City life and
cooperative behaviour
in humans

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Preface

I, Elena Zwirner, confirm that the work presented in this thesis is my own. Where information has been derived from other sources, I confirm that this has been indicated in the thesis.

Summary

Human cooperative tendency is extraordinary. Humans extensively cooperate with genetically unrelated individuals on an unprecedented scale. The focus of much previous research has been to explain how particular cooperative investments fit evolutionary theory; nevertheless new attention has been drawn to the remarkable variation in human cooperation depending on the environmental context. In particular, cities are frequently associated with reduced pro-social tendency. Fast-paced urbanisation is currently a major cause of demographic change, meaning that it is fundamental to understand how it affects human social behaviour. In this thesis, I present experimental evidence on the effects of city living on cooperation from standard economic games and from large-scale real-world measures. Chapter 3 describes the effects of urban residence on generosity in a dictator game and on two self-report measures of pro-social behaviours. City-living was not associated with self-reported reduction in generosity and did not predict reduced donations in the dictator game nor self-report scales. In Chapter 4, I used a trust game to test the idea that lower pro-sociality in cities may be underpinned by lower trust levels. I found that city-dwellers were less trusting than town-dwellers, but they were not less trustworthy. Finally, in Chapter 5 I present results from a set of real-world experiments. I tested whether city-dwellers were less pro-social than town-dwellers across four different forms of helping, and whether urban-rural variation in pro-sociality was explained by diffusion of responsibility or by perceived anonymity. I show that socio-economic factors, rather than urbanicity per se, play an important role in shaping cooperative tendency.

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Table of contents

List of tables

List of figures

Chapter 1

Introduction

1.1 Human cooperative behaviour

Cooperative behaviour can be thought of as an investment in which an individual pays a short-term cost while providing a benefit for another individual (Bshary & Bergmüller, 2008). The existence of costly help must be reconciled with the theory of evolution by natural selection with its emphasis on self-interest (Darwin, 1859). Thus, the problem facing evolutionary biologists is to explain how individuals that make short-term cooperative investments are rewarded in terms of lifetime fitness.

When cooperation is directed towards relatives, helping can result in passing shared genes to the next generation, that is the cooperative investment can be repaid through indirect fitness benefits (kin-selection; Hamilton, 1964a; b). However, humans extensively cooperate with non-relatives, as well as with strangers that are unlikely to ever meet again. Indeed, humans cooperative tendency spans from helping a stranger in distress, to donating money for people starving in other countries, or donating blood. This evidence challenges the idea of fitness maximising adaptations.

Trivers (1971) suggested that direct reciprocity could make cooperative behaviours between non-relatives beneficial. In particular, he argued that, when individuals are likely to interact repeatedly, cooperative behaviour can be stable if it is conditional on a future repayment. In other words, individuals help others to obtain their help in the future. Nevertheless, humans often cooperate even in one-shot encounters, where there is no

scope for direct reciprocity to occur (Fehr et al., 2002; Fehr & Henrich, 2003; Henrich et al., 2005). Under this scenario, indirect reciprocity can provide long-term benefits for cooperation (Alexander, 1987; Boyd & Richerson, 1989; Nowak & Sigmund, 1998; 2005). Indirect reciprocity implies that individuals build a reputation based on their cooperation tendencies with others. That is, individuals help others so that a third party (i.e. a bystander) is more likely to help them the future.

Even so, all these mechanisms do not explain cooperation with large groups of non-relatives in situations where reputation gains are unlikely or absent. Punishment (Boyd et al., 2003; Fehr & Gächter, 2000; 2002; Gintis, 2000; Henrich & Boyd, 2001) or social learning and cultural evolution (i.e. social norms; Whiting & Whiting, 1975; Whiting, 1980) may provide a solution to this problem (but see e.g. André & Morin, 2011 for a discussion on cultural altruism theories and shift of maladaptation from social cognition to cultural transmission). In particular, experimental evidence suggests that reciprocal cooperation is maintained with punishment (Bshary & Grutter, 2002; Raihani et al., 2010) and avoidance. For example, shunning through partner switching, in which individuals stop interacting with cheaters and choose a new interaction partner, is an effective mechanism of cooperation enforcement (Bshary & Schaffer, 2002; Melis & Semmann, 2010).

In humans, punishment is an effective and common mechanism to maintain cooperation (Boyd et al., 2003; Boyd & Richerson, 1992; Fehr & Gächter, 2000; Gächter et al., 2010; Gintis, 2000). Even third-party punishment can be seen in laboratory conditions (Fehr & Fishbacher, 2004; Fehr & Gächter, 2002). In third-party punishment, a bystander willingly pays a cost to punish an individual that is in violation of the cooperative norm, even though the uncooperative act does not affect its own pay-off. It is not clear what

benefit punishers gain in this instance, but it is likely that they are repaid through reputation enhancement (Earley, 2010; Jordan et al., 2016) and the future possibility to be chosen as interaction partner.

Indeed, the possibility to build a reputation based on previous interactions is fundamental to the evolution of human indirect reciprocity (Alexander, 1987), as well as in controlling the emergence of free-riders in group-level mutual cooperation (i.e. defectors in public goods scenario; Hardin, 1968). Experimental public goods games have shown that groups usually start with high levels of cooperation, but these are hard to maintain without the introduction of enforcement mechanisms such as punishment and reputation (e.g. Hardin, 1968; Ostrom et al., 1999; Fehr & Gächter, 2002; Gächter et al., 2010). Likewise, removing the possibility for social information exchange and gossip (necessary to pass information on reputation), leads to a drop in cooperation levels (Nowak & Sigmund, 2005; Semmann et al., 2004; Sommerfeld et al., 2007). Consequently, conditions that interfere with reputation building may hinder cooperation, and these conditions are more likely found with large and unstable groups.

Finally, it remains to consider cooperation towards strangers as a maladaptation (Boyd & Richerson, 2002; Fehr & Henrich, 2003). If humans sociality has evolved in small and stable groups, mainly formed of close relatives, and where interactions were never anonymous, then, individuals were likely to be rewarded for helping others via indirect fitness benefits (Hamilton, 1964a; b), reciprocity (Trivers, 1971), or reputation (Nowak & Sigmund, 1998). Nowadays then cooperation would be misplaced as we retain the psychological mechanisms but we no longer benefit from helping close group-members. Despite the logic of the argument, maladaptation is hardly accepted as an explanation, mainly because humans show the capacity to recognise when it is beneficial to invest in

an interaction, through kin-recognition, or by helping when observed or in repeated interactions (Fehr & Henrich, 2003; Gächter et al., 2008; Raihani & Bshary, 2015). Nevertheless, the argument, once again, raises the question of how humans adjust to new environmental conditions, especially those where groups are large, unstable, and anonymity, as well as the possibility of being exploited, are high. Such conditions are common features of today's cities.

1.2 Environment and cooperation

Changing environments present species with novel challenges and new selective pressures, which ultimately affect survival, reproduction and fitness. Accordingly, these changes can lead to behavioural modifications over time. Previous empirical research showed that variation in cooperation levels may depend on the environmental context (Bowles et al., 2003; Pepper & Nettle, 2017; Rand & Nowak, 2013; Silva & Mace, 2014). One major environmental change, for both speed and extension, is urbanisation. It is estimated that 54.7% of today's world population is lives in urban areas, compared to 33.8% in 1960, and with a projection up-to 65% by 2050 (UN DESA, 2015). Understanding the impact of these rapid demographic changes and of the new city-environment on our behaviour is of primary importance.

Cities may hinder cooperation levels via the anonymity that dwellers experience, or via the fast turnover and high homogeneity. These aspects could limit the possibility to create strong connections with other dwellers, for reciprocity and for reputation building, which are important aspects for the maintenance of cooperation in large groups (Alexander, 1987; Hardin, 1968; Fehr & Gächter, 2002). Moreover, cities are often associated with higher deprivation levels and crime rates than towns (Pateman, 2011). These factors promote distrust, antisocial behaviour, and unhealthy behaviours (Falk et

al., 2015; Gardner & West, 2004; Mobley et al., 2006; Schroeder & Hoffman, 2014).

The effects of deprivation on behaviour is explained by future discounting, for which individuals prefer present rewards to delayed ones because, in harsh and unpredictable environments, future rewards are less likely to be obtained (Frankenhuis et al., 2013; Frankenhuis et al., 2016; Pepper & Nettle, 2017). In particular, living in severe environments triggers a switch to a short life history strategy, leading to lower investments in the long-term in health, in reproductive strategy, as well as in investment in offspring (Frankenhuis et al., 2013). In cities, where deprivation and crime are often higher than in towns, pro-social behaviours may be lower.

1.2.1 Urbanisation and urbanicity

Urbanisation refers to the phenomenon of population growth living in cities, which leads to the development of urban areas. It is a rapid demographic transformation from rural world population that is rural to a predominantly urban one. Urbanicity, on the other hand, refers to the presence of conditions characteristic of urban areas, such as high population size and density, transportation networks, or pollution (UN DESA, 2015; Vlahov & Galea, 2002).

The United Nations' World Urbanization Prospects reported that 64.1% and 85.9% of the developing and developed world respectively will be urbanised by 2050 (UN DESA, 2015). This unprecedented shift of population to urban areas is forecast to intensify in the next few decades, creating cities of population sizes over 40 million people each. Indeed, today many urban agglomerates (e.g. Mumbai, Delhi, Manila, Seoul, Beijing) have already a population size of over 20 million people, with many others approaching the same sizes. Urbanisation is often linked to modernisation and industrialisation,

throughout human history. The major leap in technology in modern times, the Industrial Revolution in the late 18th century, created new jobs which lead to a flow of immigration to the urban areas, first in the north of England, then in Europe and North America. By 1900, 13% of the world's population had become urban. The leap to 50% in just over a century, is also based on science and technology advancements, specifically, improvements in medicine and prevention of diseases made city-living possible by lowering mortality.

The new scale and speed of urbanisation, though, is unprecedented. Nowadays, urbanisation mostly consists of poor people migrating to cities. It is believed that First World countries have mostly slowed down or arrested their urbanisation process, but in poorer countries, this migratory trend is set to continue (UN DESA, 2015). Nevertheless, this increase in migration in continents such as Asia and Africa might not translate into a rise of wellbeing. Today, over 90% of the urban population of rural countries such as Ethiopia and Uganda, live in slums.

1.2.1.1 The urban dilemma

Urbanisation is not always linked to wealth and wellbeing growth (Glaeser, 2011). Today's world population growth is concentrated in marginal urban and sub-urban contexts, especially slums. According to the UN-Habitat (https://unhabitat.org/), a third of urban dwellers is living below the poverty line, and a minimum of 90% of slum dwellers reside in the developing world. South Asia has the highest number of urban poor, followed by East Asia, Latin America and Sub-Saharan Africa. In Sub-Saharan Africa, almost 75% of urban dwellers currently live in slum conditions making urbanisation almost indistinguishable from slum growth (UN DESA, 2015). It is generally believed that uncontrolled rapid urbanisation is contributing to a rise in organised forms of urban

violence (Muggah, 2014). Urban and metropolitan authorities often attribute urban insecurity to the urban poor, and in particular to the failure of their integration.

There are concerns about urbanisation, urban poverty and urban violence (Beall et al., 2011; Farley, 1987; Muggah, 2014), especially on the scale and distribution of urban growth as well as the character of urban impoverishment and inequality. Beall et al. (2011) talk of a "fragile city" in which internal conflicts and violence are generally linked to failed policies directed to providing security, growth and welfare in urban areas. Nevertheless, there is growing understanding that the fragility of cities is not inevitable. Policies should address a number of issues that seem to increase fragility (Muggah, 2014), such as: unregulated urbanisation, extremes of inequality, social disorganisation, crime opportunity (Nazire et al., 2016; UN DESA, 2014; 2015). In particular, it is believed that in North America specific neighbourhoods within a city may offer more intrinsic opportunities for crime, and this is seen as a result of political neglect and local economic decay.

1.2.2 UK cities

UK cities are witnessing a population growth with a positive net immigration, as well as an increase in the proportion of younger adults without children, accompanied by a rising participation in higher education. This all seems to suggest a promising demographic prospect for urban areas, especially for the larger cities (Parkinson et al., 2006). Cities represent an important part of the UK in terms of population, economic power, and employment. The cities' contribution to the overall national growth in England has increased in recent years, and more cities contribute to the growth in jobs.

As for the downside of urbanisation, it is recognised that crime is generally higher in

cities. It also tends to be higher in larger cities than in smaller cities. Moreover, a geographical pattern as described higher crime rates in the north and west than in the south and east, although large variations between individual cities are present. Also, deprivation is more widespread in cities than in towns, however, conditions are improving in most cities, especially in some of the most deprived (Parkinson et al., 2006).

1.3 Urban-Rural variation in cooperation

There is a widespread view that city life is linked with lower cooperative tendency and weaker inter-personal social ties than life in more rural settings. Early theorists predicted that the probability of receiving help from a stranger would be inversely correlated with population size (Wirth, 1938; Milgram, 1974) and subsequent studies provided empirical support for these predictions (Korte, 1980; Amato, 1983; Steblay, 1987; Levine et al., 1994; 2008).

In his theoretical analysis of city life, Wirth (1938) describes behavioural consequences of living in large, dense settlement of heterogeneous individuals, as creating impersonal relations between strangers, as well as neighbours, friends, and family members. Indeed, in his paper, Wirth argues that larger population size and density of settlements lead to individual variability and anonymous relationships, diversification and specialisation, whereas high heterogeneity leads to weakening of social structures, higher mobility and rate of turnover, which in turn would create instability and insecurity. In this scenario, institutions are oriented towards taking care of the collective rather than individuals and individuals themselves tend to act through organised groups rather than alone. Thus, demographic factors linked to urbanicity would inescapably translate into lowered pro-sociality.

In contrast, Milgram (1974) looked at urban-rural differences in pro-social behaviour from a psychological perspective and suggested that city-dwellers interact less with others than town-dwellers as a response to the overwhelming environmental input and stimuli of the urban environment (psychological overload theory). This psychological overload occurs when the sensory inputs exceed the system's capacity of processing them or using them effectively (Fukukura et al., 2013; Milgram, 1974; Sweller, 1988) forcing it to prioritise some stimuli over others. For this, individuals might end up overlooking the possibility to act pro-socially. An early test of this theory demonstrated that after a high intensity sound and colour video, subjects had a significant increase in social alienation-personal disorganisation scores as well as in cognitive-intellectual impairment scores (Gottschalk et al., 1972). More recently, Misra & Stokols (2012) showed that higher levels of perceived overload were positively correlated to self-reports of higher stress rates and poorer health. According to Milgram (1974), city-dwellers are more susceptible to psychological overload due to the high stimuli of the city environment. Consequently, city-dwellers adapt their social behaviour to the urban environment and, in results, relationships between friends and family are unvaried, but contact between strangers is lowered if not absent.

