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# Human altruistic tendencies vary with both the costliness of selfless acts and socioeconomic status

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Altruism toward strangers is considered a defining feature of humans. However, manifestation of this behaviour is contingent on the costliness of the selfless act. The extent of altruistic tendencies also varies cross-culturally, being more common in societies with higher levels of market integration. However, the existence of local variation in selfless behaviour within populations has received relatively little empirical attention. Using a 'lost letter' design, we dropped 300 letters (half of them stamped, half of them unstamped) in 15 residential suburbs of the greater Perth area that differ markedly in socioeconomic status. The number of returned letters was used as evidence of altruistic behaviour. Costliness was assessed by comparing return rates for stamped vs unstamped letters. We predicted that there is a positive association between suburb socioeconomic status and number of letters returned and that altruistic acts decrease in frequency when costs increase, even minimally. Both predictions were solidly supported and demonstrate that socioeconomic deprivation and elevated performance costs independently impinge on the universality of altruistic behaviour in humans.

1 **Human altruistic tendencies vary with both the costliness of selfless acts**  
2 **and socioeconomic status**

3

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21 **Abstract**

22 Altruism toward strangers is considered a defining feature of humans. However,  
23 manifestation of this behaviour is contingent on the costliness of the selfless act. The extent  
24 of altruistic tendencies also varies cross-culturally, being more common in societies with  
25 higher levels of market integration. However, the existence of local variation in selfless  
26 behaviour *within* populations has received relatively little empirical attention. Using a 'lost  
27 letter' design, we dropped 300 letters (half of them stamped, half of them unstamped) in 15  
28 residential suburbs of the greater Perth area that differ markedly in socioeconomic status.  
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30 assessed by comparing return rates for stamped vs unstamped letters. We predicted that  
31 there is a positive association between suburb socioeconomic status and number of letters  
32 returned and that altruistic acts decrease in frequency when costs increase, even  
33 minimally. Both predictions were solidly supported and demonstrate that socioeconomic  
34 deprivation and elevated performance costs independently impinge on the universality of  
35 altruistic behaviour in humans.

36 **Key words:** altruism; socioeconomic status; 'lost letter'

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## 43 1. Introduction

44 Prosocial sentiments, i.e. caring about the welfare of others, have emerged as hallmarks of  
45 humans (Gintis 2003; Henrich *et al.* 2004; Hill *et al.* 2009; Alvard 2012); but see (Burton-  
46 Chellew & West 2013). Altruism represents a special case of prosociality in which an actor

03

47 helps others at a personal cost. Altruism can even surface in large anonymous groups of

48 unrelated individuals in which canonical evolutionary approaches based on nepotistic

49 biases (Hamilton 1964), direct reciprocity (Trivers 1971) and indirect reciprocity

50 (reputation enhancement; Alexander 1987) can largely be ruled out as explanations.

04

51 Despite its ubiquity in human societies, the propensity for altruism is not invariant and is

52 expected to be superseded by selfish motives when acts of altruism are more costly, that is

53 when they entail larger sacrifices to one's own payoff (Fehr & Fischbacher 2003). This

54 argument has been substantiated through economic games such as the dictator game, e.g.

55 when the cost of relinquishing one monetary unit to the recipient increases, the dictator

56 donates less (Andreoni & Miller 2002). In a study using children it was shown that in a

57 costly sharing game (when delivering rewards to a recipient required personal sacrifice)

05

58 the likelihood of prosocial behaviour was lower than in a prosocial game (in which offering

59 a reward to a recipient had no inherent costs) (House *et al.* 2013). Stewart-Williams

60 (2007) used questionnaires about help exchanged with individuals of different relatedness

61 classes and found that with increasing costs of help, nonkin received a smaller share of the  
62 help given than kin.

63

64 Prosocial inclinations are also contingent on the social and ecological environment (Lamba  
65 & Mace 2011). House et al. (2013) demonstrated the emergence of population-specific  
66 variation in costly prosociality during middle childhood. A cross-cultural study of  
67 behaviour in ultimatum games showed that levels of prosociality increased with market  
68 integration and the reliance on cooperative partners from outside the immediate family  
69 (Henrich *et al.* 2005; Henrich *et al.* 2010). However, the existence of local variation in  
70 prosocial behaviour *within* such industrialized populations has received relatively little  
71 empirical attention.



