *18* (1), 10–30.

Raisler, Iren, "Differential response to the same message delivered by native and foreign speakers," *Foreign Language Annals*, 1976, *9* (3), 256–259.

Rödin, M and G Özcan, "Is It How You Look or Speak That Matters," *An Experimental Study Exploring the Mechanisms of Ethnic Discrimination*, 2011, *3.*

Rooy, Bertus Van and Gerhard Van Huyssteen, "The vowels of BSAE: current knowledge and future prospects," *South African Journal of Linguistics*, 2000, *18* (sup38), 15–33.

Ryan, EB, C Gallois, and PA Forbes, "Evaluative reactions to accented English," *Journal of Cross-Cultural Psychology*, 1983, *14*, 407–426.

Ryan, Ellen B and Miguel A Carranza, "Evaluative reactions of adolescents toward speakers of standard English and Mexican American accented English.," *Journal of personality and social psychology*, 1975, *31* (5), 855.

Ryan, Ellen Bouchard and Richard J Sebastian, "The effects of speech style and social class background on social judgements of speakers," *British Journal of Social and Clinical Psychology*, 1980, *19* (3), 229–233.

—— **, Miguel A Carranza, and Robert W Moffie**, "Reactions toward varying degrees of accentedness in the speech of Spanish-English bilinguals," *Language and Speech*, 1977, *20* (3), 267–273.

—— **, Miles Hewstone, and Howard Giles**, "Language and intergroup attitudes," in "Attitudinal judgment," Springer, 1984, pp. 135–158.

Sapienza, Paola, Luigi Zingales, and Luigi Guiso, "Does culture affect economic outcomes?," Technical Report, National Bureau of Economic Research 2006.

Scovel, Thomas, *A time to speak: A psycholinguistic inquiry into the critical period for human speech*, Newbury House Rowley, MA, 1988.

Silva, Penny, "South African English: Oppressor or Liberator?," *The major varieties of English: papers from MAVEN 97, Vaxjo 20-22 November 1997*, 1997.

Simas, Alexandre B., Wagner Barreto-Souza, and Andra V. Rocha, "Improved estimators for a general class of beta regression models," *Computational Statistics & Data Analysis*, 2010, *54* (2), 348 – 366.

Simpson, Brent, Tucker McGrimmon, and Kyle Irwin, "Are blacks really less trusting than whites? Revisiting the race and trust question," *Social Forces*, 2007, *86* (2), 525–552.

SSA, "Census 2011 Key Results," Technical Report, Statistics South Africa 2011.

Stewart, Mark A, Ellen Bouchard Ryan, and Howard Giles, "Accent and social class effects on status and solidarity evaluations," *Personality and Social Psychology Bulletin*, 1985, *11* (1), 98–105.

Sztompka, Piotr, *Trust: A sociological theory*, Cambridge University Press, 1999.

Tahta, Sonia, Margaret Wood, and Kate Loewenthal, "Foreign accents: Factors relating to transfer of accent from the first language to a second language," *Language and Speech*, 1981, *24* (3), 265–272.

van Rooy, Bertus, "INTRODUCTION," *South African Journal of Linguistics*, 2000, *18* (sup38), i–vii.

Wilson, Rick K and Catherine C Eckel, "Judging a book by its cover: Beauty and expectations in the trust game," *Political Research Quarterly*, 2006, *59* (2), 189–202.

Wooldridge, Jeffrey M, *Econometric Analysis of Cross Section and Panel Data* MIT Press Books, 2 ed., The MIT Press, 2010.

Wright, Lawrence, "The Standardisation question in Black South African English," in Vivian de Klerk, ed., *Varieties of English around the world: Focus on South Africa*, Amsterdam: Benjamins, 1996, pp. 149–62.

Zak, Paul J and Stephen Knack, "Trust and growth," *The economic journal*, 2001, *111* (470), 295–321.

