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The Self-Referencing Effect does not modulate In-Group Racial Bias

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Abstract

A significant amount of research demonstrates that self-relevant stimuli are prioritised by attentional and encoding systems and consequently become more easily retrievable from memory. The term Self Referencing Effect (SRE) has been coined to describe this self-bias. We initially investigate whether the SRE exists in a South African sample. We then ask whether the SRE extends to own-group processing, such as the in-group prioritisation seen in own-race bias research. Twenty-four participants from the University of Cape Town (7 black, 8 “coloured”, and 9 white) completed a self-reference task (experiment 1), and a race-distance task (experiment 2). The self-reference task is an extended version of Sui and colleagues’ (2012) computer-based matching task that assess the SRE’s existence. In this task participants associated words that varied in relational self-proximity (you, best friend, stranger) with basic shapes. In the race-distance task (experiment 2), participants associated names that were coded to imply a degree of racial self-similarity (Amahle, Fatima, and Jessie) with basic shapes. In matching trials, participants indicated whether displays of random shape-label combinations were the same as those learned in the training stages. Results showed that the self label elicited faster and more accurate responses, relative to other labels, replicating results from studies that have reported the SRE. However, results from Experiment 2 showed no accuracy or response time advantage for the own-race label. This suggests that racial-coding has no influence on low-level attentional responses to stimuli. We discuss the implications of these results on the role of SRE in social cognition.

Keywords: Self-Referencing Effect, In-Group Bias, Socio-Cognitive Biases.

The Self Referencing Effect (SRE) occurs when self-relevant stimuli are prioritised by attentional and encoding systems and consequently become more easily retrievable from memory (Rogers, Kuiper, & Kirker, 1977; Symons & Johnson, 1997). The SRE may contribute to the social bias for the self over others commonly seen in socio-cognitive research on self-perception (Sui, He, & Humphreys, 2012), although the details of this role and the mechanisms behind it remain unclear Cognitive biases such as the bias for self-related processing underlie aspects of our adaptive decision-making, appraisals, attitudes, and beliefs. However, they can become problematic in contexts wherein, for instance, self-preference becomes harmful to others (Greven & Ramsey, 2017). There is little research on whether the SRE operates on the perceptual salience of social categories, such as race. Research on these social categories is important for understanding the socio-cognitive substrates of intergroup behaviour.

The SRE and Memory

Self-relevant stimuli such as one’s own face, or possessions, are well-established in memory (Blume et al., 2017). A recent meta-analysis of 53 studies reported that the SRE reliably enhances memory for self-related stimuli, across different age groups. (Mattavelli, Richetin, Gallucci, & Perugini, 2017). For instance, Golubickis, Falben, Cunningham, and Macrae (2017) have demonstrated that processing speed and categorisation of objects labelled as belonging to the self is enhanced compared to friend-labelled objects. Memory is enhanced when objects are recently self-chosen, even when this choice is an illusion (Cunningham, Vergunst, Macrae, & Turk, 2013). Golubickis, Falben, Cunningham, and Macrae (2018) have since demonstrated that the SRE is underpinned by a response bias, indicating that self-related information processing is prioritised over information relevant to decision making. However, most studies have demonstrated the SRE using representations of stimuli that are well-established in memory, such as everyday objects. The problem with these findings is that they suggest that the SRE only operates on stimuli that are well-established in memory rather than at earlier stages of cognitive processing.

The SRE and Early-Stage Cognitive Processing

Some recent work suggests that self-related stimuli influence earlier-stage cognitive processing, which may have evolutionarily enabled attentional self-prioritisation to enhance processing of self-preserving opportunities (Sui et al., 2012). The SRE’s impact on cognition appears more pervasive than an effect on well-established stimuli (Golubickis et al., 2017). The SRE is thought to influence early-stage cognitive processing by biasing low-level attentional systems towards the social salience of the self (Sui et al., 2012). This process is automatic and precedes the influence of higher-order decision-making inputs. For instance, SRE research has demonstrated a bias for responding more quickly and accurately to self - associated basic stimuli (e.g. a triangle which has been associated with the label "you"). These basic stimuli, which are previously not well-established or socially-relevant, have been shown to increase the relative automaticity of responses compared to those shapes coded as an "other" (e.g. stranger), regardless of the frequency regimen of stimuli presentation (Sui, Sun, Peng, & Humphreys, 2014). Whereas the more popular memory-performance studies (e.g. Golubickis et al., 2017), require the input of well-established memories (e.g. remembering a fork), these more recent studies measure response times and accuracy scores when presented with basic stimuli (Sui & Humphreys, 2013). Using such basic stimuli reduces the semantic memory load and helps demonstrate the automaticity with which humans recruit the SRE to adapt to socially salient and personally important environmental changes.

The SRE and In-Group Bias

The SRE is thought to render self-relevant stimuli more socially salient, thereby enabling more efficient categorisation of those stimuli (Sui & Humphreys, 2013). Although the SRE appears to influence both object-categorisation and social-salience processing, its influence on social categorisation of out-groups is yet to be investigated. Research has shown though that in many situations people tend to favour their in-group members over out-group members (Katsumi & Dolcos, 2017). For instance, it has been consistently demonstrated that own-race facial recognition is superior to facial recognition of faces of other races (Havard, Memon, & Humphries, 2017; Malpass & Kravitz, 1969). This effect also extends to socio-cognitive processes such as those involving processing social cues like emotional displays (Xiaoqian, Andrews, & Young, 2016). The SRE has been linked to expansion theory with the speculation that its rapidity serves to enable in-group biases (Sui & Humphreys, 2015). According to self-expansion theory, we form in-groups to gain access to a pool of like-minded people so that the in-group may enable the individual to reach their goals (Aron & Aron, 1996). However, the extent of this link remains unclear and under-researched.

Investigating the influence of the SRE on racially-coded stimuli could reveal processes which play a role in racial bias. It is plausible that early-stage SRE processing of social information contributes to a range of self-versus-other social biases, such as the own-race face recognition bias (Kokje, Bindemann, & Megreya, 2018). For instance, limited exposure to different races could limit later stages of stimulus processing because of the activation of the SRE at early-stage processing levels. However, if the SRE is involved in this process, this implies that racial categorisation of people happens during early stages of cognitive processing.

The recent literature on top-down and bottom-up attentional processing has shown that learned prejudices, such as racial beliefs, can influence low-level attentional deployment (Kok, Bains, van Mourik, Norris, & de Lange, 2016; Levin, Baker, & Banaji, 2016). This research is widely debated, as some researchers argue that top-down processes have no influence on perception (Firestone & Scholl, 2016). Although racial attitudes have been shown to influence face-processing and other higher-order socio-cognitive processing stages, the stage of perceptual processing they first influence is not known.

Race is in many contexts a social construct. The influence of higher-level social constructs on low-level processing is also unclear. Some identity theorists speculate that although race is important, it is not an aspect of the self because it is a concept artificially attributed to the self (Hogg, Terry, & White, 1995). Some research suggests that the driving force of neural responses to racial-others is a product of high-level socially conditioned race information, and not low-level perceived self-similarity (Losin, Cross, Iacoboni, & Dapretto, 2014). On the other hand, studies have demonstrated that top-down beliefs about a person's race can influence the low-level perceptual judgements about that person's skin lightness or darkness (Levin et al., 2016). These findings have been challenged (see Firestone & Scholl, 2016), and the levels at which prejudiced beliefs influence basic processing are not yet clear. We aim to contribute to this debate by investigating whether racially-coded information is influential at the level of automatic attentional deployment.

The Universality of the SRE

Cultural factors influence the formation and experience of the self in relation to others (Wang et al., 2012), and thus may mediate the extent to which the SRE influences responses to stimuli cross-culturally. One study has demonstrated that Chinese participants incorporate their mothers into their self-concept more than Western participants do (Wang et al., 2012)**.** Chinese participants showed significantly faster response times to mother-related stimuli than western participants (Sui et al., 2012). However, the qualities of SRE responses in many other cultures remain unknown. Some studies suggest that culture shapes our neural substrates for social cognition (Mu, Kitayama, Han, & Gelfand, 2015), and the varied mechanisms through which this can occur suggests that the SRE might not be equally robust across cultures. The SRE has been demonstrated in predominantly white, western cultures (e.g. Brédart, 2016; Gutchess et al., 2015).

In this study, we aim to establish the existence of the SRE in a South African sample, and the extent to which the effects of SRE may differ in a multi-cultural sample. We also investigate the extent to which SRE enables the discernment of racial closeness to the self with the intention to gain insight into the automaticity of in-group biases and the SRE's role in low-level social judgements.

Rationale, Specific Aims, and Hypotheses

An important question about the SRE is whether it interacts with cultural and race-related, particularly in-group and out-group, social cues. Recent studies have provided some ingenious mechanisms with which to investigate this, such as the self–other matching paradigm by Sui et al. (2012). These studies provided a base for our research into whether the SRE operates in a different cultural context to those in which its existence has been researched so far. Furthermore, we investigate whether the SRE influences the processing of race information by biasing low-level cognitive processes involved in processing self-related stimuli. We extend in-group processing to racial in-group processing.

South Africa has a legacy of racial segregation and current intergroup problems. Studies on race-related biases are important in this context, and this study may enable evaluation of socio-cognitive biases which may influence social decision making, attitudes, beliefs, and behaviour. Illustrating the lower-order attentional biases involved in race categorisation could prove a valuable method for investigating automatic racial prejudice. To investigate this, we focus primarily on the strength of processing ingroup and outgroup racial information early-on in the processing stream, with limited input from semantic knowledge.

We investigate two questions. Firstly, we investigate whether the SRE exists in a sample of South African university students. This contributes to the research into the universality of the SRE. We compare the response times and accuracy scores when participants respond to a self-related stimulus against those for other-related stimuli: a familiar-other stimulus (their best friend) and an unfamiliar-other stimulus (a stranger).

In the second question, we ask whether in-group/outgroup race information influences low-level social processing, as a function of the SRE. To do this we compare the response times and accuracy scores when participants respond to racial in-group stimuli against those for racial out-group stimuli. We vary the ingroup-outgroup distance across three different racial categories to investigate whether stimuli are processed differently as a function of this distance.

More specifically, we propose the following hypotheses, informed by the pattern results by Sui et al. (2012):

H1: Participants' response times will be fastest when responding to the self-related stimuli, and second fastest to the familiar-other and slowest to unfamiliar-other related stimuli.

H2: Participants' accuracy scores will be highest when responding to the self-related stimuli, and second highest for the familiar-other and lowest for unfamiliar-other related stimuli.

H3: Participants' response times will be faster when responding to racial in-group related stimuli, than to racial out-group stimuli.

H4: Participants' accuracy scores will be higher when responding to racial in-group related stimuli, than to racial out-group stimuli.

Methods

Design

We adopt a within-subjects design with the degree of participants' relation to stimuli and participant race as the independent variables. These relations are pegged at 6 levels. In the SRE task used in experiment 1, they are self, familiar-other, and unfamiliar-other. In the race-distance task used in experiment 2, they are racial in-group unfamiliar-other, racial out-group unfamiliar-other, and second racial out-group unfamiliar-other, depending on the participants' race. We investigate the effect of this relational distance and participants' race on response time in milliseconds (ms) and matching accuracy as dependent variables.