For the subcultural theory (Fisher, 1975), on the other hand, city-dwellers have less contact with strangers than town-dwellers due to the higher heterogeneity and diversification of subcultures within cities. Fisher proposed that, in cities, it is easier for new behaviours to emerge and be adopted in different areas, and consequently strangers are likely to be divided by these subcultures. Moreover, in cities turnover of inhabitants is faster, and neighbours change more frequently than in towns (Bontje & Latten, 2005; Burgess, 2008). This leads to a situation in which neighbours as well are

often strangers, making it hard to create any ties. On the contrary, in small towns, newcomers are encountered more frequently and are quickly recognised. All of these factors may create an environment in which cooperative investments are discouraged in cities.

Despite this theoretical support for the view that city-dwellers are less cooperative than town-dwellers, Gans (1962; 1967) proposed a model which actually predicted that city-life has no impact on social behaviour. According to his idea, social interactions are shaped and influenced by sociological factors characteristic to the individual, such as age, socio-economic status, or ethnicity. These factors are independent of the external environment and urbanicity levels. Moreover, Gans (1962) argues that factors such as overload, population size and density, have no direct influence on individuals' social behaviour. According to this model, there is no reason for expecting urban-rural differences in social behaviour unless urban and rural populations have inherent differences in social traits (e.g. if the urban population were mainly working class and the rural mainly middle class).

Following the theoretical models of urban social behaviour, empirical studies mainly provided support for the view that city-life is deleterious for cooperation (Korte, 1978; Steblay, 1987 for reviews). The strongest evidence of urban-rural differences in pro-social behaviour is found in interactions between strangers. Individuals are less trusting, helpful, and generally open to an exchange with unacquainted others. City-dwellers are less likely to help others in a variety of contexts. For example, they are less likely to complete and return postal surveys and interviews (Couper & Groves, 1996; House & Wolf, 1978), to return a 'lost letter' (Kammann et al., 1979), to let a stranger use the phone (Levine et al., 1976), less helpful when answering a 'wrong number call'

(Kammann et al., 1979; Korte & Kerr, 1975; Milgram, 1974) or doing small favours (Rushton, 1978). Moreover, in cities, clerks are found to be less likely to correct accidental overpayments in shops (Korte & Kerr, 1975), and bank clerks are more likely to double-check the amount of money given by customers (Lowin et al., 1971). Finally, Takooshian et al. (1977) also found that city-dwellers are less helpful in assisting a lost child.

Nevertheless, these many empirical examples of differences between urban and rural social behaviour are not uncontested. Indeed, few other studies have failed to replicate these findings and to find a link between urbanicity and pro-sociality (e.g. Forbes & Gromoll, 1971; Korte et al., 1975). Moreover, some studies even suggested that city-dwellers are in fact more helpful than town-dwellers in some contexts. For example, Hansson & Slade (1977) using a lost letter experiment found that, when the letters were addressed to a deviant identity (i.e. "Friends of the Communist Party"), return rates were higher in urban versus rural environments (Hansson & Slade, 1977).

Taken together, results from a considerable number of experimental studies on urban-rural variation in cooperative behaviour are suggestive that there is a decline in pro-social tendency towards strangers with the increase in urbanicity levels. Nevertheless, there is not and univocal consent. Moreover, more recent studies argued against this idea by showing that human cooperative tendency can vary widely, even within a single city (Nettle et al., 2011; Francey & Bergmuller, 2012). For example, Nettle et al. (2011) found that, within a single city in the UK, socio-economic deprivation was negatively associated with the tendency to cooperate in more anonymous situations (i.e. posting lost letters, completing a survey, donating to a charity), whereas they found no effect of deprivation in face-to-face interactions such as giving directions or making change. This

would suggest that cooperation is lower in situations susceptible to the 'bystander effect' (Darley & Latane, 1968).

The 'bystander effect' (Darley, 1967; Latane & Darley, 1970) refers to the phenomenon for which individuals refrain from helping someone in distress if other people are present on the scene, and for which the likelihood of helping decreases with the increase in the number of onlookers. Latane and Darley (1970) ascribed the bystander effect to the perceived diffusion of responsibility (i.e. onlookers are less likely to intervene if there other possible helpers) and to social influence, that takes place when individuals in groups monitor the behaviour of other group members to determine how to act. Interestingly, Plötner and colleagues (2015) found that also 5-year-old children helped significantly more when alone compared to when other children (bystanders) were present. In addition, they showed that children's likelihood to help was not reduced when the bystanders were present but unable to help (i.e. behind a barrier). Thus, with their study, they successfully showed not only that the bystander effect is present in children, but also that it is due not to social influence but, rather, to a perceived diffusion of responsibility (Plötner et al., 2015). A simple way to overcome the diffusion of responsibility would be to directly ask for help to a single individual in the group, which indeed grants higher help rates than indirect help requests (e.g. Flynn & Lake, 2008; Goldman et al., 1983). Overall, if cooperation is lower in situations susceptible to the bystander effect, it is possible that in cities – where the number of onlookers is often higher than in towns – levels of cooperation are lower. Conversely, in situations where an individual is directly approached for help, city-dwellers should be as likely as town-dwellers to cooperate.

Finally, in highly populated cities where the turnover of inhabitants is fast (Wirth, 1938;

Milgram, 1974; Burgess, 2008), the day-to-day interactions that are more likely to take place are one-shot interactions with strangers. Such a context leaves little scope for reciprocity and for reputation gain associated with helping, as well as punishment of antisocial behaviour (Milgram, 1974; Turner et al., 1987; Zimbardo, 1969). These are major factors in promoting cooperation between unrelated individuals (Boyd & Richerson, 1992; Melis & Semmann, 2010; West et al., 2007). This absence of known observers (i.e. anonymity) found in cities may be a key-factor underpinning any variance in cooperation levels. On one hand, Kerr (1999) argues that anonymity per se has little impact on cooperation, but it assumes its negative aspect when the possibility of reputation building and punishment is present. On the other hand, anonymity arises when there is a lack of perceived personal value or when individuals are not personally identified by others, and this state could lead to antisocial and aggressive behaviour (Ellison et al., 1995; Reicher, 1984; Zimbardo, 1969). According to this anonymity theory, in cities cooperation levels should be higher when individuals are in a group of acquaintances rather than alone.

Overall, this evidence, suggests that variation in cooperative tendency may be context specific, with some situations promoting cooperation and others hindering it – rather than suggesting an underlying behavioural disposition of city-dwellers. Identifying the contexts that foster cooperation and understanding how specific features of city-life may undermine cooperation can generate insight into our understanding of the extensive variability of human cooperation.

1.4 Aims

Theoretical and experimental studies suggest reduced cooperation levels in cities compared to towns. Nevertheless, the mechanisms by which the environment impacts

on the sociality of individuals are poorly understood. With this project, I aimed at empirically test theories for the reduction in cooperation of city-dwellers, and to investigate the mechanisms underpinning variation in human cooperation. My key questions were:

1) Do urban-rural differences in cooperative tendency exist and, if so, are these differences consistent across different contexts and forms of helping?

2) Can urban-rural variation be explained by:

    i.   Variation in trust levels?

    ii.   Psychological overload and/or pace-of-life?

    iii.   Bystander effect?

    iv.   Perceived anonymity?

1.5 Thesis outline

I begin describing the experimental and statistical methods used throughout the thesis in Chapter 2. I move on to the first two experimental chapters of this thesis, in which I present the results from the laboratory experiments: Chapter 3 explores the effects of city-living on generosity in a dictator game and in self-report measures of cooperation, and Chapter 4 tests the effects of city-living on trust and trustworthiness. In Chapter 5, I present the results from large-scale field experiments: here I used four real-world help measures to test the effects of city-living on helping and to determine what features of city-life affect cooperative behaviour. Finally, in Chapter 6 I synthesise the findings of the thesis and discuss its implications for human cooperation research and policy-making, and I also suggest possible approaches for future research.

Chapter 2

Methodology

2.1 Introduction

To investigate the effects of urbanicity on cooperation, I used a dual approach of laboratory and real-world experiments. This was aimed at providing a comprehensive insight into cooperative behaviour (Levitt & List, 2007). This chapter explains the different methods utilised to best answer the specific questions, starting with the laboratory experiments and proceeding with the field experiments.

2.2 Laboratory experiments

I used two standard economic games to analyse variation in cooperative behaviour across urban scales. Participants were recruited using the online crowdsourcing platform, Amazon Mechanical Turk (http://www.mturk.com; hereafter, AMT). Below I briefly introduce what economic games are and describe the structure of the two games, followed by a brief description and justification of online data collection methods.

2.2.1 Economic games

Economic games are contexts created in game theory to study decision making and behaviour. They were introduced by Neumann & Morgenstern (1944) to analyse situations in which two or more individuals make decisions that will influence their and other individuals' benefit. Since then, economic games have found applicability in many fields, mainly economics, politics, psychology, and biology (Hammerstein & Hagen, 2005). In biology, economic games are commonly adopted to investigate human

cooperation and have been used to demonstrate how human choices can deviate from rational decision making – individuals are willing to incur costs to themselves to benefit others instead of taking the choice which maximally benefits themselves (the payoff-maximising choice).

However, can these results be extrapolated to the real-world? Levitt & List (2007) argue that the laboratory setting is characterized by particularities extraneous to the field, such as the type of scrutiny or the self-selection of participants, who are assigned roles and tasks exogenously, and that these peculiarities might compromise generalizability (see also Gneezy et al., 2004; Hoffman et al., 1994). Moreover, the games played in laboratory experiments are arguably reflective of real life situations (Levitt & List, 2007; Raihani & Bshary, 2015). Nonetheless, these concerns have been addressed and a growing number of studies validate the external validity of results in economic games (Baran et al., 2010; Benz & Meier, 2008; Franzen & Pointner, 2012; Peysakhovich et al., 2014; Stoop, 2014). In particular, Peysakhovich et al. (2014) found a strong positive correlation between decisions in economic games, real-world help measures, and self-report measures of cooperation among thousands individuals, providing considerable support of the domain generality of human decision making in cooperative situations. Consequently, I considered the use of economic games an appropriate method to address my questions. Specifically, I used a dictator game and a trust game.

2.2.1.1 Dictator game

The dictator game (Kahneman et al., 1986) is a two-player game in which one participant plays the 'dictator' role and is endowed with a sum of money which they can choose to distribute between themselves and a second participant (the 'receiver'). The receiver has no active role in the game. This game is designed to assess how

individuals respond to situations in which self-interest and equality are opposed. Despite the fact that keeping all the money is the payoff-maximising strategy in this game, many participants send some of the endowment to the receiver. A recent meta-analysis of over 100 dictator games showed that dictators on average donate 43% of their endowment (Engel, 2011). Of all the participants, Engel found that only 36% kept all endowment, 16% split the endowment equally, and approximately 5% sent it all to the other player.

The meta-analysis, reproduced and confirmed more recently by Zhang & Ortman (2012; 2014), also show high variation in decisions made by dictators, which documents how demographics like age, gender, or country of residence shape behaviour in this game (Engel, 2011). In particular, age has a strong effect on donations. Young people tend to give less, whereas middle-aged people tend to split the endowment equally, and elderly individuals tend to give everything. Also, gender affects donations, with females giving significantly more than males. Based on this, I collected and included the demographic information of workers in the analysis, in order to control for their effect on donation.

2.2.1.2. Trust game

The trust game (Berg et al., 1995) is a two-player game used to measure trust and trustworthiness. An investor is endowed with a sum of money and can choose to keep the endowment or to trust the other player (the 'trustee'). If the investor chooses to trust, the money sent is increased (often tripled) by the experimenter. The trustee then decides whether to keep the money entrusted to him or to send any amount of it back to the investor. This situation creates a social dilemma in which trustees would profit from acting selfishly (i.e. keeping all the money entrusted to them), but if investors also choose selfishness over cooperation, then both parties have a lower payoff. Based on the standard assumption of self-interest, the prediction is that investors keep all of the

money without incurring the risk of entrusting it to the other player, while trustees also keep all the money eventually entrusted to them. Nevertheless, studies consistently record willingness to trust on the part of the investor by sending part of their endowment and willingness to return money entrusted to them on the part of the trustees (Johnson & Mislin, 2011). On average investors sent 50% of their endowment, whereas trustees sent back 35% of the amount received.

Similarly to the dictator game, variation is high in both trust and trustworthiness measures among studies in the trust game (Buchan et al., 2000; Johnson & Mislin, 2011). Results on the effects of age and gender in the trust game are discordant. Student participants, which on average are younger than the random adult sample, are found to be less trusting and trustworthy in some studies (Bellemare & Kröger, 2003; Fehr et al., 2003), but not in others (Fehr & List, 2004). There is little support for gender effects on trust (Chaudhuri & Gangadharan, 2003), however females are generally more trustworthy than males (Bonein & Serra, 2009; Chaudhuri & Sbai, 2011; Croson & Buchan, 1999). Therefore, I collected and included demographic information of workers playing the trust game in the analysis, in order to control their effect on responses.

2.2.2. Online labour markets

Online labour markets, such as AMT, connect employers with potential workers who are paid to complete a short task on the computer. When conducting behavioural experiments on online labour markets, the experimenter acts as the employer and hires workers to be the participants in the experiment.

The principal advantages of online labour markets are that they allow researchers to recruit many participants quickly and relatively cheaply without affecting data quality

(Amir & Rand, 2012; Buhrmester et al., 2011; Ipeirotis, 2010; Mason & Suri, 2011; Paolacci & Chandler, 2014), and they also allow access to a more demographically diverse subject base than the traditional western undergraduate subject pool that is often used in behavioural experiments (Buhrmester et al., 2011; Mason & Suri, 2011). The AMT sample has a good representativeness of demographic: it is older than the average student sample but younger than the average adult sample (Berinsky et al., 2012); there are significantly more females than males, although this trend is not limited to the AMT sample but is also found in traditional and other web-based samples (Gosling et al., 2004; Paolacci et al., 2010); and education level and racial composition is similar to other adult samples (Berinsky et al., 2012).

On the AMT platform, workers can browse a list of human intelligence tasks (HITs) and choose whether to participate or not. In behavioural experiments, workers usually receive a show-up fee for participating in the experiment and an additional payment based on decisions made during the experiment. As economic games are often based on interactions between participants, payoffs may also depend on the other participant's decisions. Nonetheless, participants do not need to be simultaneously present and to have a real interaction. For experiments that do not require scaffolding of interactions, it is common practice to use 'ex-post matching' of workers (Rand, 2012): after they have all completed the task, workers are matched and payoffs are calculated *a posteriori*.