Figure 1: Modelling Trust

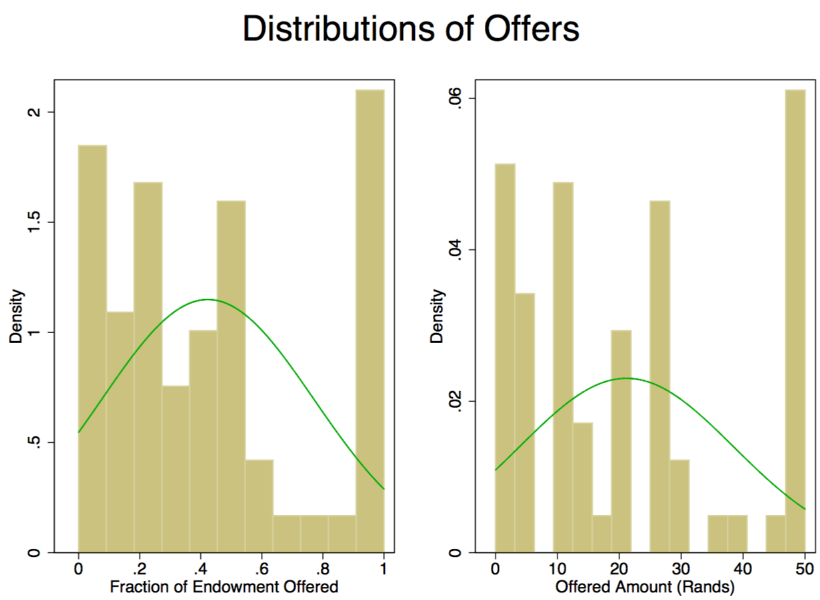

Table 1: Sample Characteristics by Co-ethnicity

	Non Co-ethnic Pair	Co-ethnic Pair	Total
Offers:			
Amount sent by Player A	23.40	19.43	21.16
	(18.18)	(16.61)	(17.36)
Fraction of offer	0.468	0.389	0.423
	(0.364)	(0.332)	(0.347)
Offer expected in return	33.09	24.93	28.48
	(31.17)	(22.04)	(26.61)
Non-anonymous interaction	0.0175	0.122	0.0763
	(0.132)	(0.329)	(0.267)
Demographics:			
Age in years today	20.18	20.07	20.12
	(1.869)	(1.885)	(1.871)
Player B is MTE (self-assessed)	0.596	0.514	0.550
	(0.495)	(0.503)	(0.499)
Player A receives financial aid	0.255	0.343	0.305
	(0.440)	(0.478)	(0.462)
Player A is a South African citizen	0.839	0.775	0.803
	(0.371)	(0.421)	(0.399)

Table 2: Test of Differences in Means by Co-ethnicity

	(1) diff.	
Amount sent by Player A	3.971	(1.30)
Fraction of offer	0.0794	(1.30)
Offer expected in return	8.155	(1.75)
Non-anonymous interaction	-0.104*	(-2.25)
Age in years today	0.108	(0.32)
Player B is MTE (self-assessed)	0.0830	(0.94)
Player A receives financial aid	-0.0884	(-1.03)
Player A is a South African citizen	0.0646	(0.91)
Observations	131	

Table 3: Trust, Ethnicity and Mother Tongue (no controls for OVB)

	AME b/se	AMEno01 b/se	AME2 b/se	AMEno012 b/se
Player A is male	0.0228	0.0349	0.0245	0.0376
	(0.021)	(0.032)	(0.021)	(0.032)
Player A is Black	0.0014	0.0021	0.0131	0.0201
	(0.026)	(0.040)	(0.031)	(0.047)
Co-ethnic pair	-0.0105	-0.0161	-0.0338	-0.0518
	(0.024)	(0.036)	(0.034)	(0.052)
Player B is MTE (self-assessed)	-0.0282	-0.0433	-0.0525	-0.0804
	(0.023)	(0.035)	(0.042)	(0.065)
Co-ethnic pair × Player B is MTE (self-assessed)			0.0373	0.0572
			(0.049)	(0.075)
Observations	117	117	117	117

† Sig: *** $p < 0.1$, ** $p < 0.05$, * $p < 0.001$.

‡ Std. errors reported in parenthesis, robust to arbitrary forms of heteroscedasticity.