Participants

We recruited a convenient sample of 24 undergraduate students (Females = 20; Males = 4) at the University of Cape Town in South Africa between the ages of 18 and 29 (*M* = 20.36; *SD* = 1.28). The sample consisted of 7 black participants, 8 coloured participants, and 9 white participants. See table 1 for participants' demographic characteristics. All participants had normal or corrected-to-normal vision and were South African citizens.

Participants were recruited through the Student Research Participation Programme (SRPP) and received course credits in return for their participation.

Using G*Power version 3.1.9.2, we computed that 18 participants would be sufficient. Predicting a large effect size of .83, this sample size was intended to provide a power level of .95, with a two-tailed test. To be conservative, the correlation among repeated-measures was set at 0, and a non-sphericity correction of .2 was applied. The alpha level was set at 0.05. In a related study by Sui et al. (2012), an effect size of .41 was adequate.

Materials

We created two extended versions of Sui et al. (2012)'s computer-based matching task to assess the existence of the SRE and the possible link between the SRE and low-level processing of race-coded stimuli.

The tasks were run on a computer with a 32″ monitor through E-prime Experiment Software Version 2.0.10.353. The tasks comprise of shape-label pairings. The shapes are a square, a triangle, a pentagon, a rectangle, a circle, and a diamond, with 3.6cm x 3.6cm size dimensions each. All shapes are solid black, and the tasks take place on a grey background. The shapes are displayed 3.5cm above a white fixation cross at the screen's centre and 3.5cm below the centre of this cross are the labels: YOU, FRIEND, STRANGER, AMAHLE, FATIMA or JESSIE in Courier New font size 30, with 3.8cm x 3.8cm size dimensions.

The 3 names, AMAHLE, FATIMA, and JESSIE are common names in Black African, Coloured, and White communities respectively and were used to create an in-group/out-group distance in this study. Two of these names, Amahle, a female Zulu and isiXhosa name, and Fatima were selected based on statistics for the most common South African baby names in the past ten years (Nyathi, 2017). The Arabic name Fatima is a common South African "coloured" name. The name "Jessie" was selected based on its appearance on several South African baby name recommendation websites (e.g. Parent24, 2017). Jessie, a Hebrew name, is a typical white female name. Surnames were also initially presented in this task, to indicate a greater degree of racial specificity, as is often the case for surnames in the South African context (Van Der Merwe & Burns, 2008). Thus, the names initially presented to participants were AMAHLE NDLOVU, FATIMA ACHMAT, and JESSIE VAN VYK, based on the most common surnames with 6 letters in South Africa (e.g. Name Statistics South Africa, 2018).

The two tasks are made up 480 trials each, split into 4 blocks of 120 trials. There are 960 trials in total. There are 120 trials for each of the 6 label conditions (YOU, BEST FRIEND, STRANGER, AMAHLE, FATIMA, and JESSIE). Half of the trials are matching trials. For instance, where AMAHLE is represented by a square, the label AMAHLE and a square are presented on the screen and the participants should press the m key to indicate that this pairing is a match. The other half of the trials are none-matching. For instance, where AMAHLE is represented by a Square, AMAHLE is presented with a shape other than a Square and participants should respond by pressing the c key to reject the pairing and indicate a non-match. 240 trials were matching, and 240 trials were non-matching, in a random order. Half of the participants received the self-referencing task first; half received the race distance task first.

Self-Referencing Task

The task begins with the training stage. Participants are asked to associate a randomly allocated shape with a given label. The order in which these were presented was counterbalanced. Participants are given the on-screen instructions: "In this task, you will be shown a series of shapes, which all have their own labels. These labels are YOU, BEST-FRIEND, STRANGER. Please learn which shape is associated with each of these labels." They are then given 1 minute to associate the labels with the given shapes.

They are then instructed on-screen: "There will be a white cross in the middle of the screen. A label will appear above the cross e.g. YOU. A shape will appear below the cross. Press the C KEY if the shape and label are the same as the pairs you just learned. Press the M KEY if the shape and label are not the same as the pairs you just learned. The first 12 slides will be a practice round." Participants will perform 12 practice trials (four per shape-label pair) before the matching stage begins.

The matching stage involves responding as quickly as they can by pressing either the C key when the pair is the same (a match), or the M key, to reject a non-match pair.

Each trial begins with 500ms of a fixation cross displayed in the centre of the screen. Participants are then presented with a randomly generated label-shape combination on screen (See Appendix D), depending on which task they are doing. The pairings will each be displayed for 100milliseconds (ms) and could either be the same as a pair associated in the first training stage or could be a new, random pairing. After stimulus presentation, a blank screen appears for 800ms during which participants respond. The short response window period is intended to encourage rapid responses. The shape-label pair combinations are counterbalanced for all participants.

Race-distance task

The race-distance task is structured in the same way as the self-referencing task. The task begins with the training stage. Again, participants are asked to associate a randomly allocated shape with a given label. The shapes will be the three remaining shapes that were not allocated in the first task. In this task, the labels are AMAHLE, FATIMA, and JESSIE. The on-screen instructions are: "In this task, you will be shown a series of shapes, which all have their own labels. Imagine these labels are names of your classmates: AMAHLE, FATIMA, and JESSIE. Please learn which shape is associated with each of these labels." They are then given 1 minute on the next slide to associate the labels with the given shapes. (See Appendix E). The instructions for the matching task which follows are the same as those for the self-referencing task. Participants perform 12 practice trials (four per shape-label pair) before the matching stage begins. Only the first name appears in the matching stage. The matching stage of this task is identical to that of the self-referencing task, but the racially-coded labels AMAHLE, FATIMA, and JESSIE replace the self-referenced label stimuli (e.g. YOU).

On completion of the task, a message is displayed on-screen: “Well done! Please collect your debriefing form”. The debriefing form (see Appendix F) gives information on the true nature of the experiment and contacts for further information about the experiment.

Procedure

Participants were invited into the study by email through the SRPP process (see Appendix A). They were assigned a timeslot to come into the UCT Psychology department, where they completed a consent form (see Appendix B) and demographic questionnaire (see Appendix C). The experiments were conducted in a quiet room in the psychology department with an experimenter present to deal with technical difficulties.

They were initially deceived about the study’s purpose to prevent race-awareness or racial bias influencing their responses (Katsumi & Dolcos, 2017; Plant, Peruche, & Butz, 2005). They were made to believe that the study investigated memory for basic shape-label combinations. Being aware that race is a factor have could biased participants to process the stimuli differently. Informing my participants about the SRE could also potentially lead participants to processes the self-related material differently.

Data Management and Statistical Analyse

Statistical Package for Social Sciences (SPSS) software version 25 was used for most data analyses. Descriptive statistics were computed for an initial data check. Thereafter, data cleaning involved removing outlier trials with response times that lay beyond 3 standard deviations of the mean, eliminating 0.6% of the trails. Furthermore, correct responses given within 200ms were also excluded, eliminating under 2% of the trials. These measures are consistent with data handling practices for research of this nature (e.g.Sui et al., 2012)

Log transformations were performed to correct the skewed accuracy and RT variables. Thereafter, the inferential statistics were computed, with α set to 0.5 as the statistical significance threshold. Unless stated otherwise, all assumptions of parametric statistical tests were upheld. When the assumption of sphericity was violated the Greenhouse-Geiser correction was used.

A *d’* statistic was calculated to assess overall self-prioritisation. The signal detection approach (Macmillan & Creelman, 1990) is consistent with data handling practices for research of this nature (e.g. Sui et al., 2012). This score combined each participant’s accuracy scores in the two matching conditions into one score. This score accounts for both accurate responses and the number of “false alarms”, which are erroneous “present” responses to an absent stimulus, in each condition (Macmillan & Creelman, 1990). Repeated-measures analysis of variance (ANOVA) was used to investigate the relationship between the d’ scores with the presented label conditions in both experiments 1 and 2.

Repeated-measures ANOVAs were also used to investigate the relationships between RT and accuracy in the separate match conditions. First, the accuracy and RT data for the matching condition were analysed, followed by the non-matching condition. The composite scores which combined the match conditions were then analysed to investigate the overall effect of shape category. These same relationships were investigated for Experiment 2, with the addition of race in a Mixed-design ANOVA.

Results

Sample Characteristics

Table 1 shows the sample characteristics.

Table 1

Sample Characteristics: Descriptive statistics

Variable	Sample (*n* = 24)
Age (years)	20. 36 (1.28)
Gender: female *n*, (%)	20 (83.33)
Race: *n* (%)	
Black	7 (29.17)
Coloured	8 (33.33)
White	9 (37.50)

Note. Means are provided with standard deviations in parentheses.

Experiment 1: Matching vs Non-Matching Conditions

The mean RT and accuracy scores for experiment 1, in which participants responded to self, familiar-other, and stranger labels, are shown for each match condition (matching and non-matching) in Table 2. Responses to the self label produced the highest mean accuracy scores (*M* = .89, *SD* = .09) and the fastest responses (*M* = 522; *SD* = 77.70). The familiar label elicited the second most accurate (*M* = .77; *SD* = .17) and rapid responses (*M* = 601.44; *SD* = 75.55).

In the non-matching condition, participants were most accurate when presented with the stranger label (*M* = .77; *SD* = .14) although the accuracy scores are similar across label conditions. The fastest non-matching RT, however, was found for the self (*M* = 595; *SD* = 92.41). These descriptive statistics support our first hypothesis in which we proposed that response times would be fastest when responding to the self-related stimuli.

Table 2

Mean Accuracy and Response Times within Matching Conditions (Matched or Non-Matched) and Label Category Conditions in Experiment 1

Condition	Label Condition	Mean RT(ms)	Mean Accuracy
Matched	Self	522.70 (77.70)	.89 (.09)
	Familiar	601.44 (75.55)	.77 (.17)
	Stranger	613.70 (70.41)	.71 (.15)
Non-Matched	Self	595.63 (92.41)	.75 (.19)
	Familiar	646.43 (89.24)	.75 (.16)
	Stranger	636.71 (89.85)	.77 (.14)

Note. Standard deviation in parentheses. Accuracy = correct proportion of response. RT = Response time.

The results from all one-way repeated measures ANOVAs for experiment 1 are displayed in table 3.

Table 3

Experiment 1 ANOVA Table

Predicted Variable	Predictor Condition	*df*	*F*	η^2	*p*
Accuracy	Matched	2	16.23	.42	.000**
	Non-Matched	2	18.20	.04	.431
	Composite Condition	2	15.18	.40	.000**
Response Time	Matched	2	36.60	.59	.000**
	Non-Matched	2	6.71	.23	.009*
	Composite Condition	2	45.01	.66	.000**
Error		46			

Notes. Standard deviation in parentheses. Accuracy = correct proportion of response. RT = Response time.