Despite its popularity, issues concerning the reliability of AMT for behavioural studies exist. Non-naïveté of participants and repeated participation are common concerns (Chandler et al., 2013; Chandler et al., 2015; Rand, 2012). Non-naïveté seems particularly relevant to studies conducted on AMT, as its workers have discussion boards and communities where they can share information about HITs, as well as information

about requesters. Moreover, workers can show preferences towards specific requesters, which could lead to an over-representation of these workers. Both non-naïveté and repeated participation may lead to an undesirable knowledge of the structure and purpose of the experiment which has the potential to influence responses (Edlund et al., 2009; Chandler et al., 2014). Fortunately, repeated participation is safeguarded by the structure of AMT. Workers are identified by a unique 14-digit code (Worker ID) which is used to prevent workers from submitting the same HIT multiple times. As for non-naïveté, Chandler et al. (2014) showed that cross-talking may not be a strong issue as workers tend to share information about the speed of payments mainly and only rarely or inadvertently share information about specific passages of tasks. Furthermore, the remarkable consistency of behavioural choices across tasks and especially over time found by Peysakhovich et al. (2014) challenges the idea that non-naïveté affects responses.

Honesty of workers when reporting demographics has also been questioned (Suri et al., 2011). Nevertheless, Rand (2012) used information gathered with workers' Internet Protocol addresses and compared it with self-reported demographics to test their truthfulness, and found reliability on self-report measures. Moreover, he found consistency over time of reported demographics of the same workers. Other concerns with AMT for behavioural studies focus on the situation in which workers complete the tasks. As they are not in a controlled environment, it is possible that they are distracted by other things happening in their surroundings, they might be working at the task with someone else, they might be occupied in other things while working on AMT and not be paying close attention to the task, and they could leave in the middle of the task (Crump et al., 2013; Germine et al., 2012). A simple solution to control for most of these factors is to include questions check granting the continuation of the tasks. Requiring workers to

answer questions about the task they are about to start can help in preventing them to complete the task when not fully present to it (Rand, 2012). Besides, reassurance concerning the reliability of AMT for behavioural studies comes from the direct replication of experiments in both the laboratory and on AMT (e.g. Horton et al., 2011; Fagerlin et al., 2007; Suri & Watts, 2011; Peysakhovich et al., 2014).

Based on this knowledge and following the general guidelines given by Mason & Suri (2012), I used AMT to conduct the dictator game and the trust game. In particular, workers interested in the HIT were given general instruction on the AMT platform where they could find a password and a link to the game. I designed the experimental setup on the web-based survey tool Opinio (https://opinio.ucl.ac.uk) and this included: 1) a password request to access the game; 2) detailed instructions of the game; 3) two comprehension questions to which workers had to answer correctly to have access to the game; 4) an exit password at the end of the game that workers had to enter in the AMT platform to be warranted the payment. This was done to ensure the completion of the task by workers.

2.3 Field Experiments

All field experiments were conducted in cities and towns of the mainland United Kingdom (hereafter UK), over July-September 2014, May-October 2015, and May-July 2016. In this section I briefly introduce the situation in urban and rural UK, I proceed with presenting the study sites and their selection criteria, and I conclude explaining the procedures used for the field experiments.

2.3.1 Study sites

The UK population was estimated at 64.6 million in 2014, an increase of almost half a

million people from 2013 and its highest value until then (Humby, 2016). Annual growth rates between the 1990s and the 2000s increased from 0.28% to 0.64%. Looking in more detail, population size, growth rates, and population density varied between countries within the UK. Specifically, population density ranged from 69 people per square kilometre in Scotland compared to 417 people per square kilometre in England (Table 2.1). The population density of London alone was found to be more than 10 times that of any other country (5,432 people per square kilometre; Humby, 2016).

Table 2.1: Regional variation in demographic variables. Population size and density from 2014, growth rate from 2004 to 2014. Modified from Humby, 2016. Source: Office for National Statistic.

Region	Population 2014 (millions)	Population density 2014	Growth Rate (%) 2004-2014
UK	64.6	266	0.75
England	54.3	417	0.79
Scotland	5.3	69	0.51
Wales	3.1	149	0.45
Northen Irland	1.8	136	0.71

Despite the predominantly rural geography of the UK, at least 60% of the population lives in urban areas (Pateman, 2011). Urban-rural differences in the UK are found in a variety of sectors, such as job density, deprivation, crime rates, and health (Pateman, 2011; Prothero, 2016). For example, although there is no urban-rural difference in the overall job density (based on how many vacancies are present divided per number of residents of working age), urban areas seem to have more local authorities within with the lowest (as well as highest) job density. Total weekly earnings are generally higher in

most rural areas and rural areas are less likely to be deprived (Pateman, 2011). Crime is substantially higher in cities, which could be the result of the urban-rural differences in income, population density, as well as of transportation and housing.

Aware of these urban-rural differences, I carefully selected the areas within cities and towns to carry out my experiments. Firstly, I defined cities as settlements of 100,000 inhabitants and over and towns as settlements of 20,000 inhabitants or less. This choice was based on the literature of cooperation in urban/rural environments. For example, Amato (1983) conducted experiments in 55 settlements in Australia and found a drop in cooperation levels over the threshold of 20,000 inhabitants. This limit of 20,000 is the lowest in the literature, consequently, I chose it for selecting towns in order to elicit and detect variation in pro-social attitudes between cities and towns. Then I created a pre-sample list of the 24 most populated cities in the UK (excluding London), ranked them for population density, and selected the top six and bottom six. Towns were also chosen on the basis of population size and density in the same manner. Moreover, their distance from the cities selected was recorded to control for the effects of rural isolation on local urbanism (Amato 1983). All information was obtained from the 2011 census data (available at: www.ons.gov.uk). In this manner, I selected with 12 cities and 12 towns. The mean population size (± se) of cities was 481,566.8 (± 63,918.3), whereas for towns it was 14,966.5 (± 1,000.6). London was deliberately excluded from the study to avoid incurring in different behavioural patterns from other cities which would have been incomparable as London would represent the only global city (i.e. node of the global economic system; Sassen, 2001) in the UK.

All experiments were conducted in small areas (neighbourhoods) within cities and towns to allow a focused control of demographic variables. Thus, supplementary data were

collected on other aspects of urbanism at the neighbourhood level. Neighbourhoods are represented in the neighbourhood statistics as Lower Super Output Areas (LSOAs), which are the smallest areas for which census data are available. For each city, I selected two neighbourhoods, one high-wealth and one low-wealth. To define wealth I used the Index of Multiple Deprivation (IMD). Deprivation is a multi-dimensional concept that includes a range of domains such as employment, health, education, services or crime (Townsend, 1987; Venkatapuram & Marmot, 2009). Likewise, the IMD is a complex index consisting of multiple factors affecting deprivation of an area, to each of which is given a percentage weighted value to the index. The principal factors of the index are income and employment (Payne & Abel, 2012), which together count for approximately 50% of the total weight on the IMD score (see section 2.3.1.1). Here, high-wealth neighbourhoods were defined as having an IMD score in the upper quartile, while low-wealth neighbourhoods had an IMD score in the lower quartile. Towns did not have a comparable range of wealth within, thus it was not possible to choose a high- and low-wealth neighbourhood in the same town. Towns were consequently selected on the basis of their general IMD score, and then a neighbourhood was chosen within the same upper or lower quartile scheme used for the selection of the neighbourhoods of cities. In total, 36 neighbourhoods were selected, 18 of which were categorised as 'high-wealth' and 18 as 'low-wealth'. Twenty-four of these neighbourhoods were in cities and 12 in towns. In addition, one experiment (i.e. the charity collection) was conducted in the centre of each city and town. The same information on LSOA and IMD was gathered and used in the analyses.

2.3.1.1 LSOAs and IMD in England, Wales and Scotland

National statistics within the UK use different approaches to the neighbourhood statistic, thus a note of caution is required. In 2004 England and Wales released their national

statistics of LSOAs, designed to improve the reporting of small area statistics. In the same year, Scotland released statistics for Data Zones (DZs), the equivalent of LSOAs (available at: http://statistics.gov.scot/). DZs in Scotland have a smaller population size than their LSOA counterparts in England and Wales. In particular, DZs have a minimum population of 500 residents and a maximum of 1000, whereas LSOAs have a minimum population size of 1000 and a maximum of 3000 residents.

Moreover, England, Scotland, and Wales have each developed their own IMD (Payne & Abel, 2012). Although the method used to develop the indices is similar (Noble et al., 2006), the domains used, as well as the weight of each of these domains on the total IMD, vary between countries (Table 2.2). However, income and employment are two domains common to all national indices. Both are the heaviest weighted domains on the indices and the weight is similar between countries (i.e. 45% in England, 56% in Scotland, 47% in Wales). Moreover, removing the other domains from the IMD score leaving only income and employment has been shown to have minimal effect on the overall deprivation ranking (Adams & White, 2006). Finally, Payne & Abel (2012) showed minimal differences between the English, Welsh and Scottish indices using an adjusted IMD with national income and employment domains.

With this in mind, I selected two adjacent Scottish DZs with similar neighbourhood statistics (i.e. in the same IMD decile) to create an area of population size comparable with LSOAs. If the ranking for income and employment differed between the two DZs, I calculated and used the mean of their ranking value to extrapolate the decile in which to categorize the new area. I used separate values of income and of employment deciles or the national IMD decile in separate analyses to control if the two approaches held to different results. All neighbourhood statistics used in the final analyses was based on the

2015 census data.

Table 2.2: Domains and domain weights for the 2010 national IMD of England, Scotland, and Wales. Modified from Humby, 2016. Source: Office for National Statistic.

Domain	Weight England	Scotland	Wales
Income	22.5%	28.0%	23.5%
Employment	22.5%	28.0%	23.5%
Health	13.5%	14.0%	14.0%
Education	13.5%	14.0%	14.0%
Access to services	9.3%	9.0%	10.0%
Housing	9.3%	2.0%	5.0%
Physical environment	0.0%	0.0%	5.0%
Crime	9.3%	5.0%	5.0%

2.3.2 Experimental Help Measures

I used four help measures to examine cooperative tendency across urban scales: making a donation to a charity, picking up a dropped item, stopping for a jaywalker, and posting a lost letter. These measures are common in field studies of cooperation (e.g. Amato, 1983; Levine et al., 1994; Milgram et al., 1965; Pearce & Amato, 1980; Silva & Mace, 2014). In addition, I conducted direct observations to control for additional community-level variables not captured by LSOAs census data.

Charity collections required two experimenters; I was always in charge of the collection, whereas a second experimenter was present to record information on the subjects. For the dropped item and jaywalking measures only I conducted the experiments. In one neighbourhood only, the lost letter experiment was conducted by a second investigator, whereas two investigators helped me to conduct the direct observations.

2.3.3 Procedures

2.3.3.1 Charity donation experiment

The charity collections were conducted once in n = 10 cities and in n = 9 towns in their respective central area, between July – September 2014, May – October 2015, May – July 2016. The charity chosen for this experiment was Doctors without Borders (www.doctorswithoutborders.org/), an international charity that aims to bring medical and humanitarian aid to populations affected by conflicts, epidemics, and natural disasters. It was carefully chosen for not having any racial, religious, or political affiliation, and for being international and not linked to any aspect more typical of either cities or towns. Permission was granted by the charity and all money collected was deposited in the London branch of Doctors without Borders.

Charity collections took place in cities and towns centres, during weekday mornings, between 09:00 and 13:00. During charity collections, I stood on the pavement with a branded T-shirt and branded hand-held collection bucket. Every third suitable pedestrian (i.e. over 18 and with no impediment to movement, such as disabilities, bags, old age) was selected as a subject.

I conducted three experimental treatments to measure variation in tendency to donate to the charity:

1) Direct request: subjects were approached when reaching a 3 metres distance, presented with the collection bucket and asked if they wish to contribute with a donation to the charity saying: "Hello, would you like to make a donation for Doctors without Borders?".

2) Indirect request: I smiled and made eye-contact with the selected subject while

holding the collection bucket in sight, but never directly asked for a donation.

3) General request: I stood smiling silently on the sidewalk without approaching or making eye contact to any potential subject. Every 30 seconds I would shake the collection bucket and ask for donations saying: "Please, make a donation for Doctor without Borders" without looking at anyone in the crowd.

I switched conditions every 15 minutes during the time of collection, with a maximum total of four 15 minutes blocks for each of the three treatments per location. The second experimenter stood at a minimum distance of 10 metres away from me and recorded the number of people passing in front of me (using a clicker), the gender of the subject, his/her estimated age, whether he/she contributed with a donation or not, if the subject was alone or not, and the gender of whom he/she was with. For the general request treatment, subjects were considered to be the individuals that contributed with a donation.

2.3.3.2 Dropped item experiment

This experiment was conducted in 36 neighbourhoods, both in the central and in the residential area of each neighbourhood, between July – September 2014 and May – October 2015. The procedure began with me walking with a handful of 20 cards on the pavement. A pedestrian passing on the same side of the street was selected to be a subject if they appeared to be 18 years or older, was not carrying bags, and had no physical handicap. When the subject was approximately 5 metres away, I dropped the cards onto the pavement, bent down, and began picking them up one at a time.

I conducted two experimental treatments to measure variation in tendency to help pick up the dropped items:

1) Direct request: after dropping the cards, I bent down to retrieve the cards and also looked at the subject and asked: "Could you help me, please?".

2) Indirect request: after dropping the cards, I bent down to retrieve the cards and looked at the subject, but never directly asked for help.

After picking up the envelopes, I recorded gender and estimated age of the subject, whether he/she stopped to pick up any cards, if the subject was alone, and the gender of whom he/she was with.

2.3.3.3 Lost letter experiment

Stamped letters addressed by hand to a PO box address were dropped in the 36 neighbourhoods between July – September 2014 and May – October 2015. The addressee's name was made neutral by including only the initial of the name (Holland et al., 2012), which consequently could have been male or female (i.e. E. Zwirner). To test the effect of a direct versus indirect help request, half of the letters were dropped on the pavement with the address facing up on rain and wind free mornings, whereas the others were left on cars' windscreens with a post-it saying: "Could you post this for me please? Thank you".

The letter drop points in the neighbourhood were randomly determined using Google Maps (www.google.com/maps) and were never on the same street or where a post-box was visible. I used the return rates of the letters from the two treatments to measure the neighbourhood levels of cooperation.

The number of post-boxes in the neighbourhood was counted using data from Somerville (http://dracos.co.uk/made/nearest-postbox/) and Local Postbox (www.localpostbox.co.uk/) and controlled for in the analysis because the number of letters posted is likely to be higher in neighbourhoods with more post-boxes. I also

controlled for the possibility that litter in the environment may be responsible for a lower return rate (letters may be overlooked as litter) by conducting a minimum of four transects per each neighbourhood (mean ± sd = 5.11 ± 0.71). Transects were 100 metres long. I recorded the number of visible litter and used the mean number of litter pieces per neighbourhood as control variable in the analysis.

2.3.3.4 Jaywalking experiment

This experiment was conducted in 26 neighbourhoods, both in the central and in the residential area of each neighbourhood, between July – September 2014. The procedure began with me standing on the sidewalk. An approaching car was selected if its speed seemed inside the speed limits and if no other car behind it was present. When the selected car was approximately 10 meters away, I started to cross the road. If the car slowed down/stopped I continued to cross the road, if it did not, I stepped back on the sidewalk. After the attempt to cross the road, I recorded whether the car stopped to let me cross the road, whether the driver was alone, and their gender and estimated age.