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72 A simple but powerful way to quantify pure altruism toward strangers in a naturalistic  
73 setting (urban context) is through the lost letter experiment. This experiment involves  
74 dropping letters on the sidewalk and counting the number of letters that are picked up by  
75 passers-by and mailed to the addressee (Milgram *et al.* 1965). Previous applications of this  
76 methodology have found that letter return rates were correlated with perceived  
77 neighbourhood quality (Wilson *et al.* 2009) and objective neighbourhood wealth and  
78 socioeconomic status (Nettle *et al.* 2011; Holland *et al.* 2012; Silva & Mace 2014).

79 In the present study we aim to apply the lost letter technique to simultaneously disentangle  
80 the effects of both socioeconomic status and the inherent costs of executing a task on the  
81 prevalence of altruistic behaviour in an urban setting. We first predicted that spontaneous  
82 prosociality would be less prevalent in areas of low socioeconomic status because poorer

83 neighborhoods are characterized by low neighbourhood quality (Wilson *et al.* 2009), high  
84 crime rates (Sampson *et al.* 1997; Nettle *et al.* 2011), low social capital and trust (Sampson  
85 *et al.* 1997; Li *et al.* 2005; Nettle *et al.* 2011), and low rates of civic engagement (Li *et al.*  
86 2005). Hence letters dropped in socioeconomically poorer areas should have a lower  
87 likelihood of being returned. We also predicted that increased costs of returning the letter  
88 would decrease altruism (Fessler 2009). That is, among the returned letters there would be  
89 fewer unstamped letters; due to the additional financial expense required to post an  
90 unstamped letter, it can be implied that returning unstamped letters imposes a larger cost  
91 to the actor.

92

## 93 **2. Methods**

### 94 2.1 Data collection

95 A total of 300 letters (150 stamped and 150 unstamped) were dropped in 15 residential  
96 suburbs in the Perth Metropolitan area that differed in levels of socioeconomic  
97 deprivation/affluence (see following paragraph). Twenty letters, ten stamped and ten  
98 unstamped, were distributed face up on sidewalks of each suburb. Envelopes were  
99 addressed to one of the author's home address; no letters were dropped in the suburb that  
100 all the letters were addressed to. The addressee's name was chosen to be 'S. Roberts', as it  
101 was considered to be a gender-neutral name. A 'Western' name was chosen to remove  
102 potential ethnic biases (Ahmed 2010). There was no 'return to sender' address. The letters  
103 were all addressed in the same handwriting in the same standard white letter envelope.  
104 Since the letter was handwritten, it can be deduced that the letter did not contain official  
105 documents, utility bills or company letters. The content of the letter was a folded piece of

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106 A4 paper containing the name of the suburb the letter was dropped in and a note on  
107 whether it was stamped or unstamped. The content of the letter was indistinguishable from  
108 the outside.

109 All 300 letters were dropped in their respective suburbs on the same evening between  
110 17:00 and 19:00. The letters were dropped on a Saturday evening to ensure no postmen  
111 would pick up the letters, as they do not work until Monday morning. The letters were  
112 strategically dropped on a weekend that had no rain forecasted to avoid damage to the  
113 letters. The letters were dropped approximately 5 meters from a house driveway or front  
114 gate on the pedestrian walkway to ensure visibility. Letters were not dropped in front of  
115 any of the small businesses that exist in the residential suburbs, and construction sites  
116 were also avoided. This ensured the letters were returned by actual members of the area  
117 rather than short-term visitors. Letters were not dropped in sight of a post box or post  
118 office so as to ensure the effort the finder would have to go to was consistent across  
119 suburbs. There was only a maximum of one letter in each street to maximize the spread of  
120 the letters within the suburb, which reduced the likelihood of a participant coming across  
121 more than one letter and potentially alerting them to the nature of the experiment.

122 Ethics approval for the above project was granted in accordance with the requirements of  
123 the National Statement on Ethical Conduct in Human Research and the policies and  
124 procedures of The University of Western Australia (RA/4/1/7801).