*p < .05

**p < .001

Repeated-measures ANOVA for accuracy in the matching condition showed a significant effect of label category. Pairwise comparisons indicated highest mean accuracy difference was between the matching self (*M* = .89; *SD* = .31) and stranger (M = .72, SD = .45) labels, which was statistically significant, *p* < .001. The difference between the self and familiar (*M* = .77; *SD* = .17) was also statistically significant, *p* = .01, as was the difference between the familiar and stranger labels, *p* < .001 These differences are illustrated in *Figure* 1.

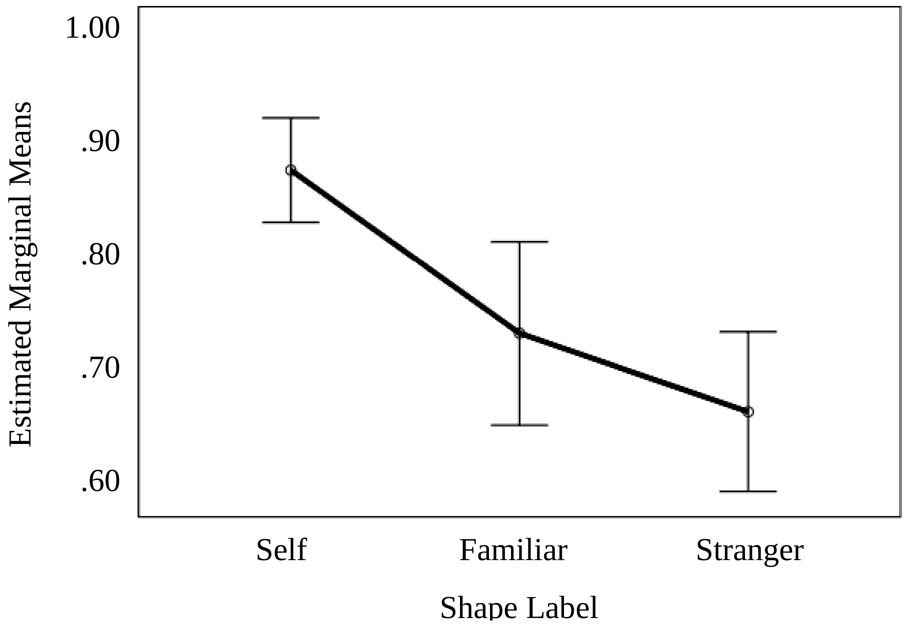

Figure 1. Accuracy scores for the self, familiar and stranger labels in the matching condition. 95% confidence intervals are represented in the figure by the error bars attached to each line for figures

Repeated-measures ANOVA for RTs in the matching condition showed a significant effect of label category. Pairwise comparisons showed there was a significantly faster response to the matching self (*M* = 522; *SD* = 77.70), when compared with both the familiar (*M* = 601.44; *SD* = 75.55) and stranger labels (*M* = 613.70; *SD* = 77.70), both $p < .001$. These results are displayed in *Figure* 2.

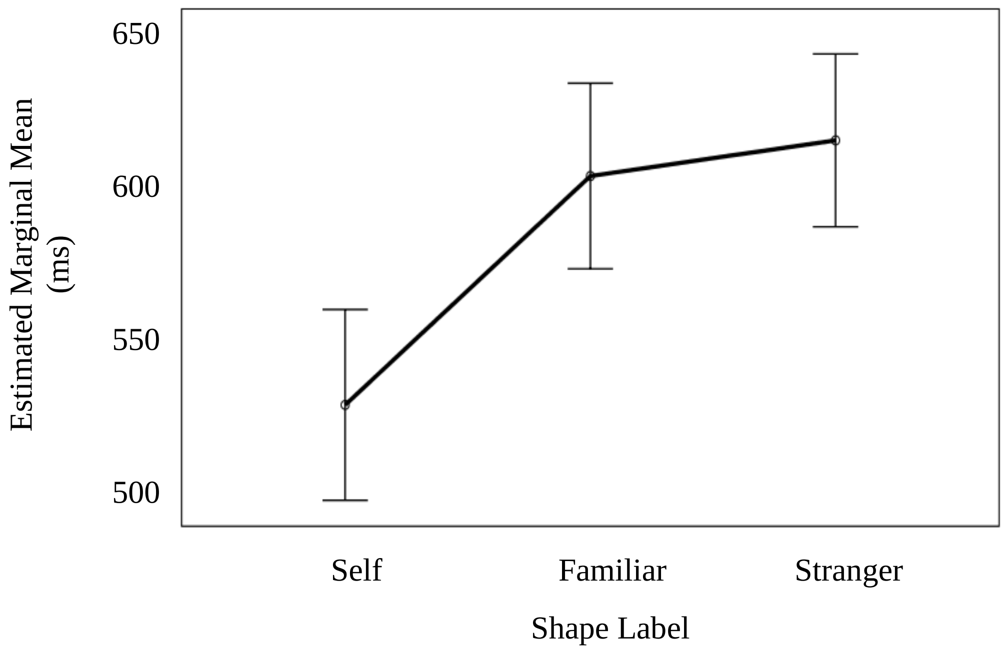

Figure 2. Response times to the self, familiar and stranger labels in the matching condition. Ms = Milliseconds.

The repeated-measures ANOVA performed on the accuracy scores in the non-matching condition showed no significant differences across all the three conditions, that is, self (*M* = .75; *SD* = .19); familiar (*M* = .75; *SD* = .16); stranger (*M* = .77; *SD* = .14), as illustrated in *Figure 3*.

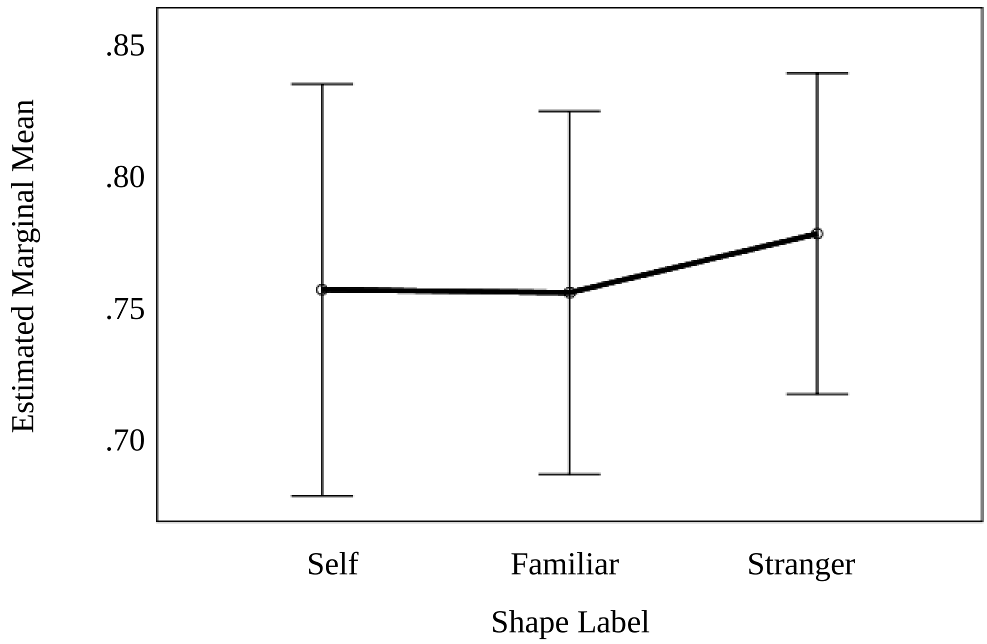

Figure 3. Accuracy scores for the self, familiar and stranger labels in the non-matching condition

Despite similar accuracy, repeated-measures ANOVA showed significant RT differences within the non-matching condition. Pairwise comparisons showed that, responses were fastest to the non-matching self label (*M* = 595.63; *SD* = 92.41) compared to both the familiar label (*M* = 646.36; *SD* = 89.24); and the stranger label (*M* = 636.84; *SD* = 89.85), both $p < .001$. RTs to the non-matching familiar and stranger conditions were not significantly different, $p = .87$. These results are displayed in *Figure* 4.

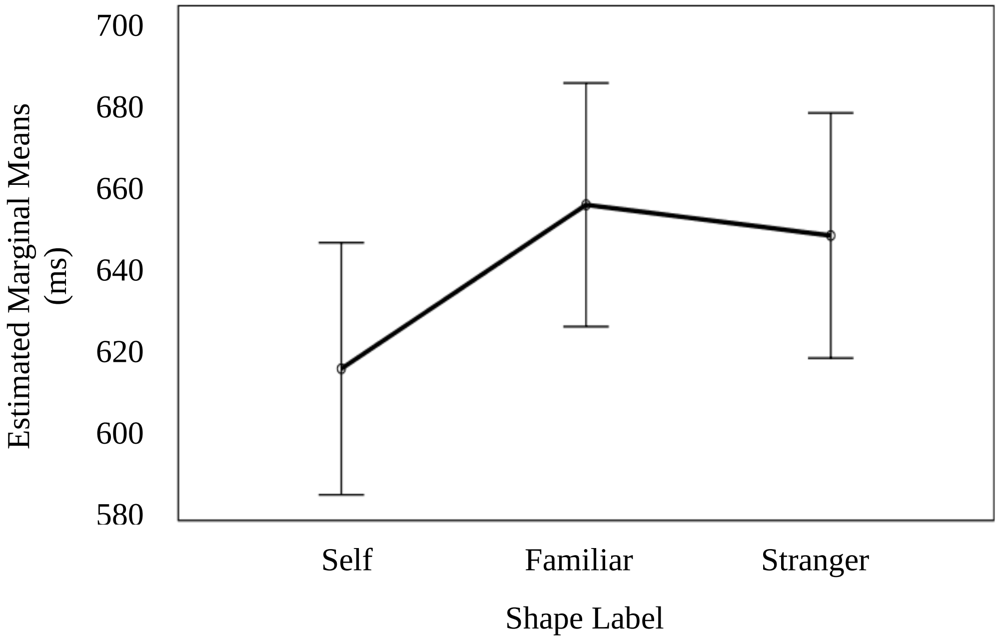

Figure 4. Response time to the self, familiar and stranger labels in the non-matching condition. Ms = Milliseconds.

These results suggest that the self has an accuracy advantage in the matching condition and a response time advantage in both the matching and non-matching conditions.

Experiment 1: Overall Label Category Effect

We analysed overall accuracy with *d'* statistics, which combined the matching and non-matching scores to create a single composite score, consistent with the signal detection approach (Macmillan & Creelman, 1990). Repeated measures ANOVA showed a significant main effect of label category on the d' scores, regardless of matching condition. Pairwise comparisons showed that the self (M = 2.45; SD =. 93), elicited significantly more accurate responses than the both the familiar (M = 1.56; SD = 1.08), p < .001; and stranger labels (M = 1.12; SD = .93), p < .001, as displayed in *Figure* 5. The self label had the largest d' score, suggesting that the self elicited the highest proportion of correct responses, and the lowest proportion of erroneous “false alarm” responses.