2.3.3.5 Direct observations

For the psychological overload hypothesis (Milgram, 1974) urban-rural variation in pro-social tendency is primarily underpinned by the excessive levels of social and environmental stimuli present in cities but not in towns. Therefore, other measures not captured in the neighbourhood statistics were collected at each testing site for control. Direct observations were carried out between July – September 2014 and between May – November 2015. Particularly, in each neighbourhood, I conducted eight sample intervals of 15 minutes on weekdays as follows: 8:30-9:00 and 13:00-13:30 on main roads; 10:30-11:00 and 17:00-17:30 on residential roads. I used both main and

residential roads to control for the possibility that individuals are more often walking alone in residential roads rather than in central roads.

During these observations, the sampling included the following information:

i) the number of people observed,

ii) their gender,

iii) their estimated age,

iv) whether they were in groups and the number of people per social group (i.e. individuals walking together),

v) walking speed (seconds/metre) by marking a 10 metres zone on the sidewalk,

vi) number of cars passing a pre-established line on the street.

2.4 Statistical analyses

Data were analysed using R version 3.1.2 (R Core Team, 2015). As a general rule, I used a model averaging approach (as described in Grueber et al., 2011), in which multiple models representing multiple hypotheses are examined and ranked. Therefore, rather than testing a null hypothesis, I calculated quantitative measures of support for each of the hypothesis tested (Anderson & Burnham, 2002). Models were compared between one another using Akaike's Information Criterion (AIC; Akaike, 1976) corrected for small sample sizes (AICc; Hurvich & Tsai, 1993). A subset of top-models was created by taking the best model (lowest AICc) and any models within two-AICc units from it. From the subset of models, the relative importance of each term in the models was estimated by summing the Aikake's weights of all models where that term is present. Aikake's weights represent the probability of one model to be the true model compared to the others; consequently, relative importance can be seen as the probability of the term in consideration to be a real component of the best model (Anderson & Burnham,

2002; Symonds & Moussalli, 2011).

In my analyses, I firstly created a global model which included all explanatory terms of interest. I then centred (by subtracting the mean) and standardized (by dividing by two standard deviations) the input variables to allow averaging over models that include different interaction terms (Grueber et al., 2011) and relative strength of parameter estimates to be interpreted (Gelman, 2008), respectively. I used the R package MuMIn (Barton, 2013) to determine the sub-models which are then compared using the AICc value and the package AICcmodavg (Mazerolle, 2011) to estimate confidence intervals. Finally, I computed the estimates and relative importance of each parameter present in the top-models (models within two-AICc units from the best model). In the result sections of the experimental chapters, I reported the parameter estimates of the top-models.

2.5 Ethical statement

All methods for the laboratory experiments were approved by the University College London Research Ethics Committee (project number 3720/001). Before taking part in the experiment, participants were provided with detailed written instructions, and were informed that participation was voluntary and that they could leave the game at any moment. Debrief emails were sent after the completion of the trust game experiment to acknowledge the simulated counterpart. All methods for the field experiments did not require specific ethical approval through the University College London Research Ethics Committee as the research only involved anonymised records and data sets publicly available (UK Census Data) and non-invasive, anonymous studies of public behaviour.

Chapter 3

Urban residence effects on generosity
in a dictator game and in self-report scales

3.1 Abstract

With over half of the world's population living in cities, it is of primary importance to understand how city life influences our behaviour. Several field studies have reported lower cooperative tendency of city-dwellers compared to rural-dwellers in a range of contexts. I used a dictator game in combination with two self-report measures of cooperative behaviour to investigate how population size of place of residence affects pro-sociality, as well as to assess whether behaviour in a common economic game correlates with self-reported measures of cooperative behaviour in the real world. Results indicated a correlation between dictator donations and the self-reported Interpersonal Generosity Scale, but showed no evidence of urban-rural variation in generosity in either the dictator game or the self-report scales. Based on these results and the contrasting evidence from previous field studies, this study suggests caution when generalising behaviours from one context to another.

3.2 Introduction

Cooperative behaviours are widespread in nature, from the eusocial insects to cleaner fish and cooperative breeding vertebrates (Bshary & Grutter, 2002; Heg et al., 2005; Jennions & Macdonald, 1994; Koenig & Dickinson, 2004; Wilson & Hölldobler, 2005). Nevertheless, human cooperation reaches unique levels, extending to a variety of forms, involving large groups of unrelated individuals, and showing an extraordinary plasticity.

This plasticity is shaped by variation in the environmental conditions in which individuals find themselves (Fehr & Gächter, 2002; West et al., 2007).

One environmental context that seems to trigger variation in cooperative levels in humans is urbanicity, via the high population density associated with it (Amato, 1983; Milgram, 1974; Korte, 1980). Various studies have shown that, compared with rural-dwellers, city-dwellers are less willing to assist strangers in distress, to help a 'lost' tourist, to post a 'lost letter', or to donate to charities (Levine et al., 1994; Levine et al., 2008). Furthermore, city-dwellers adopt different strategies to town-dwellers in experimental economic games. Bahry & Wilson (2006) conduced an ultimatum game in urban and rural areas of Russia and found that rural-dwellers are more likely to reject low offers and to accept high ones than their urban counterparts. The latter were more likely to employ a "hyper-fair" strategy, thus rejecting offers that are too low and too high.

A common approach to studying the factors affecting human cooperation is to use economic games in online labor markets, which allow many participants from different backgrounds and different locations to be recruited (Mason & Suri, 2012; Paolacci et al., 2010; Rand, 2012). A simple economic game often used is the dictator game (Kahneman et al., 1986), which was designed to assess how individuals respond to situations in which self-interest and equality are opposed. In this two-player game, one participant plays in the 'dictator' role and is endowed a sum of money which they can choose how to distribute between themselves and a second participant (the 'receiver'). The receiver has no active role in the game. Dictators are expected to keep all the endowment to maximise their income; nevertheless, multiple studies show that dictators tend to deviate from the income-maximising strategy of keeping the whole endowment, and average donations were found to reach 28% in a meta-analysis (Engel, 2011;

Zhang & Ortmann, 2013).

In spite of the widely accepted conclusions drawn from studies employing the dictator game that dictators act pro-socially (by deviating from the income-maximising strategy), experimental evidence of the real-world validity of results from economic games is still debated (Bardsley, 2005; Benz & Meier, 2008; Franzen & Pointer, 2013; Levitt & List, 2007; Stoop, 2014). One way of controlling whether donations in a dictator game are representative of participants' generosity in real-world situations is to employ self-report scales of cooperative behaviours (Peysakhovic et al., 2014; Rushton et al., 1981). Self-report scales, widely used in personality studies, are designed to measure the degree to which individuals are willing to incur personal costs to enhance the well-being of others (Peysakhovic et al., 2014; Rushton et al., 1981; Smith & Hill, 2009). In particular, Peysakhovich et al. (2014) found consistency between results in a dictator game and self-report measures of cooperation, as well as consistency in results over time.

In this experiment, I examined the effects of urbanicity on generosity in a dictator game and in self-report scales. Consistent with other studies, I used donation in the dictator game as a proxy for generosity and, based on the literature, I predicted that city-dwellers would be less generous than town-dwellers. To control whether donations in the dictator game were representative of participants' generosity in real-world situations, I used two self-report scales of cooperative tendencies and matched responses from the dictator game and the self-report scales. The scales reflected the levels of pro-sociality by asking to rate statements about self-perceived generosity (Rushton et al., 1981) or statements on the frequency in which one engages in prosocial activities (Smith & Hill, 2009). I predicted that results from the dictator game and scores from the self-report measures would be correlated, with city-dwellers reporting less real-world cooperative

acts than town-dwellers.

3.3 Methods

Data were collected during May and June 2014. All workers were recruited via the online labour market AMT. Workers were informed that they would participate in an online experiment and that they could earn money. For this study data were collected in two parts, separated by an interval of 14 days. This time separation between the two parts was used to avoid any priming effects. In the first part, 621 workers were randomly assigned to play a dictator game (n = 310) or to complete a survey (n = 311). After two weeks, the same workers were contacted to participate in the alternative task. Of the initial 621 workers, only 356 returned for the second part (i.e. the dictator game, n = 171; survey, n = 185). Overall, n = 210 workers in the dictator role submitted complete responses and n = 496 workers submitted complete responses to the surveys. A total of n = 169 workers completed both tasks.

3.3.1 Dictator game

Workers in the dictator game received written instructions about the game (see Appendix I for full instructions) and were required to answer two comprehension questions correctly to participate. They were informed of their role in the game as 'Player 1' (the dictator) or 'Player 2' (the receiver) and that their worker ID would remain anonymous to the other worker. Workers received $0.20 for participation in the game, regardless of their role. Dictators received an extra $1 and they were asked to choose how much of this endowment they wanted to send to the other worker (from $0.00 to $1.00, in $0.10 increments). After making their decisions, all workers were asked to provide their age, gender, approximate annual income and place of residence. Only data from workers in the dictator role were analysed. I used 2010 census data (US Census

Bureau) to retrieve information on population size of each location.

3.3.2 Survey

Workers in the survey answered a total of 25 questions. For completing this task, workers received $0.60. Surveys were composed of two self-assessment Likert-type scales to measure helping behaviour in real-world settings (Appendix I). I used two separate scales that rely on different types of memory (episodic and semantic) (Adams et al., 1999; Robinson & Clore, 2002), to limit the influence of "memory bias" - for which individuals tend to overestimate the frequency of favour exchange when giving (Smith & Hill, 2009). "Memory bias" involves recalling of events from episodic memory, thus its influence, if present, should be stronger in one scale (i.e. the one that relies on episodic memory) than the other.

In particular, workers completed an Interpersonal Generosity Scale (IGS, 6 questions) (Smith & Hill, 2009) and a Self-Reported Altruism scale (SRA, 19 questions) (Rushton et al., 1981). These scales reflect the worker's levels of pro-sociality. The IGS scale asks workers to rate how strongly they agree with statements about themselves and their perceived generosity (i.e. "My decisions are often based on concerns for the welfare of others"; from 0 = "I don't agree at all" to 6 = "Strongly agree") and relies on semantic memory, whereas the SRA scale asks how often the worker engages in prosocial activities (i.e. "I have done volunteer work for a charity"; from 1 = "Never" to 5 = "Always") and relies on episodic memory. Scores of the self-reported scales were calculated by adding responses (Likert, 1932; Boone & Boone, 2012). Scores ranged between 6 – 36 for the IGS scale and between 5 – 95 for the SRA scale. These were treated as continuous variables for the analyses. A Pearson's correlation was run to determine the relationship between the two scales' scores.

Due to the high frequency of $0.00 and $0.50 cents donations, I reduced dictator donation to a 3-level ordinal variable (1 = gave $0.00, 2 = gave between $0.10 and $0.40, and 3 = gave $0.50 or more). Of the 239 workers that specified gender, 78 were females and 161 were males. Age ranged between 18 and over 65 in age (Table 3.1). Approximate annual income ranged from less than $12.500 to over $100.000. For the analyses, age and income were divided in 3-level and 6-level variables, respectively (Table 3.1). I used the demographics of current residence to test the effects of city-living on dictator donations and Likert-type scale scores. Models and results presented here use the log of population size of current residence.

Table 3.1. Information on factor levels and sample sizes for the explanatory terms used in the statistical models.

Variable	Class						
Age	**0: 18-24**	**1: 25-34**	**2: 35<**	**Total**			
	66	121	52	239			
Gender	**0: Male**	**1: Female**	**NA**	**Total**			
	161	78	2	241			
Income	**0: <$12.500**	**1: <$25.000**	**3: <$37.500**	**4: <$50.000**	**5: <$65.000**	**6: >$65.000**	**Total**
	52	40	46	30	31	37	236
Donation	**0: $0.00**	**1: $0.10-$0.40**		**2: $0.50 and over**		**Total**	
	114	45		82		241	

3.3.3 Analysis

3.3.3.1 Were dictator donations predicted by population size of current residence and self-reported cooperation measures?

I tested whether generosity in the dictator game was predicted by population size of current residence and self-reported generosity while controlling for age, gender and income variables. I created a cumulative link model (CLM) with amount sent as response term (3-level ordinal: 1 = gave $0.00; 2 = gave between $0.10 and $0.40; 3 = gave $0.50 or more) and the following explanatory terms: population size of current residence (continuous), dictator's gender (0 = male; 1 = female), age (3-level ordinal) and annual income (6-level ordinal), and whether the dictator played the game in the first or second wave of the experiment (0 = first wave; 1 = second wave) (Table 3.1). The number of observations for this model was n = 206.

To test whether IGS or SRA scales predicted donations in the dictator game, I created a CLM with amount sent (3-level ordinal) as response variable, and IGS score (continuous), SRA scale score (continuous), and whether the worker took the survey in the first or second wave of the experiment (0 = first wave; 1 = second wave) as explanatory terms. Number of observations for this model = 169.

3.3.3.2 Did self-reported cooperation measures vary across urban scales?

To test whether scores from self-report measures of social behaviour differed between cities and towns, I created two linear models (LMs) with IGS and SRA scale scores as continuous response variables, respectively. Explanatory terms for the global models were: population size of current residence (continuous variable), gender (0 = male; 1 = female), age and annual income (categorical), and whether the worker took the survey

in the first or second wave of the experiment (0 = first wave; 1 = second wave) (Table 1).

The number of observations for these models was n = 150.

3.4 Results

Dictator donations ranged between $0.00 and $1.00, nevertheless higher frequencies were recorded for the $0.00 and $0.50 cents donations and the most common response was to keep all the endowment (Figure 3.1). Population size of residence ranged from 367 to more than 8 million (mean ± se = 714,200 ± 161,095). No significant relationship was found between current residence and age or income.
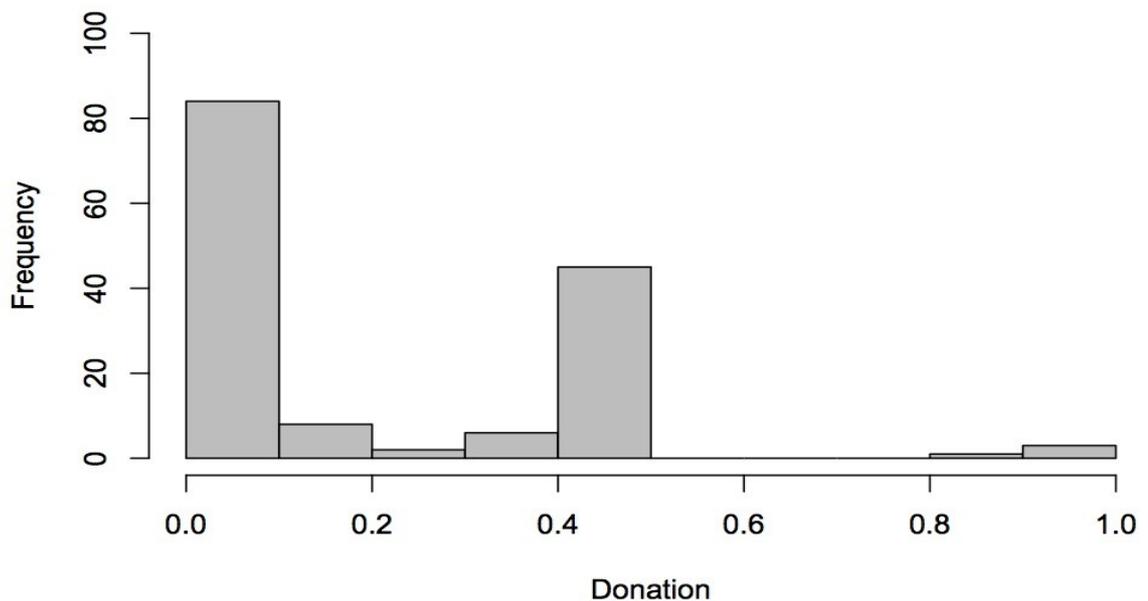
Figure 3.1. Histogram of the amount sent (donations). The most common response was to send $0.00, followed by the equal split of the endowment (sending $0.50).