125

## 126 2.2 Data analysis

127 Suburbs were classified according their economic status. The Socio-economic Indexes for  
128 Areas (SEIFA) was used to determine the socioeconomic status of the different suburbs in

129 which the letters were distributed. Specifically, the Index of Relative Socioeconomic  
130 Disadvantage (IRSD) was used which ranks areas on a scale from most disadvantaged to  
131 least disadvantaged. The index takes into account 16 different variables from the 2011  
132 census data, with each variable receiving a different weighting. Some of the more heavily  
133 weighted variables included the percentages of low-income houses, jobless parents,  
134 individuals living without internet and other variables including education level,  
135 occupation and average rent (Australian Bureau of Statistics 2009, 2014). These variables  
136 are combined to produce a decile ranking of deprivation for specific areas, on a scale of 1 to  
137 10 (henceforth termed *socioeconomic index*). A score of 1 for an area shows that the  
138 residents in that area are in the most disadvantaged 10% in the nation. There were  
139 numerous areas in each suburb, so the median rating of deprivation was taken from each  
140 suburb in our experiment (Appendix 1).

141 We first ran a Generalized Linear Mixed Model with binomial error structure and logit link  
142 function using the glmer function from the lme4 package (Bates *et al.* 2015) in R (R  
143 Development Core Team 2014) version 3.1.0. The response variable – letter returned vs.  
144 not returned – was binary. Fixed effects were socioeconomic status, and whether or not a  
145 letter was stamped or unstamped. We also included number of postboxes in a suburb as a  
146 control variable. Suburb was classified as a random effect and included in the statistical  
147 model. Next, using a likelihood ratio test, we compared a saturated model containing all  
148 fixed effects with a null model containing none of the fixed effects but the same random  
149 effect as the saturated model (Forstmeier & Schielzeth 2011). The interaction between  
150 stamped/unstamped and socioeconomic status was not significant and was therefore not

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151 retained in the final model. P-values for individual predictors were calculated based on  
152 Satterthwate's approximations using the lmerTest package (Kuznetsova *et al.* 2014).

153

### 154 3. Results

155 A total of 92 stamped and 46 unstamped letters were returned. A comparison of the full  
156 model to the null model showed that the set of predictors had a strong effect on whether a  
157 letter would be returned or not ( $\chi^2 = 45.373$ ,  $p = 7.71e-10$ ). An analysis of the individual  
158 predictors in the model showed that unstamped letters had a significantly lower chance of  
159 being returned (estimate = -0.320, SE = 0.054,  $p = 6.49e-09$ ) (Fig. 1). Socioeconomic index  
160 also had a significant effect on whether or not a letter was returned (estimate = 0.035, SE =  
161 0.011,  $p = 0.00167$ ) (Fig. 2). A confounding effect of density of postboxes could be ruled out  
162 (estimate = -0.002, SE = 0.012,  $p = 0.919$ ).

163

### 164 4. Discussion

165 A steady stream of recent research has undermined the original characterization of  
166 humans as *Homines economici* and has uncovered hitherto unrecognized variation in  
167 prosocial behaviour (Gintis 2003; Henrich *et al.* 2004; Hill *et al.* 2009; Alvard 2012). The  
168 present field experiment using lost letters demonstrating people's willingness to engage in  
169 truly altruistic acts conforms with this paradigm shift. However, our experimental  
170 approach has revealed that these altruistic tendencies vary strongly with both levels of  
171 neighborhood socioeconomic status and the costs involved in performing the altruistic act.

172 Cost of the act has rarely been investigated within the experimental paradigm. When there  
173 was the added cost of going to a post office and purchasing a stamp, a letter was roughly  
174 half as likely to be returned. This is in line with results from economic games (Isaac &  
175 Walker 1988; Andreoni & Miller 2002), questionnaire-based studies on helping behaviour  
176 (Stewart-Williams 2007) and two earlier implementations of the lost letter experiment  
177 (one of which was not couched in an evolutionary framework) (Simon 1971; Fessler 2009).  
178 The negative effect of low socioeconomic status on letter return rates is in agreement with  
179 most studies that utilized the lost letter technique to measure altruism.