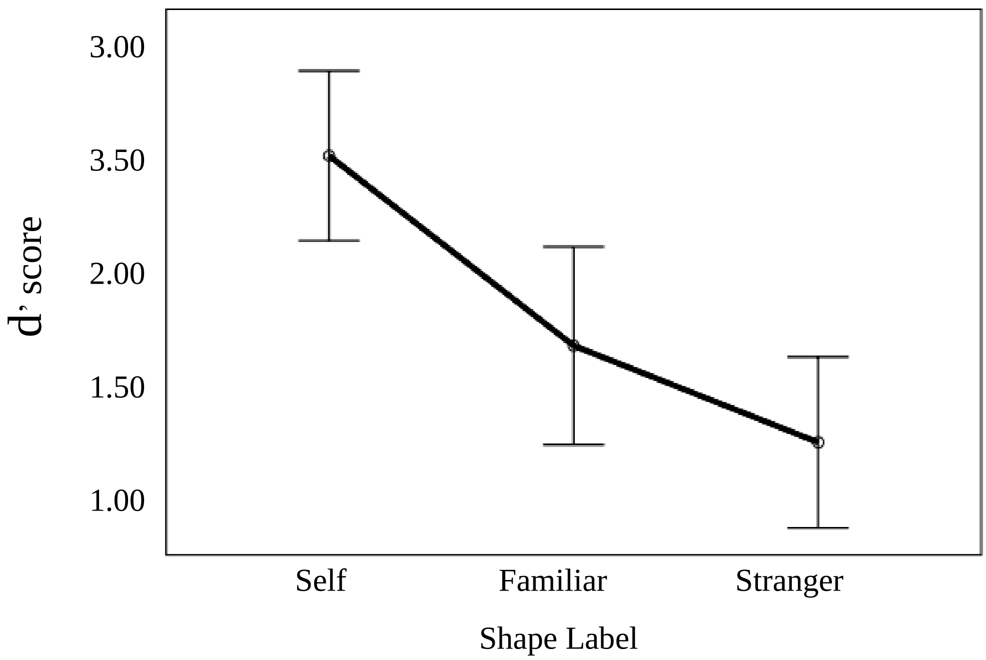

Figure 5. Participant accuracy, irrespective of matching condition for each label condition, self, familiar, and stranger.

Repeated measures ANOVA showed a significant effect of label category on the RTs, regardless of matching condition. Pairwise comparisons indicated that there was a significant RT difference between the self, (*M* = 559.16; *SD* = 92.15), and familiar label (*M* = 623.89; *SD* = 84.88); as well as between the self and stranger labels (*M* = 625.27; *SD* = 80.70), both $p < .001$. However, the difference between the familiar and stranger conditions was insignificant, p = .89. *Figure* 6 shows these comparisons.

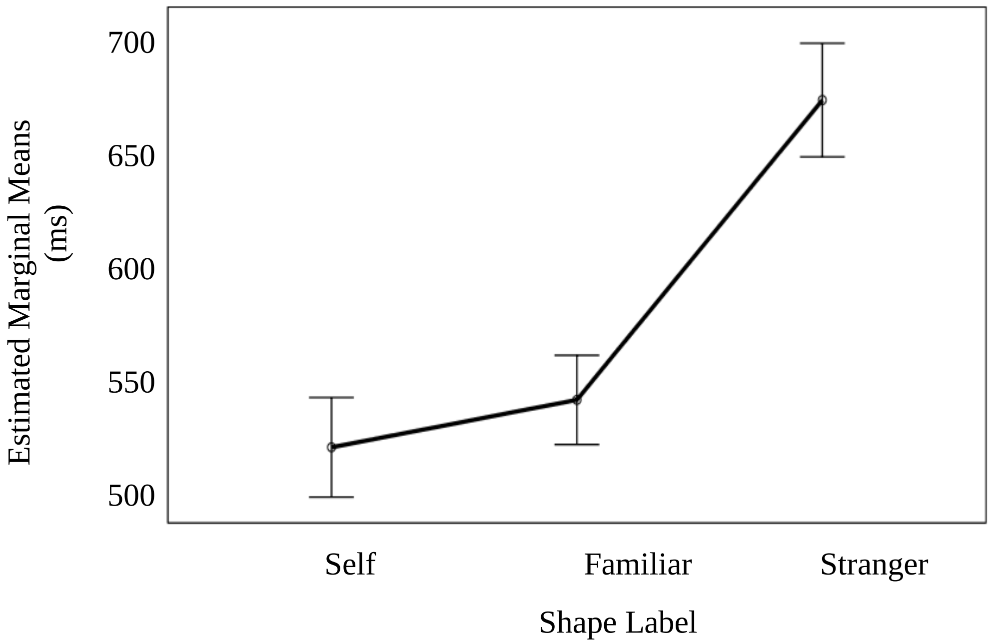

Figure 6. Participant response times, irrespective of matching condition, to each label condition, self, familiar, and stranger. Ms = Milliseconds.

These analyses showed that regardless of matching condition, the self was the only label to elicit significantly more accurate and faster responses.

Experiment 2: Matching vs Non-Matching Conditions Irrespective of Participant Race

The descriptive statistics suggest that when participant race is not considered as an independent variable, participants' mean response times and accuracy scores in each condition are very similar, for example, accuracy for the labels 'Amahle' (*M* = .73; *SD* =.26) and 'Fatima' (*M* = .73; *SD* =.25) in the non-matching condition. The descriptive statistics are displayed in table 4.

Table 4

Mean Accuracy and Response Times within Matching Conditions (Matched or Non-Matched) in Experiment 2

Label Condition	Label Category	Mean RT(ms)	Mean Accuracy
Matched	Amahle (Black)	548.80 (93.88)	.82 (.19)
	Fatima (Coloured)	559.78 (116.41)	.80 (.18)
	Jessie (White)	545.49 (117.64)	.79 (.18)
Non-Matched	Amahle	598.85 (128.68)	.73 (.26)
	Fatima	601.75 (121.28)	.73 (.25)
	Jessie	590.91 (130.17)	.76 (.25)

Notes. Standard deviation in parentheses. Accuracy = correct proportion of response. RT = Response time.

Repeated measures ANOVAs confirmed that the means in the respective matching and non-matching conditions did not show significant main effects for the shape labels, ‘Amahle’, ‘Fatima’ or ‘Jessie’. These results are displayed in table 5.

Table 5

ANOVA Table for Accuracy and Response Times in the Matched and Non-Matched Conditions in Experiment 2

Predicted Variable	Predictor Condition	*df*	*F*	η^2	*p*
Accuracy	Matching	2	.81	.04	.453
	Non-Matching	2	1.28	.05	.293
Response Time	Matching	2	.75	.03	.481
	Non-Matching	2	1.19	.05	.318

Notes. Standard deviation in parentheses. Accuracy = correct proportion of response. RT = Response Time.

Thus, the task itself, when participant race is not considered a predictor variable, does not generate differing responses to the racially-coded stimuli.

Experiment 2: The Effect of Race in Matching vs Non-Matching Conditions

As in experiment 1, the highest mean accuracy scores overall were found in the matching conditions. Black participants (*M* = .86; *SD* =.16), coloured participants (*M* = .77; *SD* =.27) and white participants, (*M* = .86; *SD* =.09) were all most accurate for the racially-coded label 'Amahle' in the matching condition. Thus, only the group of black participants responded most accurately to their own racially-coded shape. The most rapid RT was found in response to the 'Amahle' label in the matching condition by the group of coloured participants (*M* = 540.11; *SD* =141.68). 'Amahle' also elicited the most rapid responses from the group of black participants (*M* = 544.59; *SD* =90.09). The group of white participants responded most rapidly to the 'Jessie' label (*M* = 547.83; *SD* = 81.02). Thus, only the group of coloured participants did not respond most rapidly to their own racially-coded label. Table 6 presents these statistics.

Table 6

Mean Accuracy and Response Time as a Function of Participant Race within Matching Conditions (Matched or Non-Matched) and Label Conditions in Experiment 2

Participant Race	Matching Condition	Label Condition	Mean RT	Mean Accuracy
Black	Matched	Amahle	542.59 (90.09)	.86 (.16)
		Fatima	563.75 (92.12)	.79 (.16)
		Jessie	556.93 (88.24)	.79 (.17)
	Non-Matched	Amahle	582.95 (119.08)	.71 (.31)
		Fatima	594.14 (187.59)	.67 (.25)
		Jessie	598.06 (156.18)	.68 (.32)
Coloured	Matched	Amahle	540.11 (141.68)	.77 (.27)
		Fatima	546.96 (181.54)	.74 (.27)
		Jessie	533.98 (176.63)	.75 (.26)
	Non-Matched	Amahle	587.88 (187.59)	.71 (.26)
		Fatima	590.78 (175.38)	.71 (.28)
		Jessie	578.95 (174.41)	.75 (.26)
White	Matched	Amahle	559.47 (46.68)	.86 (.09)
		Fatima	567.64 (63.69)	.84 (.36)
		Jessie	547.83 (81.02)	.82 (.26)
	Non-Matched	Amahle	617.15 (80.11)	.77 (.26)
		Fatima	615.08 (82.22)	.77 (.25)
		Jessie	596.18 (76.82)	.81 (.32)

Notes. Standard deviation in parentheses. Accuracy = correct proportion of response. RT = Response Time.

The descriptive statistics for RT and accuracy, as a function of race, appear to suggest a relationship between race and responses in the respective matching and non-matching conditions. These statistics do not fully support the hypotheses. Hypothesis 3, which is that participants' response times will be faster for racial in-group related stimuli than to racial out-group stimuli, is not supported. The only group to respond most quickly to their own racial label was the black participants to 'Amahle' (*M* = .86; *SD* =.16). Hypothesis 4, which is that participants' accuracy scores will be higher when responding to racial in-group stimuli than to racial out-group stimuli, is supported by the descriptive statistics for all groups except for the group of coloured participants, whose most accurate score was found for the racially-coded "black" 'Amahle' label.

Mixed-designs ANOVA, with participant race as the between-subjects independent variable, showed no significant interaction between race and accuracy scores in the matching condition, F (4, 42) = .59, p = .56, η^2 = .03. The very low partial eta squared value alongside the high *p*-value suggests that the mean differences observed were likely the result of chance. These results are shown in *Figure* 7.