There was a moderate positive correlation between scores from the IGS and from the SRA scale (Pearson's r = 0.43, n = 461, p < 0.001). The mean SRA scale score (mean ± se = 50.2 ± 0.58) was significantly higher than the mean IGS (mean ± se = 25.08 ± 0.25; Paired t-test: t = 47.5, df = 461, p < 0.001).

3.4.1 Were dictator donations predicted by population size of current residence and self-reported cooperation measures?

I found five models which were within the 2AICc units of the best model when testing the effects of population size on dictator donations (Table 3.2).

Table 3.2. Top models (models within 2AICc units of the best model), with AICc values for model investigating the effects of population size on dictator donations. Age: age of Dictator; Gender: gender of Dictator; Income: approximate income; Wave: wave in which the Dictator Game was played.

Model Rank	Parameters	df	AICc
1	Age + Gender	4	422.19
2	Gender	3	422.27
3	Age + Gender + Wave	5	423.06
4	Gender + Wave	4	423.85
5	Age + Gender + Income	5	424.12

Gender was a component of all five top models and had a significant negative effect on donations (effect size = -0.31; CI: -0.57, -0.05). Male workers were less generous than female workers (Figure 3.2).

Table 3.3. Estimates, unconditional standard errors and confidence intervals for parameters included in the top models from Table 3.2.

Parameter	Estimate	SE	Confidence Interval
Age	0.21	0.14	(-0.16, 0.42)
Gender	-0.31	0.13	(-0.57, -0.05)
Wave	-0.13	0.14	(-0.24, 0.15)
Income	-0.05	0.13	(-0.10, 0.09)
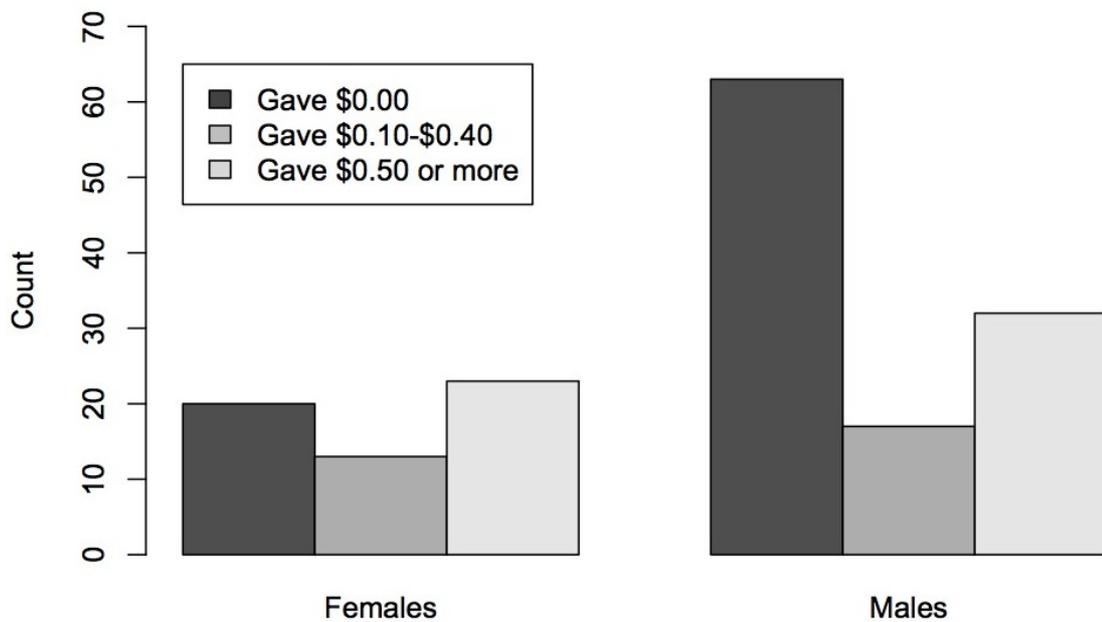
Figure 3.2. Donation categories per gender of worker. Male workers were significantly less generous than female workers.

Age and income of worker, as well as wave in which the dictator game was played were

all component variables of the top models, although confidence intervals spanned zero suggesting that they were not likely to affect donations (Table 3.3).

Testing whether IGS or SRA scale scores were correlated with dictator donations, I found 3 top models, and IGS was a component of all the top models (effect size = 0.34; CI: 0.02, 0.66; Table 3.4). Dictator donations were positively correlated with IGS scores. SRA scores and the wave in which the dictator game was played were both components of the top models. Nevertheless, all of the confidence intervals spanned zero (Table 3.5).

Table 3.4. Top models (models within 2AICc units of the best model), with AICc values for model investigating the effects of scale scores on dictator donations. IGS: IGS scores; SRA: SRA scale scores; Wave: wave in which the Dictator Game was played.

Model Rank	Parameters	df	AICc
1	IGS	3	346.32
2	IGS + SRA	4	347.66
3	IGS + Wave	4	348.04

Table 3.5. Estimates, unconditional standard errors and confidence intervals for parameters included in the top models from Table 3.4.

Parameter	Estimate	SE	Confidence Interval
IGS	0.34	0.16	(0.02, 0.66)
SRA	-0.15	0.17	(-0.25, 0.18)
Wave	-0.18	0.3	(-0.35, 0.27)

3.4.2 Did self-reported cooperation measures vary across urban scales?

For the IGS scores, gender was a component of the two top models (effect size = -2.38; CI: -4.16, -0.60; Table 3.6).

Table 3.6. Top models (models within 2AICc units of the best model), with AICc values for model investigating the effects of population size on IGS scores. Age: age of worker; Gender: gender of worker; Population: population size of worker's residence.

Model Rank	Parameters	df	AICc
1	Age	3	1152.31
2	Gender	3	1152.47
3	Gender + Population	4	1152.87

Male workers scored lower than female workers in this self-report measure (Figure 3.3). The other component of the top models were age and population size of current residence. Nevertheless, confidence intervals for these component spanned zero (Table 3.7).

Table 3.7. Estimates, unconditional standard errors and confidence intervals for parameters included in the top models from Table 3.6.

Parameter	Estimate	SE	Confidence Interval
Age	-2.18	1.84	(-3.92, 2.57)
Gender	-1.48	0.95	(-1.41, -0.58)
Population	-0.65	0.96	(-1.04, 0.81)

Components of the top models for the SRA scale (Table 3.8) were age, gender and population size. Confidence intervals spanned zero for all components (Table 3.9).
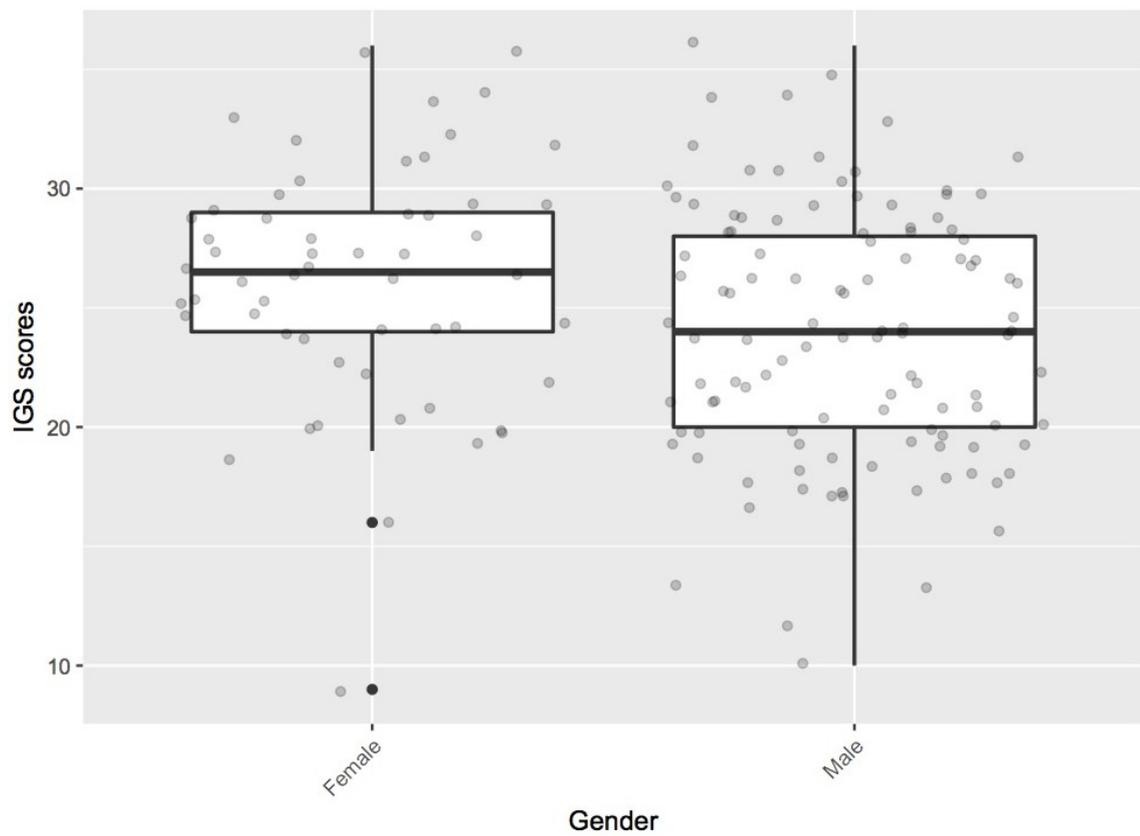
Figure 3.3. Relationship between IGS scores and gender of worker. Female workers scored significantly higher than male workers.

Table 3.8. Top models (models within 2AICc units of the best model), with AICc values for model investigating the effects of population size on SRA scale scores. Age: age of worker; Gender: gender of worker; Population: population size of worker's residence.

Model Rank	Parameters	df	AICc
1	Age	3	1151.31
2	Population	3	1152.47
3	Gender	3	1152.87

Table 3.9. Estimates, unconditional standard errors and confidence intervals for parameters included in the top models from Table 3.8.

Parameter	Estimate	SE	Confidence Interval
Age	-0.54	1.31	(-3.59, 6.21)
Gender	0.09	0.76	(-1.41, 1.59)
Population	-0.12	0.47	(-1.04, 0.82)

3.5 Discussion

This study investigated the possibility that urbanicity influences generosity in dictator games and in self-report measures of cooperation. The second aim was to test whether self-reported measures of cooperation reflect how individuals behave in an economic game. In contrast to my predictions, population size did not predict generosity in the dictator game nor scores of self-reported measures of cooperative behaviour. City-dwellers did not behave significantly less generously than town-dwellers in the dictator game, and scores from the two Likert scales measuring helping behaviour in real-world settings did not differ across urban scales. Therefore this study does not match results from field studies reporting urban-rural variation in cooperative behaviour (Amato, 1983; Levine et al., 1994; Levine et al., 2008).

Nevertheless, results show a positive correlation between self-report measures of cooperative behaviour and donations in a dictator game. In particular, the IGS scores reflected dictator choice, with people who scored lower being less likely to donate part of their endowment. This finding is similar to those of a recent paper by Peysakhovich et al. (2014). In their study, they collected decisions in different economic games and answers to 35 self-report questions regarding cooperation and punishment in real-world settings for over 500 participants. In this way, they found a strong positive correlation between

the decisions made in economic games and the self-report measures of moral values, but not self-reported behaviours (Peysakhovich et al., 2014). They argue that this might be due to an inaccuracy of self-reporting of socially desirable behaviours.

Here I have not found any correlation between donations and the SRA scale, which asks how frequently prosocial behaviours are performed (Rushton et al., 1981), but I found a correlation between donations and the IGS scale, in which workers are asked to rate how much they agree with statements about themselves and how others see them. The type of questions presented in the two scales is intrinsically different as they relate to episodic and semantic memory, respectively. Episodic memory represents memory of experiences and specific events, and has a rapid decay (Adams et al., 1999; Robinson & Clore, 2002). Semantic memory, on the other hand, refers to general factual knowledge, does not decay rapidly, and is independent of personal and temporal context (Robinson & Clore, 2002). Thus "memory biases" that lead to over-/under-estimating generosity when in the giving or receiving part of the exchange, respectively (Smith & Hill, 2009), are more likely to occur when recalling events in our episodic memory, rather than recalling generalized knowledge from our semantic memory. The IGS scale may leave little scope for over-reporting being altruistic, and this would explain the correlation found between IGS scale measures and dictator choice.

It is not clear why I did not find urban-rural variation in generosity in the dictator game or the self- report scales in this study. It is possible that these measures are not representative of behaviour in real-world settings. Despite the growing evidence of the real-world validity of results from laboratory games (Benz & Meier, 2008; Peysakhovich et al., 2014; Franzen & Pointner, 2013; Stoop, 2014), many psychology studies argue

that the correlation between behaviour in two separate situations may be low if the behaviour is mainly influenced by situational factors rather than personality traits (Benz & Meier, 2008; Gilbert & Malone, 1995). Thus, results from laboratory settings would be representative of real-world behaviours in similar situations. Pro-social tendency recorded in field studies in situations spanning from posting a 'lost letter' to helping a stranger in distress (Amato, 1983; Levine et al., 2008; Silva & Mace, 2014), have arguably little connection with donating in a dictator game.

Moreover, urban-rural variation in cooperative tendency may be primarily elicited by the "bystander effect", which refers to the phenomenon where help is less likely to be offered to an individual in need as the number of onlookers increases (Darley & Latane, 1968). In cities, where the number of onlookers is often higher than in towns, dwellers are possibly less likely to help (Darley & Latane, 1968). On the other hand, the dictator game, where workers are individually asked to participate, may not be susceptible to the "bystander effect". This might explain why no urban-rural variation was found in this context.