†† Dependent variable: fraction of endowment offered in trust game; Additional controls: Player A receives financial aid; Player A is South African; Age of player A; Age squared of player A; Interaction is anonymous; Player A's subjective expectation of B's return offer. MTE refers to "Mother tongue is English" .

Table 4: Trust, Ethnicity and Mother Tongue

	AME1 b/se	AMEno011 b/se	AME2 b/se	AMEno012 b/se
Co-ethnic pair	-0.0144	-0.0220	-0.0593***	-0.0909***
	(0.024)	(0.036)	(0.032)	(0.049)
Player B is MTE (self-assessed)	-0.0302	-0.0463	-0.0762**	-0.1168**
	(0.024)	(0.037)	(0.037)	(0.056)
Attractiveness score of Player B (3rd party rated)	-0.0106	-0.0162	-0.0105	-0.0161
	(0.009)	(0.014)	(0.009)	(0.014)
SA citizen score of Player B (3rd party rated)	0.0513***	0.0787***	0.0622**	0.0954**
	(0.030)	(0.046)	(0.029)	(0.044)
Trustworthiness score of Player B (3rd party rated)	0.0149	0.0229	0.0161	0.0246
	(0.020)	(0.030)	(0.018)	(0.028)
Co-ethnic pair × Player B is MTE (self-assessed)			0.0704	0.1079
			(0.044)	(0.066)
Observations	117	117	117	117

***

† $p < 0.1$, ** $p < 0.05$, * $p < 0.001$.

‡ Std. errors reported in parenthesis, robust to arbitrary forms of heteroscedasticity.

†† Dependent variable: fraction of endowment offered in trust game; Additional controls: Player A receives financial aid; Player A is South African; Age of player A; Age squared of player A; Interaction is anonymous; Player A's subjective expectation of B's return offer. MTE refers to "Mother tongue is English" .

Table 5: Trust, Ethnicity and Mother Tongue: Males

	AME b/se	AMEno01 b/se
Co-ethnic pair	-0.0677	-0.1134
	(0.046)	(0.075)
Player B is MTE (self-assessed)	-0.1126**	-0.1887**
	(0.051)	(0.083)
Co-ethnic pair × Player B is MTE (self-assessed)	0.1783*	0.2987*
	(0.055)	(0.086)
Attractiveness score of Player B (3rd party rated)	-0.0206	-0.0345
	(0.020)	(0.033)
SA citizen score of Player B (3rd party rated)	0.0887	0.1487
	(0.067)	(0.111)
Trustworthiness score of Player B (3rd party rated)	0.0330	0.0553
	(0.022)	(0.037)
Observations	61	61

***

† $p < 0.1$, ** $p < 0.05$, * $p < 0.001$.

‡ Std. errors reported in parenthesis, robust to arbitrary forms of heteroscedasticity.

†† Dependent variable: fraction of endowment offered in trust game; Additional controls: Player A receives financial aid; Player A is South African; Age of player A; Age squared of player A; Interaction is anonymous; Player A's subjective expectation of B's return offer. MTE refers to “Mother tongue is English” .

Table 6: Trust, Ethnicity and Mother Tongue: Females

	AME	AMEno01
	b/se	b/se
Co-ethnic pair	-0.0892***	-0.1248***
	(0.053)	(0.074)
Player B is MTE (self-assessed)	-0.0162	-0.0226
	(0.045)	(0.063)
Co-ethnic pair × Player B is MTE (self-assessed)	-0.0159	-0.0222
	(0.063)	(0.089)
Attractiveness score of Player B (3rd party rated)	-0.0018	-0.0025
	(0.013)	(0.018)
SA citizen score of Player B (3rd party rated)	0.0539**	0.0754*
	(0.021)	(0.029)
Trustworthiness score of Player B (3rd party rated)	0.0052	0.0072
	(0.028)	(0.039)
Observations	56	56

***

† $p < 0.1$, ** $p < 0.05$, * $p < 0.001$.

‡ Std. errors reported in parenthesis, robust to arbitrary forms of heteroscedasticity.

†† Dependent variable: fraction of endowment offered in trust game; Additional controls: Player A receives financial aid; Player A is South African; Age of player A; Age squared of player A; Interaction is anonymous; Player A's subjective expectation of B's return offer. MTE refers to "Mother tongue is English" .