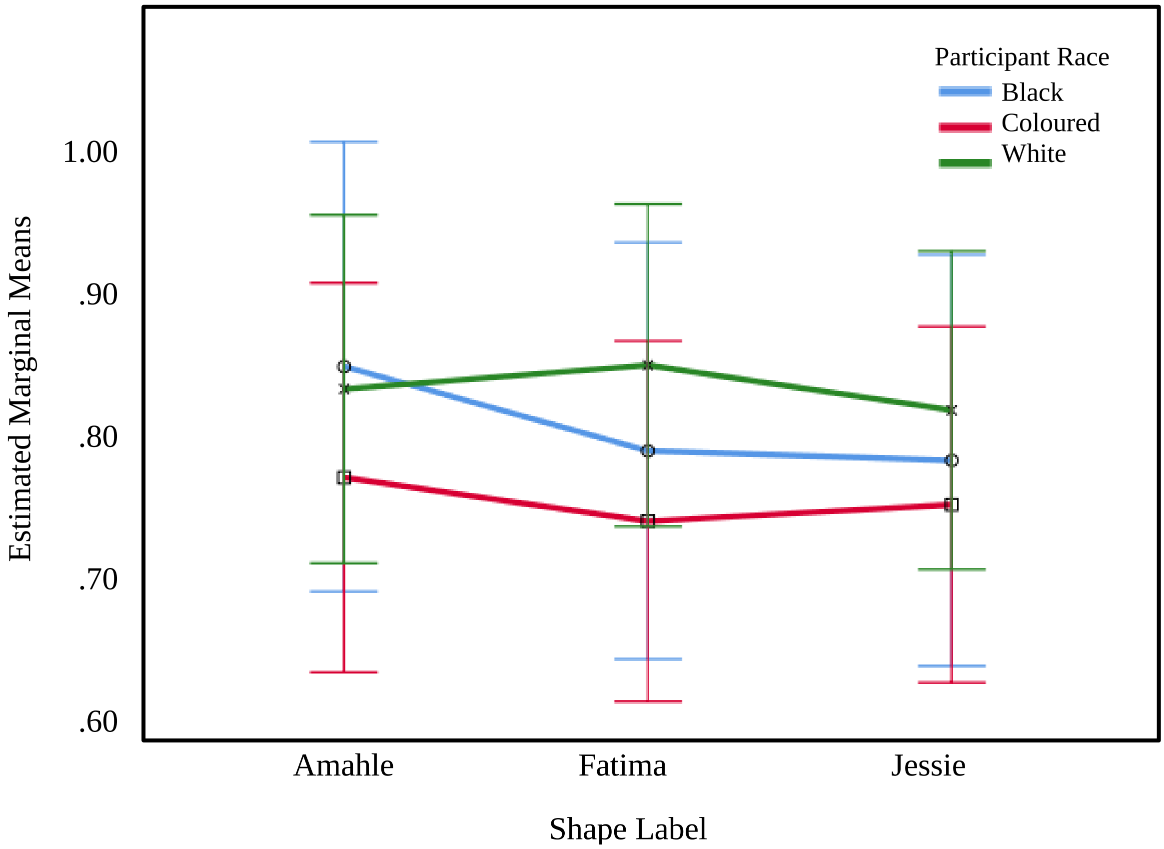

Figure 7. Participant accuracy for racially-coded labels in the matching-condition, as a function of participant race.

RTs were analysed in the same manner as the accuracy data. There was no significant interaction effect, F (4, 40) = .91, p = .47, η^2 = .08, as shown in *Figure* 8.

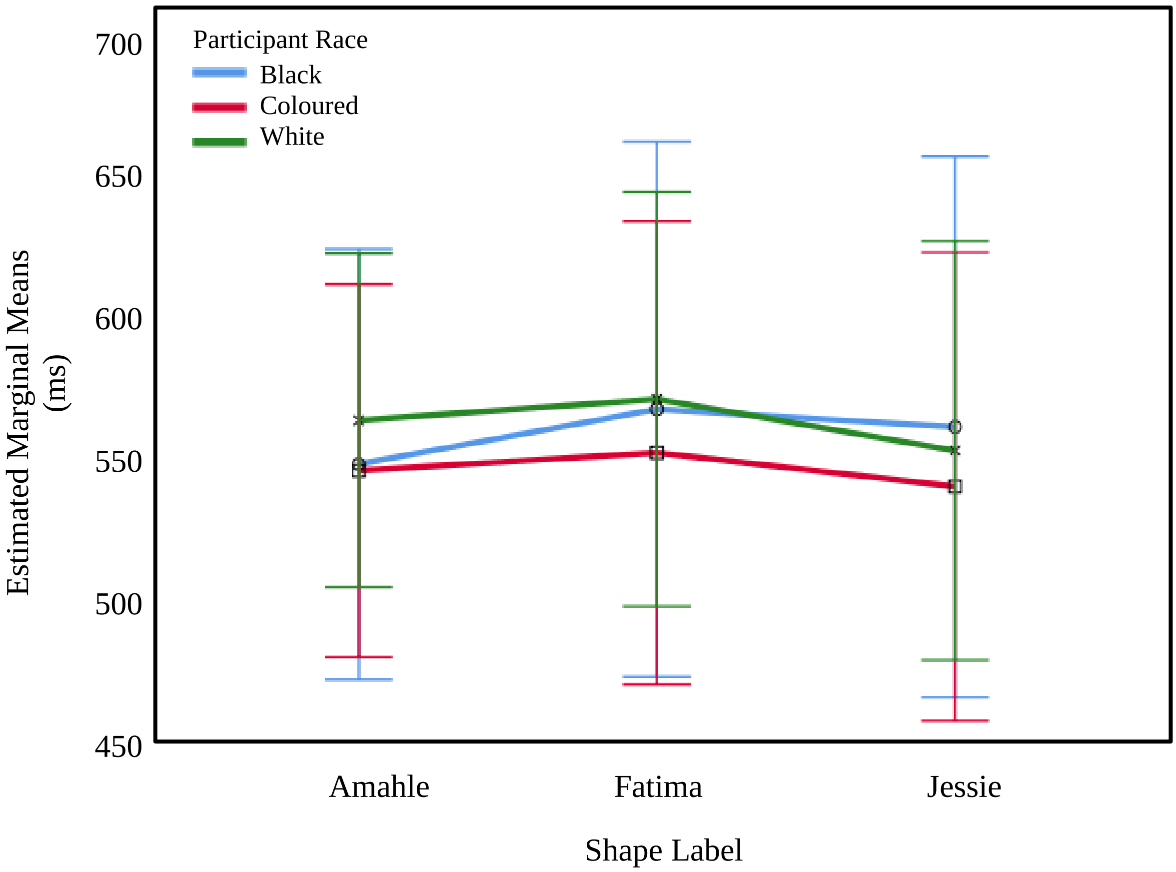

Figure 8. Participant response times to racially-coded labels in the matching-condition, as a function of participant race.

The same analyses were run for the non-matching condition. Another insignificant interaction between race and accuracy scores was identified, F (4, 42) = .60, p = .66, η^2 = .05. These results are displayed in *Figure* 9.

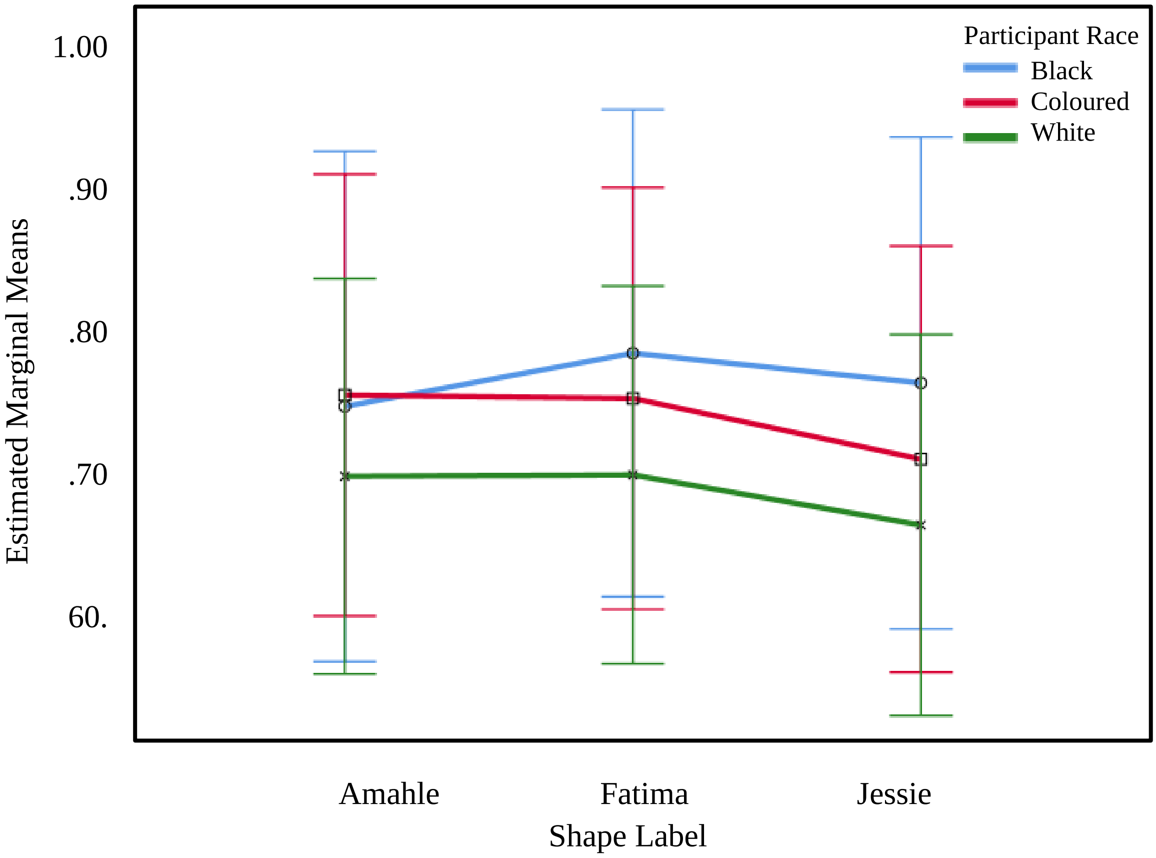

Figure 9. Participant accuracy for racially-coded labels in the non-matching-condition, as a function of participant race.

The interaction effect between race and RT scores in the non-matching condition was also shown to be non-significant, F (4, 42) = 2.13, p = .13, η^2 = .17, as illustrated in *Figure* 10.