Self-report measures, by contrast, are aimed at distinguishing between individual preferences and personalities in a variety of situations (Rushton et al., 1981; Carlo et al., 2003). From this perspective, the lack of correlation between scores from the scales used and population size in this study is maybe more puzzling than for dictator donations and population size. Moreover, IGS scores and dictator donations were positively correlated. Based on these results and the contrasting evidence from previous field studies, it is likely that results in a dictator game and the self-report scales are arguably representative of behaviour in the field.

Another potential limitation is that these results were obtained using AMT, rather than in a real-world setting. It has been suggested the online environment might produce markedly different results to those that would be obtained under more traditional lab-based settings (Crump et al., 2013; Gosling et al., 2004). This effect could be more marked if the behaviour in question is contextually evoked (Benz & Meier, 2008). In particular, if the lower pro-sociality of city-dwellers is elicited by the physical environment in which they live in, the online setting of the game would be inappropriate to measure any behavioural difference between city- and town-dwellers. A possible solution is to employ lab games in the field (Henrich et al., 2006). With a dictator game played in the field, it would be possible to investigate responses given in real-world settings, while keeping high levels of experimental control (Baran et al., 2010; Gneezy & Imas, 2016).

Chapter 4

Urban residence effects on trust and trustworthiness

4.1 Abstract

A growing body of research suggests that urban-dwellers experience higher anxiety and stress levels, and that this might lead to reduced trust levels in others. Using an online trust game to record trust and trustworthiness across different urban levels, I found that increasing urbanicity negatively affected the decision to invest (trust), but not the decision to reciprocate the investment (trustworthiness). Trustworthiness – but not trust – was positively affected by the age of the trustee. These results support the idea that urban-dwellers might be less trusting, but not necessarily less trustworthy than rural-dwellers.

4.2 Introduction

Many of our day-to-day interactions require an element of reciprocal trust in others. We need to trust our interaction partners as we lack the information on their aims and future actions, which implies that we need to take the risk of being exploited (Riegelsberger et al., 2003). Thus, trust involves an initial acceptance of the trustor to be vulnerable, and a consequent positive expectation of the actions of the trustee (Colquitt et al., 2007; Mayer et al., 1995). Trustees, in turn, can exploit the trust given to them and act selfishly, or they can reciprocate and act cooperatively. When trustees reciprocate they prove their trustworthiness, a characteristic based on their trust-warranting traits, such as norms, affections, and fears (Bacharach & Gambetta, 2001).

Trust and trustworthiness can be viewed as the product of local communities, and thus expected to be correlated with community-level variables, such as population size, population density, heterogeneity and crime rates of the community (House & Wolf, 1978). In particular, social theorists have long focused on the effects of cities on individual attitudes. They argued that city-dwellers are less trusting, helpful and socially involved than town-dwellers due to cognitive overload and the higher level of stressful stimuli found in cities (Milgram, 1974; Wirth, 1938). City-dwellers should then adapt to their environment by limiting the number of interactions as well as the degree of intimacy with people in their community.

Contemporary medical science has produced supporting evidence on the role of city life on trust and cooperation. City-living is deleterious for our health and mental wellbeing (Anderson & Jane, 2011; Dye, 2008; Peen et al., 2010). In particular, city-dwellers experience higher levels of anxiety and stress via amygdala activation (Lederbogen et al., 2011). These higher anxiety levels may lead to lower trust levels in others and thus inhibit cooperation, as people may fear that their interaction partners will exploit them rather than cooperate in return (House & Wolf, 1978).

Field studies also support the concept of lower cooperation in city-dwellers in a variety of contexts (Amato, 1983; Korte, 1980; Levine et al., 1994). At present, this difference between urban and rural populations has been attributed to trust. For example, in a study that examined refusal rates for a series of surveys over 20 years (House & Wolf, 1978), variation between urban and rural population refusal rates only appeared later in time, and was linked to variation in reported crime rates rather than population size, demonstrating that decreased trust due to rising crime was more important than population density in determining pro-social attitudes. Moreover, in a recent study on

cooperation, Nettle et al. (2011) argue that the differences recorded in helping behaviour between a poor and a wealthy neighbourhood of the same city are underpinned by variation in residents' trust levels; self-reported trust underlined lower trust levels in the deprived neighbourhood compared to the wealthy neighbourhood, and was also reflected in a lowered propensity to help.

Here I examined the effects of urbanicity on trust levels and trustworthiness directly. Consistent with other studies, I used a one-shot trust game to measure trust and trustworthiness (Berg et al., 1995). In this game, one player (the investor) is given an endowment and can decide whether to keep it or to entrust it to the second player (the trustee). The amount sent is multiplied (usually tripled) by the experimenter and the trustee then decides how much of the entrusted money to send back to the investor. Despite standard economics predictions, for which investors follow their self-interest and send nothing to the other player, results from the original Berg et al. (1995) study as well as numerous replications consistently found that investors and trustees send positive amounts of money to the other player (see Johnson & Mislin, 2011 for a meta-analysis). The amount sent by investors is then used as proxy for trust, whereas the amount sent back by trustees represents trustworthiness.

In this study, the trust game was conducted online and players were matched with a simulated counterpart. Players were asked to state where they lived in order to examine the effects of urbanicity on trust and trustworthiness. In addition, each player was given information regarding where their (simulated) partner came from. This allowed me to further test whether trust and trustworthiness are influenced by: a) one's own environment; b) one's expectations about how the partner's environment will affect their behaviour; and c) in-group behaviour. In-group behaviour – for which people value and

reward more in-group members than out-group members (Brewer, 1979) – was considered as town dwellers might have a general expectancy that others will cooperate within the in-group (depersonalized trust) (Brewer, 2008) which would not be found in city dwellers, where fast overturn, heterogeneity, and lower community involvement hinder the formation of in-group identification (Balliet et al., 2014).

Based on the literature, I expected city-dwellers to be generally less trusting and thus to keep most of the endowment irrespective of where the interaction partner was from. Conversely, I expected that town-dwellers would be more trusting than city-dwellers, but only when playing with interaction partners that were also from towns, rather than cities. I expected that trust would be highest among town-dwellers when they were paired with a partner from the same town as themselves. Also, I expected city-dwellers to be less trustworthy and send back less money than town-dwellers regardless of where their interaction partner was from.

4.3 Methods

4.3.1 Procedure

Data were collected during June 2014. For this study, a total of n = 789 workers (n = 275 females, n = 512 males, n = two did not specify gender) were recruited via the online labour market Amazon Mechanical Turk (AMT; www.mturk.com (see Rand, 2012)).

Workers received written instructions about the game and were required to answer two comprehension questions correctly to participate. They were asked where they lived, and then informed of their role in the game as 'Player 1' (the investor) or 'Player 2' (the trustee) and that their worker ID would remain anonymous to the other worker (Appendix II for game instructions). Both workers received $0.50 for participation in the game, regardless of their role. A simulated counterpart was used to make sure all workers were

receiving the same cues about the residence of the second worker and to better control the effects of this variable.

Investors were told that they could send any amount of their $0.50 endowment (in $0.05 increments) to their partner. Any money the investor kept would be paid to them as a bonus. Any money they sent to the trustee would be tripled by the experimenter and investors were informed that the trustee would then decide how much of this increased endowment to return to the investor. Investors were assigned to one of three experimental treatments (Table 4.1). In Treatment 1, investors were told that the trustee was from a large city (Dallas, Texas); in Treatment 2, investors were told that the trustee was from a small town (Woodville Town, Texas); in Treatment 3, investors were told that the trustee was from the same city or town as them (by copying and pasting the same text input they gave when answering where they were from). After this, investors were asked to choose how much of their endowment they wanted to send to the trustee (see Appendix II for all instructions).

Trustees were also assigned to one of the same three experimental treatments differing in the simulated place of residence of the investor. In addition, trustees were informed that investors either sent them $0.15 (meaning that they received $0.45) or that the investor sent them $0.35 (meaning that they received $1.05). Thus, workers in the trustee role were divided into six experimental treatments in total, as described in Table 4.1. Trustees were then asked to choose how much of the endowment received they wanted to send back to the investor (in $0.05 increments; see Appendix II).

Table 4.1. Conditions for the two players in the trust game. Investors were tested for three conditions, based on the origin of their simulated counterpart. Trustees were tested for six conditions, based on the origin of their simulated counterpart and on the amount received from them.

Player	Other player origin	Amount received	Condition
Investor	Dallas, Texas		1
	Woodville town, Texas		2
	Same residence		3
Trustee	Dallas, Texas	$ 0.45	1
		$ 1.05	2
	Woodville town, Texas	$ 0.45	3
		$ 1.05	4
	Same residence	$ 0.45	5
		$ 1.05	6

After making their decisions, all workers were asked to provide their age, gender and approximate annual income. In addition, investors were asked to state how much they expected to receive back from the other worker.

I excluded from the analysis n = 79 workers that gave an incomplete or mistyped answer when asked their place of residence, since the answer to this question was presented as the residence of the simulated worker (for the treatments where the worker was from the same place of residence as them; see Appendix II). Exclusion from the analysis was aimed at minimising the possibility that workers realised that they were playing against a simulated counterpart and that their response was affected by it. Of the 710 workers left for the analysis, 225 were females and 483 were males (two workers did not specify

gender). Age and income were divided into three and five categories, respectively (Table 4.2). The majority (n = 569) of workers were aged between 18 and 24, followed by workers aged between 25 and 34 (n = 122). The third category comprised all workers of age 35 and over (n = 19). Approximate annual income ranged from less than $12.500 to over $100.000, with the $12.500-$25.000 interval being the most common (n = 255). Of the 710 workers, 346 played in the investor role and 364 in the trustee role and they were equally divided among the possible conditions (Table 4.1). I used the United States 2010 census data (US Census Bureau) and the 2010 Uniform Crime Reports (United States Department of Justice) to retrieve information on population size and crime reports of each location. Population size of residence ranged from 367 people to more than 8 million people. The vast majority of workers (n = 565; 79.6%) were from cities of over 20000 inhabitants. Models and results presented here use the log of population size. Annual crime reports varied between locations, ranging from none to over 350000 (mean ± se = 2669.72 ± 606.43). Due to the strong positive correlation between crime and population size (Pearson's correlation: $r = 0.92$, $n = 198$, $p < 0.01$) crime was not included in the models.

Table 4.2. Information on factor levels and sample sizes for the explanatory terms used in the statistical models.

Variable	Class						
Age	0: 18-24	1: 25-34	2: 35<	Total			
	569	122	19	710			
Gender	0: Female	1: Male	NA	Total			
	225	483	2	710			
Income	0: <$12.500	1: <$25.000	3: <$37.500	4: <$50.000	5: >$50.000	NA	Total
	194	255	136	68	25	32	710

4.3.2 Analyses

4.3.2.1 Was the amount sent by investors predicted by their own environment or their expectations about the other worker's environment?

I tested whether trust (amount sent to trustee) was predicted by population size of residence and by the investor's residence, while controlling for age, gender and income variables. I created a cumulative link mixed model (CLM) with the amount sent as a 10-level ordinal response term (0 = gave $0.00 to 10 = gave $0.50) and the following explanatory terms: population size of residence (continuous), residence of second worker (binary: 0 = city; 1 = town), whether residence was said to be the same (0 = same; 1 = different), investor gender (0 = male, 1 = female), age (3-level categorical) and annual income (5-level categorical), and how much was expected back from the other worker (4-level ordinal: 0 = nothing, 1 = some of the amount sent and tripled, 2 = all of the amount sent and tripled, 3 = more than what sent).

4.3.2.2 Was the amount sent back by investors predicted by their own environment, the other worker's environment, or by the amount received?

I tested whether trustworthiness (amount sent back to investor) was predicted by population size of residence and by the other worker's residence, while controlling for age, gender and income variables. I created a CLM with the proportion of the amount received that was returned as 3-level ordinal response term (0 = returned 0%; 1 = returned less than 50%; 2 = returned more than 50%) and the following explanatory terms: population size of residence (continuous), residence of second worker (0 = city; 1 = town), whether residence was the same (0 = same; 1 = different), investor gender (0 = male; 1 = female), age (3-level categorical), annual income (5-level categorical), and amount received from investors (0 = $0.45; 1 = $1.05).

4.4 Results

The amount entrusted to the other players was variable (mean ± se = 0.30 ± 10.70), but sending the whole endowment ($0.50) was the most common choice (n = 124, 36%; Figure 4.1).
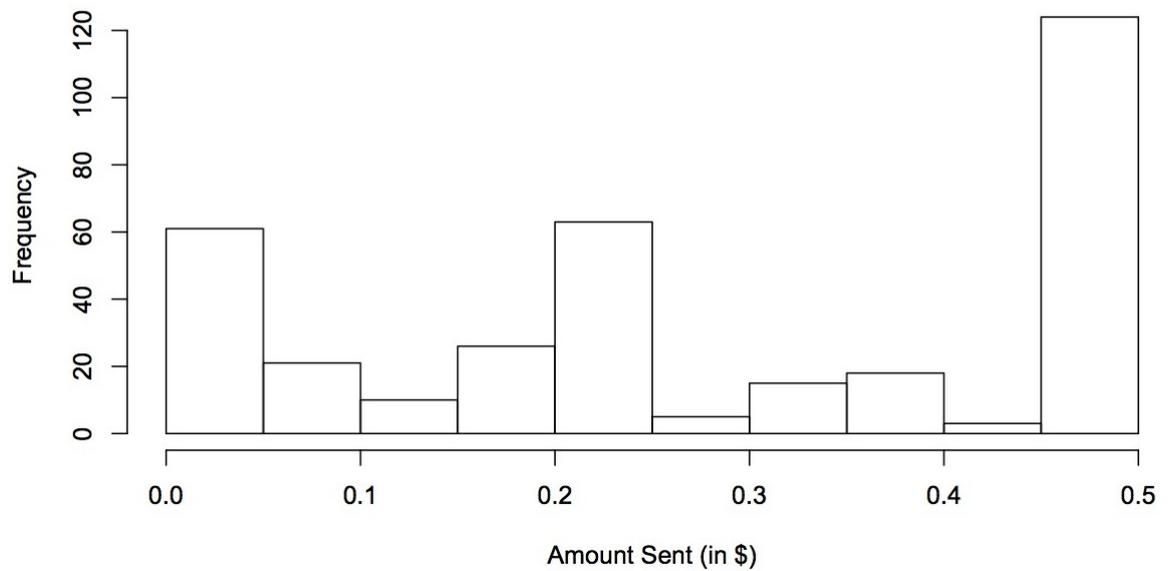
Figure 4.1. Histogram of amounts sent by investors to trustees.