180 The lower level of altruistic behaviour evident in poorer suburbs has been suggested to be  
181 a consequence of individual or neighborhood characteristics associated with  
182 socioeconomic deprivation (Holland *et al.* 2012). Individuals facing financial hardship, poor  
183 health and general life instability are likely to be preoccupied with achieving immediate  
184 needs, leaving less time and effort available to spend on benefiting a stranger (Lynam *et al.*  
185 2000; Holland *et al.* 2012). In contrast, resource-rich individuals are not likely to be  
186 affected by such time and financial constraints. Individuals residing in poorer  
187 neighborhoods are also less likely to be embedded in a socially cohesive and supportive  
188 network and are exposed to higher levels of crime, conditions that discourage the  
189 development of trust required for civic efforts and prosociality (Holland *et al.* 2012).

190 One mechanism by which altruistic behaviour to unrelated individuals can be explained is  
191 reputation enhancement (Nowak & Sigmund 2005). In our study, a number of the returned  
192 envelopes were annotated, detailing that the person had found and returned the letter on  
193 their own goodwill. In one instance, the mobile phone number of the finder was written on

194 the envelope. In addition, one letter was hand delivered to the addressee's house. These  
195 actions suggest that the actors desired recognition of their good deed, supporting the  
196 theory of reputation enhancement.

197 Despite the numerous measures taken to minimize any confounding factors whilst  
198 distributing the letters for this study, a few caveats can be identified. There is a possibility  
199 of non-residents of the selected suburbs having partaken in this experiment. These visitors  
200 may reside in suburbs of differing socioeconomic status to the one in which they chose to  
201 return or ignore a letter. We also found that whilst distributing the letters, some of the  
202 lower socioeconomic areas didn't have many footpaths compared to higher socioeconomic  
203 areas. Although all letters were dropped on footpaths, having more footpaths could amplify  
204 the chances of a letter getting picked up by a passer-by, as footpaths foster a more  
205 pedestrian-friendly environment. Lastly, having stamps readily available may also affect  
206 the decision to return an unstamped letter although it is impossible to control for this  
207 confound.

208 Overall, our findings show that a community's willingness to be altruistic decreases with  
209 increasing costs and social disadvantage. More broadly, this research shows that ecological  
210 variation within a given population can evoke divergent patterns of helping behaviour. In  
211 the context of business and industry, these results can aid charities and other crowd-  
212 funded organizations in directing their efforts to where they will likely receive the greatest  
213 return. Data such as the ones collected in this study provide a reflection of community  
214 attitudes and may therefore prove relevant to municipal government for policy  
215 development and intervention.

216

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298

## 299 **Appendix**

300 Summary data by suburb with total number of returned letters (10 stamped and 10  
 301 unstamped letters dropped per suburb), Socioeconomic Index, and number of postboxes.

Suburb	Socioeconomic Index	# Postboxes	# Letters Returned	
			Stamped	Unstamped
Medina	1	1	3	4

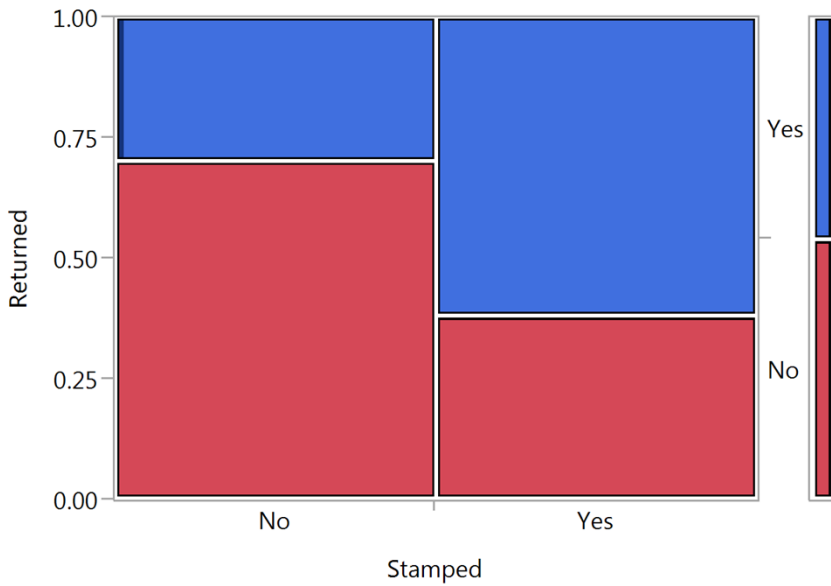
Kwinana	2	1	5	1
Hillman	3	0	7	3
Coolbellup	3	1	3	2
Warnbro	4	1	4	1
Rivervale	5	3	5	2
Willagee	5	1	5	3
Kallaroo	6	3	9	3
Madeley	7	1	7	2
Kingsley	8	3	4	5
Nedlands	9	10	8	3
Cottesloe	9	8	6	4
Dalkeith	10	5	10	3
City Beach	10	5	8	5
Peppermint Grove	10	0	8	4