Table 7: Trust, Ethnicity and Mother Tongue – Black player Bs

	AME b/se	AMEno01 b/se
Co-ethnic pair	-0.0623**	-0.0923**
	(0.030)	(0.044)
Player B is MTE (self-assessed)	-0.0074	-0.0109
	(0.062)	(0.092)
Co-ethnic pair × Player B is MTE (self-assessed)	0.0300	0.0445
	(0.066)	(0.097)
Attractiveness score of Player B (3rd party rated)	0.0067	0.0099
	(0.012)	(0.018)
SA citizen score of Player B (3rd party rated)	0.0653***	0.0968***
	(0.038)	(0.055)
Trustworthiness score of Player B (3rd party rated)	0.0101	0.0149
	(0.026)	(0.038)
Observations	79	79

***

† $p < 0.1$, ** $p < 0.05$, * $p < 0.001$.

‡ Std. errors reported in parenthesis, robust to arbitrary forms of heteroscedasticity.

†† Dependent variable: fraction of endowment offered in trust game; Additional controls: Player A receives financial aid; Player A is South African; Age of player A; Age squared of player A; Interaction is anonymous; Player A's subjective expectation of B's return offer. MTE refers to "Mother tongue is English" . The race dummy is excluded as it is perfectly collinear with *Co-ethnic pair* when restricting the sample only to Black player As.

Table 8: Trust, Ethnicity and Mother Tongue: Males – Black player Bs

	AME b/se	AMEno01 b/se
Co-ethnic pair	-0.0607	-0.1028
	(0.047)	(0.079)
Player B is MTE (self-assessed)	0.0089	0.0152
	(0.046)	(0.078)
Co-ethnic pair × Player B is MTE (self-assessed)	0.1151**	0.1950**
	(0.050)	(0.079)
Attractiveness score of Player B (3rd party rated)	-0.0327	-0.0554
	(0.022)	(0.036)
SA citizen score of Player B (3rd party rated)	0.0529	0.0896
	(0.056)	(0.093)
Trustworthiness score of Player B (3rd party rated)	0.0590*	0.1000*
	(0.016)	(0.022)
Observations	37	37

***

† $p < 0.1$, **$p < 0.05$, *$p < 0.001$.

‡ Std. errors reported in parenthesis, robust to arbitrary forms of heteroscedasticity.

†† Dependent variable: fraction of endowment offered in trust game; Additional controls: Player A receives financial aid; Player A is South African; Age of player A; Age squared of player A; Interaction is anonymous; Player A's subjective expectation of B's return offer. MTE refers to "Mother tongue is English" . The race dummy is excluded as it is perfectly collinear with *Co-ethnic pair* when restricting the sample only to Black player As.

Table 9: Trust, Ethnicity and Mother Tongue: Females – Black player Bs

	AME b/se	AMEno01 b/se
Co-ethnic pair	-0.0905***	-0.1210***
	(0.053)	(0.069)
Player B is MTE (self-assessed)	0.0180	0.0241
	(0.072)	(0.097)
Co-ethnic pair × Player B is MTE (self-assessed)	-0.0444	-0.0594
	(0.086)	(0.115)
Attractiveness score of Player B (3rd party rated)	0.0072	0.0096
	(0.017)	(0.022)
SA citizen score of Player B (3rd party rated)	0.0611**	0.0817**
	(0.027)	(0.035)
Trustworthiness score of Player B (3rd party rated)	-0.0012	-0.0017
	(0.035)	(0.047)
Observations	42	42

***

† $p < 0.1$, **$p < 0.05$, ***$p < 0.001$.

‡ Std. errors reported in parenthesis, robust to arbitrary forms of heteroscedasticity.

†† Dependent variable: fraction of endowment offered in trust game; Additional controls: Player A receives financial aid; Player A is South African; Age of player A; Age squared of player A; Interaction is anonymous; Player A's subjective expectation of B's return offer. MTE refers to "Mother tongue is English" . The race dummy is excluded as it is perfectly collinear with *Co-ethnic pair* when restricting the sample only to Black player As.