The majority of trustees (n = 99, 27%) chose to send back nothing to the investor (Figure 4.2). The mean amount sent back (± se) was $0.24 (± 0.01).
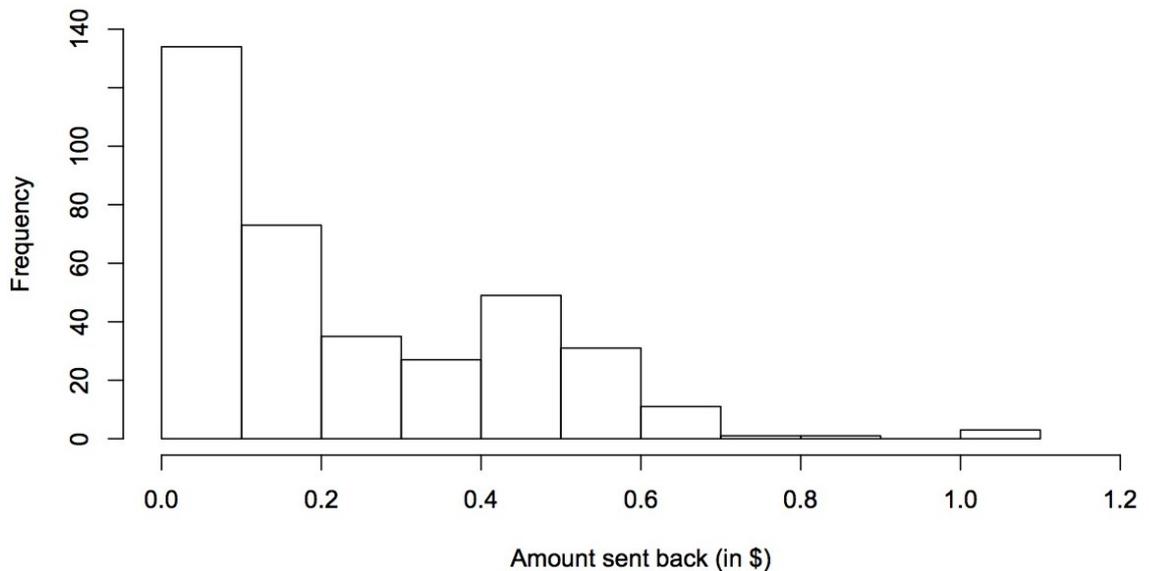
Figure 4.2. Histogram of amounts sent back by trustees to investors.

4.4.1 Was the amount sent by investors predicted by their own environment or their expectations about the other worker's environment?

Population size of investor's residence was a component of two of the five top models and had a weak negative effect on the amount sent (effect size = -0.06, CI: -0.24, -0.12; Table 4.3; Figure 4.3). Whether the other worker was from the same place had a strong positive effect on the amount sent (effect size = 0.21, CI: 0.49, 0.03).

With population size, other component variables in the top models were gender of the Investor and the residence of other worker. Nevertheless, all confidence intervals for the parameter estimates spanned zero, so there is little evidence that any of these variables affected the amount sent (Table 4.4).

Table 4.3. The top models (models within 2AICc units of the best model), with AICc values and Akaike weights for the model investigating the effects of population size of investor and trustee residence on investment. Gender: gender of Investor; Origin: population size of Trustee; Population: population size of Investor; Same: same place of residence between Investor and Trustee.

Model Rank	Parameters	df	AICc	Weight
1	Gender + Same	12	1331.87	0.29
2	Gender + Same + Population	13	1332.32	0.23
3	Gender + Same + Population + Origin:Population	14	1332.46	0.22
4	Same	11	1333.29	0.14
5	Gender + Origin + Same	13	1333.87	0.11

Table 4.4. Estimates, unconditional standard errors, confidence intervals, and relative importance for parameters included in the top models from Table 4.3.

Parameter	Estimate	SE	Confidence Interval
Origin	0.22	0.11	(-0.06, 0.45)
Population	-0,06	0.01	(-0.24, -0.12)
Same	0.21	0.12	(0.49, 0.03)
Origin:Population	-0,14	0.10	(-0.17, 0.11)
Gender	-0.01	0.03	(-0.07, 0.06)
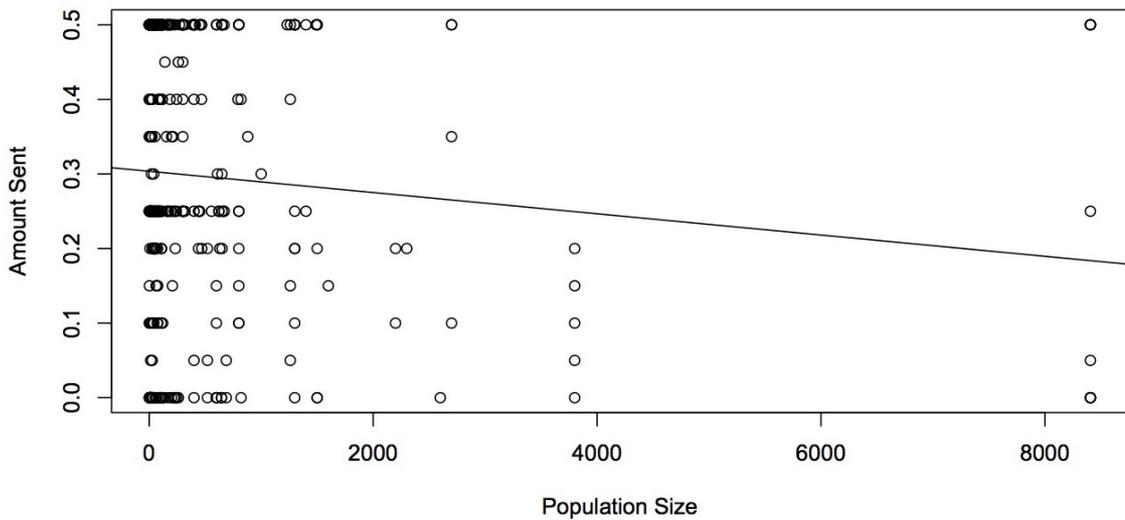
Figure 4.3. Scatter plot with best fit line representing the relationship between amount sent by investors and population size of their place of residence.

4.4.2 Was the amount sent back by trustees predicted by their own environment, the other worker's environment, or on the amount received?

Age of worker (effect size = 0.22, CI: 0.01, 0.43) was a component of all top models (Table 4.5) and had a marginal positive effect on the amount sent back. The other components of the top models were gender of the trustee, population size of trustee residence, whether the other worker was from the same place, the other worker's residence, and the amount received form the investor. Nevertheless, confidence intervals for these components spanned zero (Table 4.6), suggesting little evidence that they have affected the amount sent back.

Table 4.5. The top models (models within 2AICc units of the best model), with AICc values and Akaike weights for the model investigating the effects of population size of investor and trustee residence on reciprocation of investment. Age: age of Trustee, Gender: gender of Trustee; Population: population size of Trustee; Same: same place of residence between Trustee and Investor, Origin: population size of Investor; Received: amount received from Investor.

Model Rank	Parameters	df	AICc	Weight
1	Age	3	736.22	0.26
2	Age + Gender	4	736.93	0.13
3	Age + Origin	4	737.38	0.12
4	Age + Population	4	737.75	0.09
5	Age + Origin + Same	5	738.02	0.08
6	Age + Received	4	738.1	0.07
7	Age + Same	4	738.1	0.07

Table 4.6. Estimates, unconditional standard errors, confidence intervals, and relative importance for parameters included in the top models from Table 4.5.

Parameter	Estimate	SE	Confidence Interval
Age	0.22	0.11	(0.01, 0.43)
Gender	-0,11	0.10	(-0.15, 0.10)
Origin	-0.12	0.11	(-0.21, 0.12)
Population	-0,07	0.10	(-0.07, 0.06)
Same	0.08	0.11	(-0.11, 0.09)
Received	0.04	0.1	(-0.05, 0.06)

4.5 Discussion

In this experiment, city living had a strong negative effect on the amount investors sent, suggesting city-dwellers are less trusting than town-dwellers. This adds to a growing body of research showing city life is negatively associated with trust towards strangers (Balliet et al., 2014; Lederbogen et al., 2011; Gächter et al., 2004). Furthermore, the place of residence of the trustee was not used as a clue of trustworthiness: city dwellers were as trusting towards other city dwellers as towards town dwellers.

Despite being less trusting, individuals from urban environments were not less trustworthy. This finding is at odds with the common belief that city dwellers are generally less cooperative (trustworthy) than town dwellers (Amato, 1983; Korte, 1980; Levine et al., 1994). Importantly, as there is no face to face interaction in this experiment, and no scope for reputation based concern or fear of social sanctioning, players returning money were actually showing trustworthiness (see Baran et al., 2010 in real-world trust game). That trustworthiness was not predicted by urbanicity level but trust was, suggests that city-dwellers are cooperative but nevertheless avoid the risks associated with trusting others.

Are then, generally speaking, risks higher for city dwellers than town dwellers? Field studies in urban environments have reported a trend with lower cooperation towards strangers when the crime rate is higher (Blau & Blau, 1982; House & Wolf, 1978). This suggests urban-rural variation in cooperation is produced by the higher crime rates (registered or perceived) in cities compared to towns. More recent work has supported the idea of a negative correlation between low socio-economic status and trust or cooperation (Silva & Mace, 2014). The main explanation put forth is that people experiencing poor conditions are less open to risk taking in interacting with strangers as

their resources are already limited. This would lead them to avoid interactions, thus being less pro-social (Nettle et al., 2011; Silva & Mace, 2014).

Nevertheless, it is often complicated to separate socio-economic status and crime rates of an area. There is a strong positive correlation between deprivation and crime (Sutherland et al., 2013; Tarling & Dennis, 2016) and distrust is likely to be found in deprived areas rather than in cities per se (Nettle et al., 2011). However, a strong positive correlation is also found between urbanicity and crime (Glaeser et al., 1996). In this experiment it was not possible to separate the effects of these two variables.

Here no detailed information about the local environmental condition was acquired (as players only stated the city or town of residence rather than the neighbourhood) making it impossible to tell apart the effects of urbanicity, socio-economic status, and crime rates. Further testing could separate these factors. Ideally, a real-world trust game conducted in defined geographic areas differing for urbanicity, crime and wealth could mix the positive factors of lab and real-world experiments. Lab games in the field enable to investigate the behaviour in real-world settings, while keeping high levels of experimental control, thus reducing confounds and replicability issues (Baran et al., 2010; Gneezy & Imas, 2016). Moreover, real world lab games are especially useful for comparing responses between different populations and contexts (Henrich et al., 2006).

Some limitations of the experimental approach should also be acknowledged. Principal among these is that the results were obtained using a stylised economic task, where participants interacted anonymously and did not know the other individual. These conditions are arguably unrepresentative of most of our daily encounters involving trust (Raihani & Bshary, 2015). Despite the criticism received (Levitt & List, 2007), an

increasing number of studies validate results in economic games and in real world contexts (Baran et al., 2010; Benz & Meier, 2008; Peysakhovich et al., 2014; Stoop, 2014). Another potential limitation is that these results were obtained using AMT, rather than in a more controlled laboratory setting. It has been suggested the online environment might produce markedly different results to those that would be obtained under more traditional lab-based settings (Crump et al., 2013; Gosling et al., 2004). This effect could arise because online workers are not alone, might participate more than once in a study, may be multi-tasking, or might have taken part in similar tasks many times before (Crump et al., 2013; Germine et al., 2012).

Despite these valid concerns, it is reassuring that several seminal findings have been shown to replicate in online and laboratory settings (e.g. Rand, 2012; Horton et al., 2011). Moreover, there is some evidence to suggest that behaviour in online games also reflects the attitudes and behaviour of these subjects in the real world. A recent study by Peysakhovich et al. (2014) showed that pro-social behaviour in online experiments was a positive predictor of both-self-reported and actual pro-social behaviour in the real world. One important concern we are unable to rule out is that participants in this task may not have believed they were playing with a real partner – if so this would be expected to result in lowered trust and trustworthiness (Sanfey et al., 2003).

Typically, amounts sent and returned in trust games vary significantly. The coefficients of variation found in a meta-analysis were around 0.30 for both trust and trustworthiness, with an average of 50% sent by investors and 37% sent by trustees (Johnson & Mislin, 2011). In this study, investors were willing to send an average of 60% of their endowment and trustees sent back 31% in proportion to the amount received, which is in line with the typical results. It is not possible to rule out the possibility that participants

may have realised deception, but it seems unlikely this had an effect on trust and trustworthiness.

It is nevertheless possible that the effect of city living on responses in this experiment was limited by the use of an online platform. In fact it is not possible to rule out the possibility that reduced cooperation found in city-dwellers in previous studies is context dependent and not internalised. Under this circumstance, city-dwellers would act as pro-socially as town-dwellers if in the same context. On the AMT platform, workers are unlikely to be experiencing the same context as they would in the real-world. Once again, the use of lab games in the field would enable to address this issue by testing behaviour in real-world settings (Baran et al., 2010; Gneezy & Imas, 2016).

Chapter 5

Urban residence effects on four real-world help measures

5.1 Abstract

Previous studies have demonstrated remarkable variation in human cooperation depending on the environmental context. In particular, city-dwellers are reportedly less cooperative than their rural-dwelling counterparts. These findings raise the possibility that differences in pro-social tendencies may be affected by the environmental features people experience in their every-day life. With over half of the world population living in cities, it is of primary importance to understand how city life may influence our behaviour. With this study, I conducted a set of real-world experiments in 12 cities and 12 towns across the UK. I used measures such as willingness to return a 'lost letter', to return a 'dropped item', to stop to let someone cross the road, and to donate to a charity collection to test: i) whether city-dwellers are less pro-social than town-dwellers across different forms of helping; ii) whether urban-rural variation in pro-sociality can be explained by "diffusion of responsibility" or iii) by "perceived anonymity" often experienced in cities. Results showed that urban-rural differences in pro-social tendencies are not as clearly defined as previously believed, and suggested the importance of socio-economic factors, rather than urbanicity per se, in shaping our cooperative tendency.

5.2 Introduction

One of the main challenges in studies of human cooperation is explaining the remarkable variation in pro-social tendency. Previous empirical research has

demonstrated that variation in measures of pro-sociality may depend on the environmental context (Bowles et al., 2003; Pepper & Nettle, 2017; Rand & Nowak, 2013; Silva & Mace, 2014). One major environmental context that has received little attention in experimental studies is urbanicity. Urbanisation – the gradual shift of population from rural to urban areas – is one of the most important causes of demographic change nowadays (UN DESA, 2014). Thus, it is important to understand how these rapid changes may affect us.

Early social theorists have hypothesised that urban living would be detrimental for pro-social tendency and that in highly populated communities it would be less likely to receive help from a stranger (Milgram, 1974; Simmel, 1950; Wirth, 1938). A number of studies in the helping literature found only partial support for this hypothesis (e.g. Amato, 1983; Goldman et al., 1983; Merrens, 1973; Korte & Kerr, 1975; Rushton, 1978). In a review, Steblay (1987) found a moderate although significant negative correlation between population size of the community and helping behaviour. Nevertheless, the threshold in population size varies largely across studies, ranging from 20,000 (Amato, 1983) to over 300,000 (Steblay, 1987). In more recent studies Levine (1994; 2008) also found that the strongest predictors of helping across different cities in the United States were population size and density. However, no rural sample was considered and population size ranged from over 350,000 to 4,000,000 inhabitants.