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303

304 **Figure captions**

305 *Figure 1:* Mosaic plot illustrating the percentage of returned letters as a function of whether  
306 they were stamped (Yes) or unstamped (No).



307

308

309

310

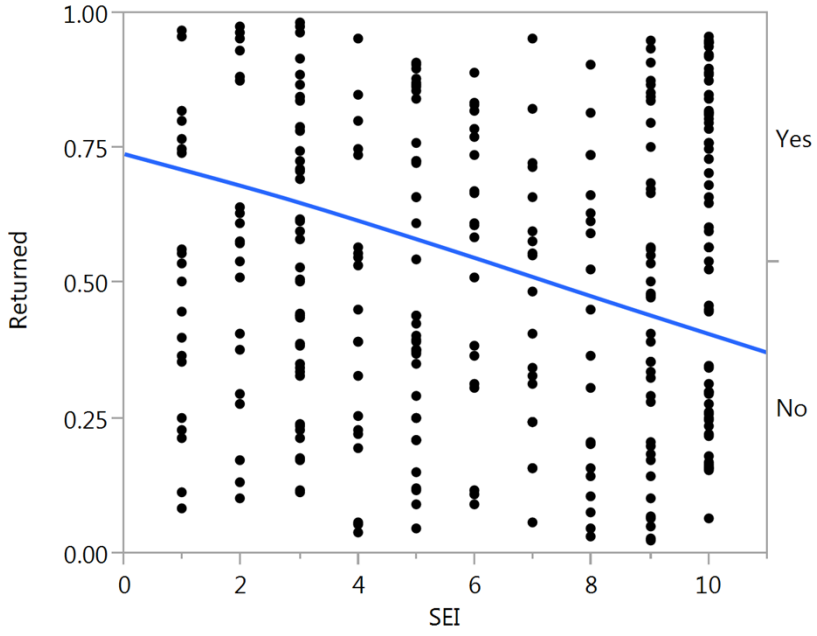
311

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314

315 *Figure 2: Visualization of the effect of socioeconomic index (SEI) on whether a letter was*  
316 *returned or not (dichotomous variable). Letters dropped in high (10) SEI suburbs were*  
317 *more likely to be returned.*



318

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# Human altruistic tendencies vary with both costliness of selfless acts and socioeconomic status

**01** Antonio Silva Page no. 3

18/8/2016 11:00

Rephrase to say there is some evidence there cross cultural variation

**02** Antonio Silva Page no. 3

18/8/2016 11:01

Rephrase to say there is some evidence of cross cultural variation, instead of stating that there is

**03** Antonio Silva Page no. 6

18/8/2016 11:02

Needs a reference and/or further explanation of why traditional evolutionary explanations don't suffice.

**04** Antonio Silva Page no. 6

18/8/2016 11:06

Replace with "levels of altruism varies"

**05** Antonio Silva Page no. 6

18/8/2016 11:07

The examples in this paragraph need to be incorporated into an coherent argument

**06** Antonio Silva Page no. 7

18/8/2016 11:08

(but see Wilson et al, 2009; Nettle et al. 2011; Holland et al. 2012; Silva & Mace 2014;2015).

**07** Antonio Silva Page no. 8

18/8/2016 11:09

Odd phrasing, can be removed

18/8/2016 11:11

Why not use the deprivation rating of the area where the letters were dropped instead?

18/8/2016 11:12

Very small p values should just be shown as  $p < 0.001$

18/8/2016 11:13

I wouldn't go as far as calling it a paradigm shift