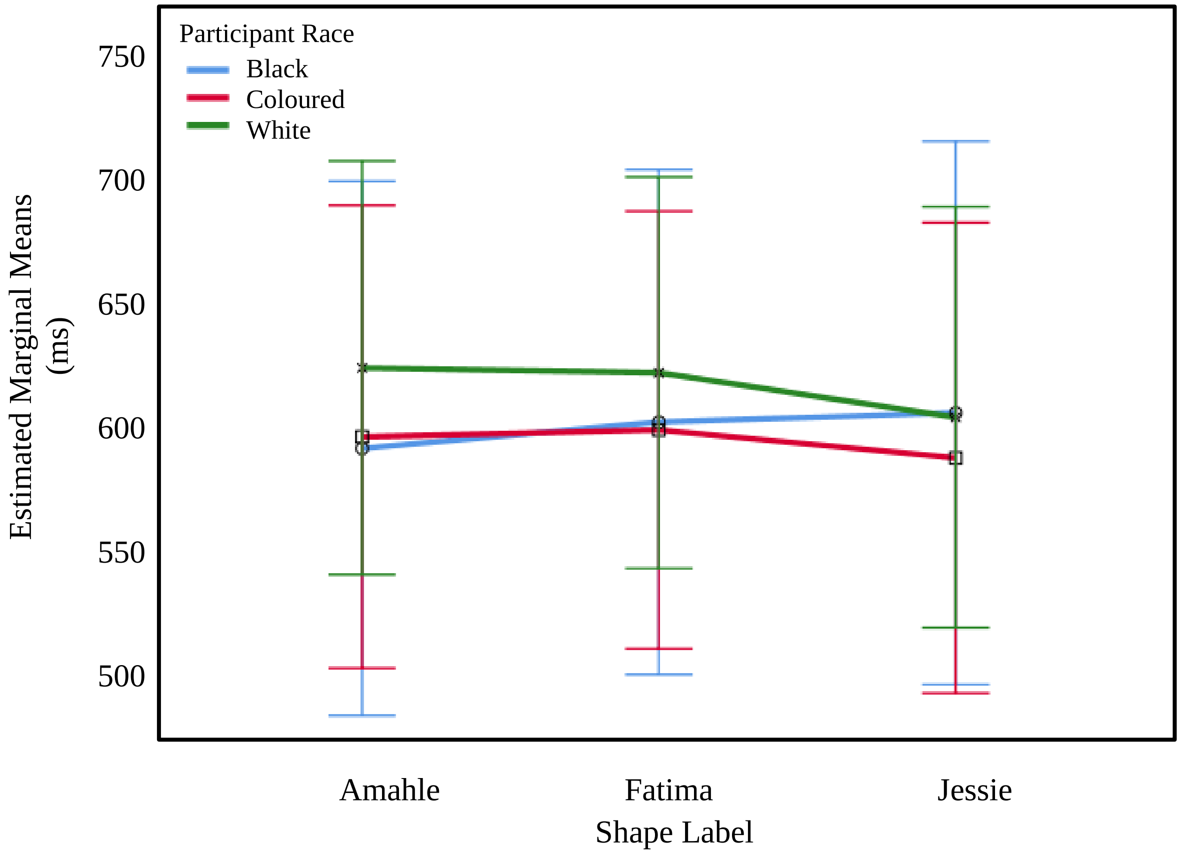

Figure 10. Participant response time to racially-coded labels in the non-matching-condition, as a function of participant race

Neither accuracy scores nor response times interacted significantly with race in either the matching or non-matching conditions.

Experiment 2: The Overall Effect of Race on Accuracy and RTs

Overall accuracy was assessed with *d'* statistics, combining the matching and non-matching scores to create a single composite score (Macmillan & Creelman, 1990). Repeated measures ANOVA showed a non-significant interaction effect, F (1,19) = 21. p = .81, η^2 = .02. The pairwise comparisons indicated minimal differences between the participant race groups when responding to the 3 shape labels, as illustrated in *Figure* 11.

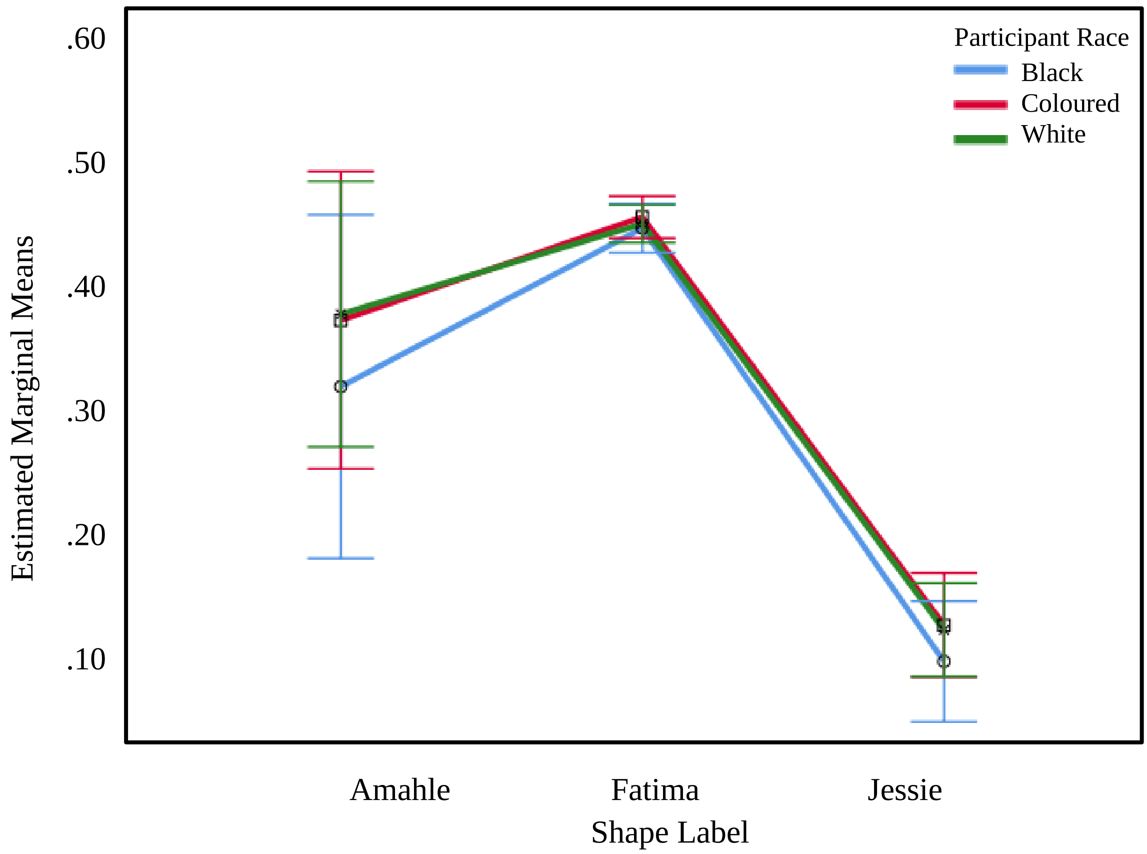

Figure 11. Participant accuracy for racially-coded labels when matching and non-matching scores are combined

A mixed-designs ANOVA showed that the interaction between participants' race and their RTs to the racially-coded labels was non-significant, F (2,21) = 21. p = .81, η^2 = .02, as illustrated in *Figure* 12.

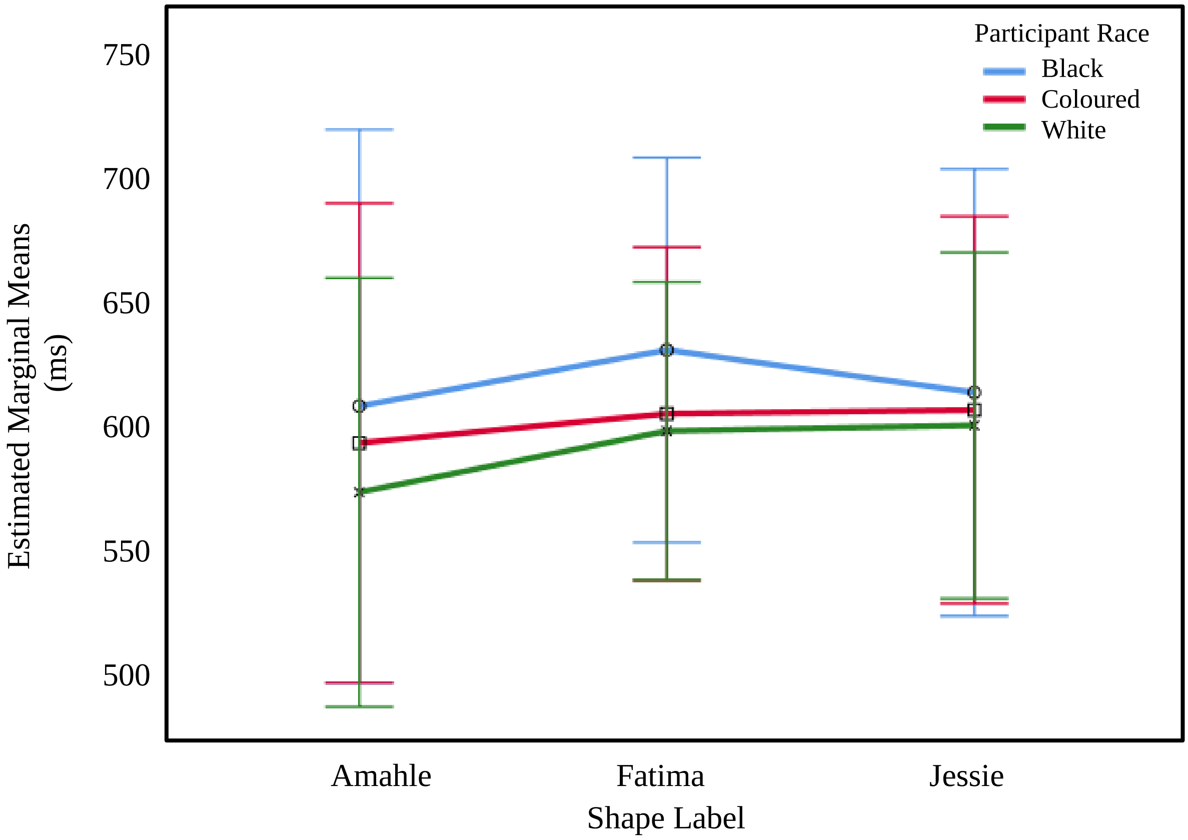

Figure 12. Participant response times racially-coded labels when matching and non-matching scores are combined.

Considered together, these results suggest that there was no significant interaction effect between participant and scores for RT or accuracy when participants were presented with racially-coded shape-label stimuli.

Discussion

We aimed to re-produce the SRE in a sample of South African students. We also investigated whether the SRE extends to the processing of own racially-coded stimuli. Our results replicated the influence of SRE in processing own versus ‘familiar’ and ‘stranger’ related stimuli, but we did not identify its effects regarding a bias for own-race-coded material.

Experiment 1: The SRE in a South African Sample

We found that participants’ responses are fastest and most accurate when responding to self-related stimuli compared to familiar-other and unfamiliar-other stimuli. This finding is consistent with a similar study on a British sample by Sui et al., (2012) in which participants were faster and more accurate when they responded to a shape that had been associated with themselves compared to when they responded to shapes that had been associated with someone familiar to them or a stranger..

In our study, when participants responded to a shape that had been self-associated in the matching condition, their responses were faster and more accurate. As anticipated, responses became slower and less accurate as relational self-proximity decreased. Interestingly, the familiar ‘best friend’ elicited relatively faster responses and fewer errors than the ‘stranger’ label. When presented with a shape-label combination that participants had not associated with themselves in the non-matching condition, there were no significant differences in accuracy across labels. However, we uniquely found that participants were still fastest when responding to their self-associated label in the non-matching condition. Other studies have not identified this effect.

When we combined scores in the matching and non-matching trials, participants were less error-prone when responding to their self-associated label. They were equally quick and accurate in response to their best friend and stranger labels.

Sui et al. (2012) attributed their findings to the tendency to quickly process self-related stimuli to the prioritisation of the self over other social stimuli (SRE). This is probably affected through attentional biases that enhance processing of stimuli with self-meaning. We speculate that the same mechanism underlies our pattern of results. Self-associated shapes gain a processing advantage over others due to this influence of the SRE. Our findings are consistent with research which suggests that the SRE has a more pervasive influence on cognition than merely acting on well-established memory stimuli (Golubickis et al., 2018). We additionally support this argument with our unique finding in experiment 1 that although the non-matching condition increased the difficulty level of the task (Sui & Humphreys, 2013), and accuracy was equal across labels, the self elicited the most rapid responses. Thus, our findings are explained by a growing body of evidence on the low-level attentional impact of the SRE.

Our results also provide further evidence for the universality of the SRE. Our sample had a more racially and culturally diverse participant composition than in previous studies. Although race and culture are not mutually exclusive, our sample must at least have a slightly different cultural heritage to the white European and Asian populations that have thus far been studied. Furthermore, historical legislation and practices in South Africa prior to the end of apartheid maintained different cultural/ethnic groups separate and this separation is still evident today (Butler, 2017) Despite cultural differences, our participants demonstrated the SRE in response to basic-shape stimuli.

Experiment 2: Race and the SRE

In Experiment 2 we investigated the hypothesis that participants' response times would be faster when responding to racially-coded in-group stimuli than to racially-coded out-group stimuli. We did this by pairing race-specific names to shapes, aiming to create an in-group/out-group bias. We also projected that participants' accuracy scores would be higher when responding to racial in-group stimuli, than to racial out-group stimuli. These hypotheses were not supported by our data when a series of repeated-measures and mixed-methods ANOVAs were run. Participants were no faster when responding to shape pairings with in-group names than when responding to shape pairings with out-group names.

Our findings can be explained by the possibility that the SRE may have a very specific role which only separates the self from the other, regardless of the group membership similarity of that other. Our data do not support the speculation made by Sui et al. (2014) linking the SRE with self-expansion theory (Aron & Aron, 1996). The SRE may not contribute to social categorisation behaviours which form in-groups. Its function may not extend to identifying how alike or different stimuli are from the self. However, our findings in experiment 1, and those of others (see Sui & Humphreys, 2013; van Veluw & Chance, 2014) demonstrate that the SRE is expressed in varying degrees, dependent on relational proximity to the self. For instance, in experiment 1 a significant difference in both accuracy and response time was found between the familiar other and the unfamiliar other. This suggests that the SRE acts on degrees of self-relatedness. Thus, it is plausible that the design of experiment 2 was not explicit enough in its elicitation of racial self-relatedness, and the SRE was not adequately activated due to the absence of the self in the task.

To clarify this finding, future researchers might aim to heighten in-group/out-group distinction of the individual label stimuli. A description of each of the classmates, including an explicit mention of race and culture, could be provided.

Some research suggests that there are bottom-up influences on top-down attentional control (see Levin et al., 2016). We found no influence of participants' top-down racial category knowledge on their low-level attentional responses to racially-coded stimuli. Our findings may illustrate that race does not contribute to SRE functioning at early processing stages. Furthermore, our findings imply that in-group biases are not influenced by low-level attentional processes. Although people favour their in-group over out-group members in a range of situations (Katsumi & Dolcos, 2017), our results suggest that the SRE may have no role in these higher-order processes. Our findings arguably imply that top-down influences do not influence perception (Firestone & Scholl, 2015). However, our experiment design limitations potentially offer an alternative explanation.

Top-down influences on low-level attention may not have been activated in our task due to the sample used to investigate these inter-racial group biases. Although our sample was racially-mixed, all participants were from the same racially-mixed South African university, and thus have had inter-racial contact. The composition of the University of Cape Town (UCT) is not racially equal, at 30% African, 16.1% coloured, 7.9% Indian, 30% white, and 15% undisclosed (University of Cape Town, 2017). However, students should arguably have had indirect inter-racial contact through enrolment. Most participants were in their second year of study, supporting this notion. The stimuli were referred to as "classmates" in the task. This could have led the racially-coded name stimuli to be perceived as equally distant from the self, because participants perceived their fellow students as being a relatively racially-mixed group. Perhaps participants' identities as students and top-down knowledge of a racially-mixed student population could have led them to assign the same degree of self-relatedness to all three stimuli, identifying them as members of the same familiar in-group. This is further supported by the relative similarity of participants response times to the three name stimuli as those elicited by the self and best friend label, compared to the stranger, in experiment 1.

The claim that race information only contributes at a high-level attentional stage may underestimate the contribution of low-level processes to complex racial categorisation judgements (Levin et al., 2016). The distinction between a top-down and bottom-up level of processing has itself been disputed. Some research has demonstrated that these processes interact more than previously thought (Vossel, Geng, & Fink, 2014). Cognitive processing of such judgements may not solely be achieved through bottom-up attentional deployment, and this may explain why our investigation of low-level attentional biases saw no effect.

One of the dangers of suggesting that top-down influences exert control over low-level perceptions is that it could be interpreted as meaning people's prejudices against racial groups are automatic, uncontrollable or irreversible biases. This is not the case, it has been shown in experimental settings that even implicit biases of which we are not aware can be indirectly controlled by the self to conform to social expectations (Forscher & Devine, 2015). Thus, provide evidence that a subscription to the binary of top and bottom-down approaches to processing can be problematic.

The SRE could also have been activated, but not influential due to the amount inter-racial experience of our sample. It has been demonstrated that a greater amount of inter-racial contact predicts greater accuracy for inter-racial face recognition tasks (Kokje et al., 2018). Thus, our participants, due to inter-racial contact, may have shown reduced differences in out-group versus in-group accuracy. The SRE may not have been active enough to differentiate the individual classmates from one another, due to a shared level of racial exposure homogeneity within the sample.

A solution to in-group homogeneity in future research would be to recruit participants from the general population. Furthermore, comparing the effect found in the general population with effects from more racially homogenous cultural groups could illustrate varying degrees of low-level attentional biases for racially-coded stimuli. Thus, although our findings did not establish the role of the SRE in racial biases, this does not mean that there is no such effect.

SRE research is becoming an important research area due to the possibilities of SRE-based learning and memory interventions. Our study has contributed evidence for the universality of the SRE. This is important if SRE-based interventions are to be adopted in South Africa in applied settings. For instance, the implications for the SRE and its role in various disorders, particularly the amnesias, are currently being researched (Wong et al., 2017). If SRE transcends culture as our results suggest, SRE based interventions and strategies can be meaningfully applied in the South African context.

The goal of investigating the SRE's influence on racially-coded stimuli is to reveal processes which contribute to racial bias. Early-stage SRE processing could plausibly contribute to a range of self-versus-other social biases, such as the own-race face recognition bias (Kokje et al., 2018). Thus, our study has demonstrated some techniques which future researchers can utilise to investigate this relationship.

General Limitations and Suggestions for Future Research

The names used in experiment 2 highlight two limitations: racial-representativeness and participant familiarity. We assumed race specific names would invoke an ingroup /outgroup perception in participants, but we did not explicitly assess whether this was invoked, or whether our participants associated the names with specific races. Future research should measure the amount of contact each participant has had with each of the names in a post-experiment survey. A future pilot study to investigate current name popularity and the extent to which the names are perceived as race-representative would enable more appropriate name selection.

The second limitation is the task's artificial nature. The task scenario is unrealistic and could arguably be investigating an effect which has no influence on real-world social cognition (James, Klinger, & Vila, 2014). The SRE is thought to influence cognitive processing of stimuli by rendering stimuli more socially salient, which enables more efficient stimuli categorisation (Sui & Humphreys, 2013). Our stimuli in experiment 2 were probably not rendered socially salient, as they represented imaginary classmates, which the participant knew were not real. Experiment 1 likely did not encounter this problem because the self is inherently socially salient to the self. Future SRE researchers should consider using a more realistic technique for the matching task. For instance, virtual reality simulation techniques may give the SRE an adequate chance of activation.

Finally, fatigue effects may have confounded our findings. One participant withdrew from this study because their eyes were becoming tired from the repeated and rapid presentation of stimuli. The task took approximately 1 hour to complete, and although the task was completed in blocks, participants were not given a break longer than 1 minute, with the instruction to breathe deeply before proceeding between experiments. The fatiguing aspect could have led participants to apply limited effort or to make non-perceptual errors. Future researchers should apply a more structured and lengthy break between experiments.

Conclusion

Our findings have illustrated that the SRE is present in a sample of South African university students, and that participant race did not predict the accuracy or response times to racially-coded stimuli.

Our findings have contributed some new perspectives on bottom-up, top-down attentional debates, by emphasising the need for realistic SRE activation by racially-coded stimuli. Identifying which attentional stage race information provides input is crucial in identifying the stage at which prejudice interventions might be applied. It remains plausible that the SRE is a mediator in social biases, including racial bias, and may directly or indirectly contribute to prejudice and racial discrimination. Our study has laid the foundations to develop studies which offer a better understanding of the cognition underlying discriminatory behaviours. Studies such as these could hopefully enable the development of counter-discriminatory interventions.

The field of SRE is a promising area of research. Our study, despite its limitations, has made the necessary preliminary steps towards confirming the SRE’s universality, as well as investigating its potentially crucial role in in-group biases.

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Appendix A

Invitation Email to Participate in Study

Invitation to Participate in Research Study: Memory for Shapes and Labels

2 SRPP Points for Completing Basic Computer Task

Dear Student

You are invited to take part in my honours research study.

What it is: I am investigating memory for basic shapes and labels. This research investigates how quickly students' can recall combinations of shape-label pairs.

What you would do: If you choose to take part, you will arrange a time slot which suits both you and the researcher. You will then complete a basic computer task in the psychology building on upper campus for about 30-45 minutes, which involves responding "the same" or "not the same" to different displays of shapes and labels.

You will receive: 2 SRPP points in return for your participation.

Please note: All participants will be between 18 and 30 years of age. All participants must be South African citizens.

You can sign up to take part in this study by emailing Nicole McIver at MCVNIC001@myuct.ac.za. Please include your student number and age in this email. You will then receive a response email to arrange a time slot which suits both you and the researcher.

Kind Regards
Nicole McIver

Appendix B

Consent Form

Consent to Participate in a Research Study

University of Cape Town

Thank you for taking the time to participate in my study. This study is an honours project, towards a Psychology degree at the University of Cape Town. It will measure your reaction times to different pictures across different social categories. Around 20 participants will take part in this study. Before agreeing to participate, please carefully read the following:

Why am I doing this study?

This study aims to compare participants memory for basic shapes and labels. This research investigates how quickly you can recall shapes and words at the same time.

What must I do?

If you choose to take part, you will complete a 1-page form about your basic information, e.g. your age. You will then complete a basic computer task for approximately 45 minutes, which involves responding “same” or “not the same” to combinations of shapes and labels.

What are the risks?

There are no risks involved in taking part in this study that you would not encounter whilst working on a computer in your everyday life.

What are the benefits?

You will receive 2 SRPP points in return for your participation, which count towards your psychology course credit at UCT. There are no other rewards for taking part. Indirectly, you can benefit by learning about the research process, and the knowledge that you have helped contribute to the body of research on social interaction.

What are my rights as a participant?

You may stop taking part in this study at any point, and there will be no punishment. You do not have to give anyone a reason for your withdrawal. You are not being forced to participate in this study. Your response time data will not be available to anybody, aside from the researcher, as the computer will anonymously record your responses according to your participant number. Your identity is not attached to your responses.

Informed Consent

I, _________________________, have read and understood what is written on this page, and by signing here, I agree to take part in this study.

Participant’s signature: ___________________________________ Date: ____________

Researcher’s signature: ___________________________________ Date: ____________

For further information, feel free to contact the researcher, Nicole McIver: MCVNIC001@myuct.ac.za.

You can also contact my supervisor, Dr Progress Njomboro: progress.njomboro@uct.ac.za.

If you would like to know more about your rights as a participant, you may contact Ms Rosalind Adams: 021 650 3417 or rosalind.adams@uct.ac.za. Should you feel the need for emotional or mental support, feel free to contact the Student Wellness Centre at any time: 021 650 1017

Appendix C

Demographic Form

Participant number: _______________ Age: ________________________

Student number: __________________ Race: ______________________

Identified Gender: ___________________

Biological sex: ______________________

Nationality: __________________________

Do you have normal eyesight? Yes ☐ No ☐

If you selected no, please state whether you wear contact lenses or glasses to help your vision:

____

____

Appendix D

Screen Display from the Self-Referencing Task

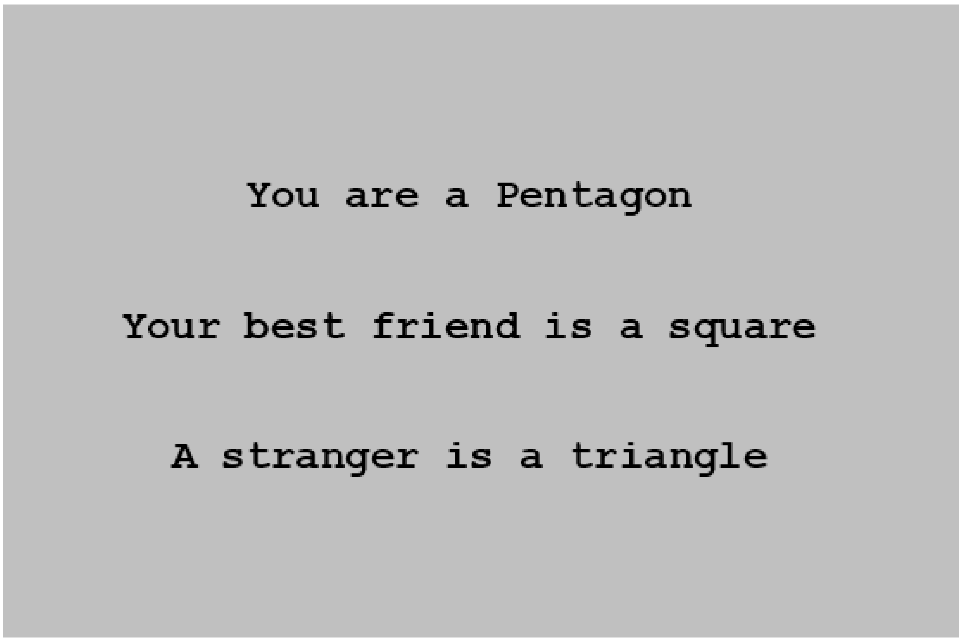

Figure 13. Screen display in the training stage of the self-reference task

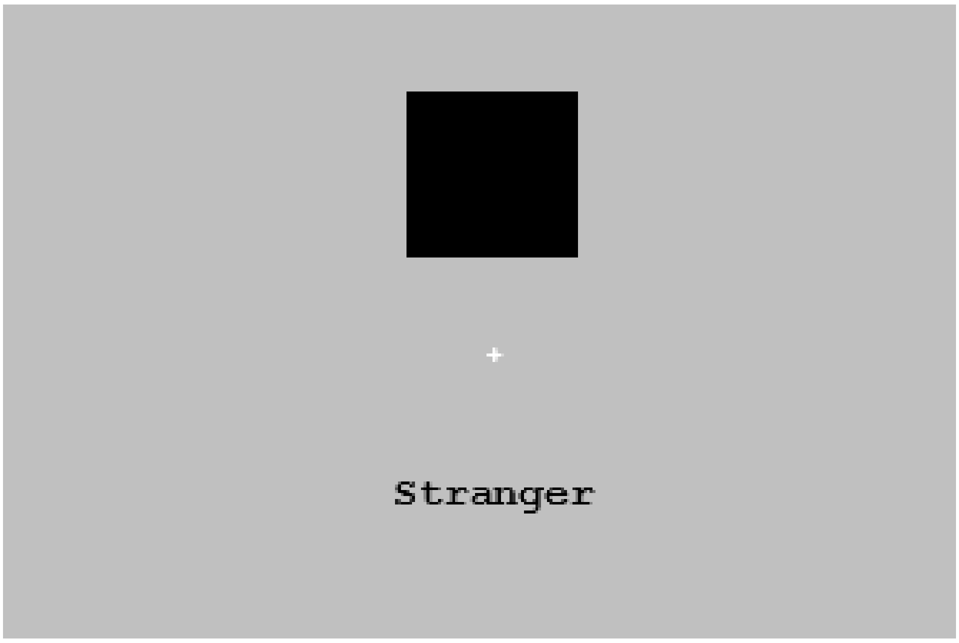

Figure 14. Screen display in the matching stage of the self-reference task.

Appendix E

Screen Displays from the Race-Distance Task

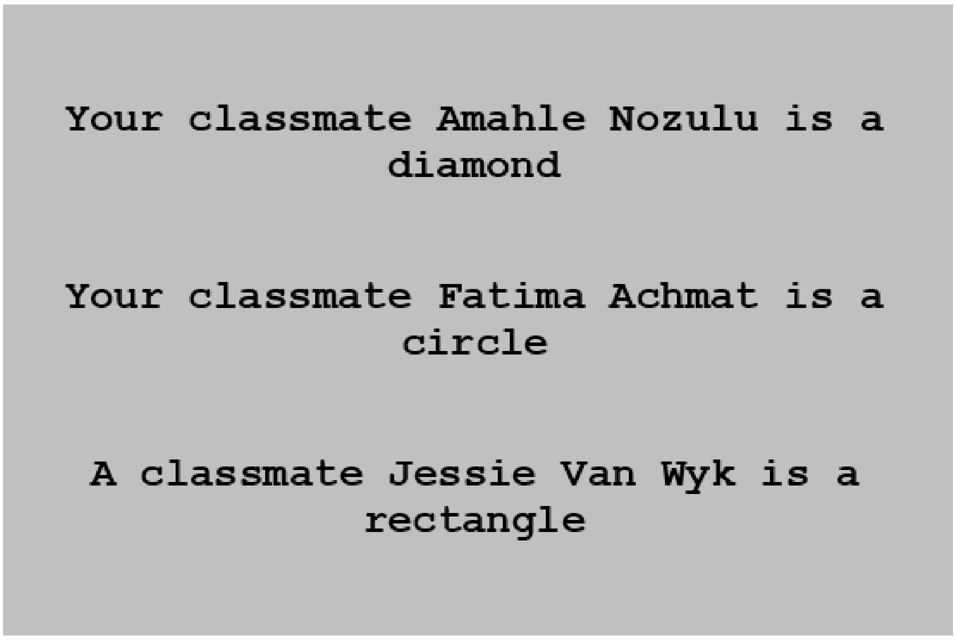

Figure 15. Screen display in the training stage of the race-distance task

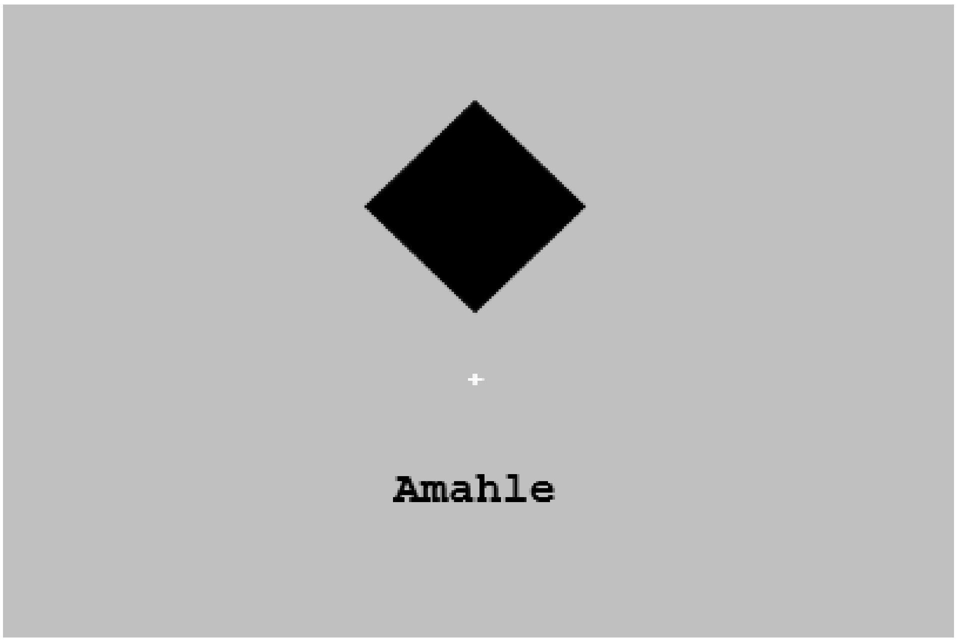

Figure 16. Screen display in the matching stage of the race-distance task

Appendix F

Debriefing Form

Debriefing Form

University of Cape Town

Thank you for taking the time to participate in my study. This true purpose of this study was to measure reaction times to different social categories, with an emphasis on race, and not memory.

Aim of this research:

This study aims to compare participants processing speed when presented with pictures associated with different social relations and races.

The Self Referencing Effect (SRE) is a cognitive effect, whereby people have been shown to respond more quickly to representations of the self than to other people, such as friends and family. My project aims to investigate whether the SRE exists in a South African sample, and if so, how does racially-specific information impact the SRE?

Cross-Cultural SRE

My research explores whether the SRE exists in a South African population. The SRE has potential benefits for learning and studying, through SRE based study strategies for example. If people can process self-relevant information more easily, this has implications for learning. If we can show that it exists across all cultures, these beneficial strategies can potentially be implemented worldwide. To do this, I recorded your response times and accuracy scores of your reactions to the “self” shape versus the “stranger” and your “best friend”. If the SRE is at work, your response times to the self shape should be the fastest.

The SRE and Race

There is a possibility that the SRE also negatively influences our social categorisation of people. This study aims to investigate how response times and thus the processing speed, is affected by different racial markers. These racial markers were the names “Amahle”, “Fatima” and “Jessie” of the three “classmates” in the task.

I, __________________________, have read and understood what is written on this page, and by signing here, I acknowledge that I am aware of the true purpose of this research.

Participant’s signature: ____________________________________ Date: _____________

Researcher’s signature: ____________________________________ Date: _____________

For further information, feel free to contact the researcher, Nicole McIver: MCVNIC001@myuct.ac.za.

You can also contact my supervisor, Dr Progress Njomboro: progress.njomboro@uct.ac.za.

If you have any questions about your rights as a participant, please Ms Rosalind Adams: 021 650 3417 or rosalind.adams@uct.ac.za. Should you feel the need for emotional or mental support, feel free to contact the Student Wellness Centre at any time: 021 650 1017