More importantly, the vast majority of studies in the urban-rural literature are conducted in central/business areas of cities and towns, but little is known about the representativeness of this sample. For example, in one study that looked at variation in help between business and residential areas of cities and towns, Goldman et al. (1983) found that significantly more help was given in residential areas, independently of

urbanicity. In addition, lower pro-social tendencies are often also associated with lower socio-economic well-being and crime rates, but these are also measured at a city/town level and thus are likely unrepresentative of the wide variability within single cities (Aldonas et al., 2007; Nettle et al., 2011). It seems particularly important to adopt an adequate level of analysis, as inequality and deprivation that strongly affect the poor may trigger anti-social behaviour (Muggah, 2012; Winton, 2004).

Specifically, a growing body of studies corroborate the idea that socio-economic status affects cooperative tendency. For example, using a lost letter experiment in 20 London neighbourhoods with a wide range of income deprivation scores, Holland et al. (2012) found that odds of the letter being returned were 91% lower in neighbourhoods with low income than in high-income neighbourhoods. A similar experiment conducted in Australia reported the same trend (Grueter et al., 2016). More extensive work also reports socio-economic status to be a major determinant of cooperative tendency (Korndorfer et al., 2014; Silva & Mace, 2014). In particular, Korndorfer et al. (2014) used results from eight large-sample studies and found a consistent positive effect of social class on cooperation. Wealthy individuals were more likely to make a donation to a charity, to volunteer, and they reported to be more helpful towards others on a day-to-day basis than poor individuals.

In contrast to these findings, a number of other studies (Cote et al., 2012; Kraus et al., 2010; Kraus et al., 2011; Piff et al., 2010; Piff et al., 2012) show that low-wealth individuals are more pro-social than their high-wealth counterparts in a variety of contexts. It is theorised that lower class individuals have less control and need to relay more on others for their future (Johnson & Krueger, 2005; 2006). This increased need for others could underpin a greater compassion and engagement in fairness and pro-

sociality. Nevertheless, a number of methodological differences may explain the different results. Firstly, the majority of these studies are laboratory or online experiments rather than field studies, and use extensively a student sample. More importantly, the socio-economic status is mostly self-reported, or is a perceived status in a ranking which is often manipulated experimentally. Finally, the sample is from the United States, which leaves open the possibility for a cultural difference in behaviour (Levine, 2003).

Here I aimed at solving these methodological shortcomings by selecting a convenience sample of 12 cities and 12 towns based on population size and density to replicate results of the urban-rural literature, and then using a neighbourhood-level analysis of socio-economic status of the area, for a better control and understanding of the factors influencing the urban-rural discrepancy in helping behaviour recorded. Thus, the experiments were run in high-wealth and low-wealth neighbourhoods of cities and towns, rather than in city and town centres alone. I used four different help measures to control whether the results were robust across different measures. In particular, I used lost letter, dropped item, jaywalking, and charity collection experiments. More importantly, I also tested the main explanations advanced for explaining the urban-rural variation in helping.

In fact, despite the evidence that population size and density are negatively associated with cooperative tendency, it is not clear what features of city-life might undermine cooperation. It might be that, as a consequence of high population density of cities, city-dwellers experience 'psychological overload' (Milgram, 1974) - which occurs when the sensory inputs exceed the system's capacity of processing them. The system must then prioritise some stimuli over others, and in doing so, it might overlook the possibility to act pro-socially. According to this idea then, city-dwellers would be just as likely as town-

dwellers to help when not experiencing overload. Another possible explanation for the urban-rural variation in cooperative tendency is that city-dwellers are more susceptible to the 'bystander effect' (Darley, 1967; Latane & Darley, 1970). In this circumstance, the likelihood of helping decreases with the increase in the number of onlookers. Thus, in cities, where the number of onlookers is often higher than in towns, levels of cooperation maybe lower.

Finally, the type of interactions that are more likely to take place in a highly populated city, are one-shot interactions with strangers. Such a context leaves little scope for reciprocity and for reputation gain associated with helping, as well as punishment of antisocial behavior (Milgram, 1974; Turner et al., 1987; Zimbardo, 1969). These are two important factors in promoting cooperation between unrelated individuals (West et al., 2007). This anonymity found in cities may be a key-factor underpinning any variance in cooperation levels. In particular, anonymity would arise when personal value or judgement lack, and individuals are not identified by others. This state of 'de-individualisation' could lead to antisocial and aggressive behaviour (Ellison et al., 1995; Reicher, 1984; Turner et al., 1987; Zimbardo, 1969).

In this study, I address these issues with the use of real-world measures. I aimed to capture the context-dependent characteristic of cooperation by measuring cooperative behaviour in a naturalistic environment. Moreover, all individuals in this study were not aware that they were part of an experiment, reducing the artificiality usually associated with laboratory and lab-in-the-field economic games. Based on the literature, my predictions were that, for each help measure, people would help more in towns than in cities, and in high-wealth neighbourhoods rather than in low-wealth neighbourhoods. I expected higher help levels when people were directly approached for help (no

bystander effect), and when asked to help in the presence of their social group (no anonymity).

5.3 Methods

5.3.1 Procedures

I conducted four large-scale experiments as well as direct observations to measure cooperative behaviour across 12 cities and 12 towns in the UK (Table 5.1). For each city, I selected two neighbourhoods, one high-wealth and one low-wealth, based on their national IMD. As for towns, I selected either a high-wealth or a low-wealth neighbourhood each, due to their lower variability in terms of wealth range within (Supporting material 5.6.1).

Table 5.1 Cities and towns selected for the study with their respective population size.

City	Population	Town	Population
Birmingham	1020589	Helensburgh	14220
Leeds	726939	Middlewich	13595
Glasgow	616430	Jaywick	4668
Sheffield	530375	Polesworth	9645
Cardiff	315040	Radstock	9419
Liverpool	467995	Redruth	19902
Edinburgh	448850	St Andrews	16870
Newcastle Upon-Tyne	282338	Saffron Walden	15210
Bristol	399633	Camborne	20436
Nottingham	283969	Wombourne	13511
Manchester	430818	Hawick	14294
Plymouth	255826	Abercynon	6390

Neighbourhood level analysis allowed me to have a focused control over demographic variables. In addition, at each testing site I conducted direct observations to control for additional community-level variables not captured by LSOAs census data, such as the

mean number of cars passing by (cars crossing a marked line in a ten minutes period), the number of people walking by (people crossing a marked line in a ten minutes period) and their walking speed (seconds needed to walk a marked ten metres distance). This information was used to test the overload hypothesis. This test, although not perfect, was satisfactory for the testing conditions and comparable with previous studies (Amato, 1983; Levine et al., 1994; 2008). For the experiments, I used lost letter, dropped item, and jaywalking experiments in 36 neighbourhoods with different socio-economic characteristics, and charity collection experiments in 10 cities and 9 town centres. Full procedures can be found in Chapter 2.

To test the bystander effect, I used a direct versus indirect help request in three of the experiments (i.e. no direct request in the jaywalking experiment), as picking out a person in the crowd should cancel the diffusion of responsibility (Flynn & Lake, 2008; Goldman et al., 1983; Steblay, 1987). In the lost letter experiment, the indirect request was made by simply dropping the letter on the pavement (as per Milgram et al., 1965) whereas the direct request was made by leaving the letter on a car's windscreen with a note saying "Could you post this for me, please? Thank you". This method was based on the evidence that people respond less to help general requests than to direct help requests in chat rooms (Markey, 2000) and that merely priming a social context leads to less helping in a subsequent and unrelated task, showing that the physical presence of others is not needed to elicit the diffusion of responsibility (Garcia et al., 2002). To test the effects of anonymity on helpful behaviour, I recorded responses to help requests made to people alone and people in a group. I used three help measures for this test: the dropped item, the jaywalking and the charity collection measures (i.e. no information recorded on who found the lost letters).

a) Lost letter experiment

For the lost letter experiment, I dropped 472 stamped letters on the pavement with the address facing up on rain and wind free mornings. In addition, to test the effects of direct help requests, I left 439 letters on cars' windscreens with a post-it saying: "Could you post this for me, please? Thank you". All letters were addressed by hand to a PO box address with the addressee's name made neutral by only using the name's initial (i.e. E. Zwirner). I used the return rates of the letters from the three treatments to measure the neighbourhood levels of cooperation. I controlled for the number of post-boxes and the mean number of trash visible recorded during transects in each neighbourhood.

b) Dropped item experiment

In the dropped item experiment, I walked in front of a selected subject (i.e. 18 years or older, not carrying bags, and had no physical handicap) and dropped a handful of 20 cards on the pavement when the subject was approximately 5 metres away. I then kneeled down and began picking them up one at a time. This experiment was carried 398 times in the 36 neighbourhoods. In 174 instances, I directly asked for help when I bent down retrieve the cards by looking the subject and asking: "Could you help me, please?". In the remaining 194 instances I bent down and looked at the subject, but never directly asked for help. After picking up the envelopes, I recorded gender and estimated age of the subject, whether he/she stopped to pick up any cards, if the subject was alone, and, if not, the gender of whom he/she was with.

c) Jaywalking experiment

In the jaywalking experiment, I stood on the sidewalk and started to cross the road when the selected car (i.e. inside the speed limits and with no other car behind) was approximately 10 meters away. If the car slowed down/stopped I continued to cross the

road, if it did not, I stepped back on the sidewalk. After the attempt to cross the road, I recorded whether the car stopped to let me cross the road, whether the driver was alone, and their gender and estimated age. This experiment was conducted 90 times in 26 neighbourhoods.

d) Charity collection experiment

Finally, I conducted charity collections for the charity Doctors Without Borders (www.doctorswithoutborders.org) in the central area of 10 cities and 9 towns. Charity collections took place during weekday mornings, between 09:00 and 13:00. During charity collections, I stood on the pavement with a branded T-shirt and branded hand-held collection bucket. Every third suitable pedestrian (i.e. 18 years or older, not carrying bags, and had no physical handicap) was selected as a subject. I switched between three experimental procedures every 15 minutes. These three treatments allowed me to test the effects of direct and indirect requests on donations. In one treatment, I asked directly for a donation by approaching the selected subject and saying: "Hello, would you like to make a donation for Doctors without Borders?". In the second treatment, I smiled and made eye contact with a subject while holding the collection bucket in sight, but never directly asked for a donation. And in the third treatment I stood smiling silently on the sidewalk without approaching or making eye contact to any potential subject, but every 30 seconds I would shake the collection bucket and ask for donations saying: "Please, make a donation for Doctor without Borders" without looking at anyone in the crowd. A second experimenter stood at a minimum distance of 10 metres away from the collection point and recorded the number of people passing in front of me (using a clicker), the gender of the subject, his/her estimated age, whether he/she contributed with a donation or not, and if the subject was alone or not (due to the local high-density of people present, no information on age and gender of the other group members was

recorded).

5.3.2 Analysis

I created four different models, one for each help measures, and used the binary response term of whether help was given or not for each request. In all models I used binary variables also for urbanicity levels (city/town) and for wealth of neighbourhoods (high-/low-wealth). This was done after establishing that these categories reflect the national IMD, employment, income and crime scores and that no qualitative difference was present in the outcome of the analyses using the original variables.

5.3.2.1 Were neighbourhoods of cities and towns environmentally different?

As a preliminary step, I used the information collected in the 36 neighbourhoods during observations to test whether cities and towns, as well as high- and low-wealth neighbourhoods, differed in: the mean number of people observed, their gender and age composition, mean number of groups observed and the number of people per social group (i.e. individuals walking together), mean walking speed (seconds/metre) by marking a 10 metres zone on the sidewalk, and the mean number of cars passing a pre-established line on the street.

5.3.2.2 What predicted the return rate of lost letters?

I created a binary response variable (0 = letter not returned and 1 = letter returned) and used a Generalized Linear Mixed Model (GLMM) with the place where the experiment was conducted as a random effect and the following explanatory terms: whether the letter was left in a city or in a town (binary: 0 = city, 1 = town), whether it was left in a high-wealth or in a low wealth neighbourhood (0 = high-wealth, 1 = low-wealth), whether the letter was dropped on the pavement (indirect request) or left on a car's windscreen

(direct request; 0 = direct, 1 = indirect), and the three interactions between the variables (i.e. urbanicity and wealth, urbanicity and type of help request, and wealth and type of help request). In addition, the mean number of post boxes, the mean number of trash pieces recorded per transect, the mean number of people observed and their mean walking speed (m/s) recorded in the neighbourhood were included as controls in the analysis. Nevertheless, the mean number of visible trash pieces was strongly correlated to the wealth of the neighbourhood, and in the final analysis I used the residual variance in trash not explained by wealth, rather than the mean number of trash pieces. The total number of observations for this model was n = 911.

5.3.2.3 What predicted helping in the dropped item experiment?

I created a GLMM with a binary response variable (0 = did not help to pick up the cards 1 = helped to pick up the cards) and the following explanatory terms: whether the experiment took place in a city or in a town (binary: 0 = city, 1 = town), whether it took place in a high-wealth or in a low wealth neighbourhood (0 = high-wealth, 1 = low-wealth), whether I asked directly or indirectly for help (0 = direct, 1 = indirect),
whether the subject was alone (0 = in group, 1 = alone), gender (0= male, 1 = female) and their estimated age (3-level categorical: 1 = 18-29 years old, 2 = 30-49, 3 = 50 and over). I included the interactions between urbanicity and wealth, urbanicity and type of help request, and neighbourhood wealth and type of help request. Additionally, I included the mean number of trash pieces recorded per transect, the mean number of people observed and their mean walking speed (m/s) recorded during observations in the neighbourhood. The place where the experiment was conducted was included in the model as a random effect. The total number of observations for this model was n = 398.

5.3.2.4 What predicted helping in the jaywalking experiment?

Similarly, I created a GLMM with a binary response variable (0 = car did not stop, 1 = car stopped) and the following explanatory terms: whether the experiment took place in a city or in a town (binary: 0 = city, 1 = town), whether it took place in a high-wealth or in a low wealth neighbourhood (0 = high-wealth, 1 = low-wealth), whether the subject was alone in the car (0 = in group, 1 = alone), their gender (0 = male, 1 = female) and their estimated age (3-level categorical: 1 = 18-29 years old, 2 = 30-49, 3 = 50 and over). I included the interaction between urbanicity and wealth. Additionally, I included he mean number of cars passing a pre-established line on the street, the mean number of people observed and their mean walking speed (m/s) recorded in the neighbourhood, and the place where the experiment was conducted was included in the model as a random effect. The total number of observations for this model was n = 90.

5.3.2.5 What predicted donations in the charity collection experiment?

For charity collections, I firstly I tested whether the three conditions (direct, indirect, and general requests) differed in the total number of donations made following a request for donation (chi-squared tests with Bonferroni correction). Then I ran a GLMM model with binary response term (0 = no donation, 1 = donation) and five explanatory variables: whether the experiment took place in a city or in a town (binary: 0 = city, 1 = town), whether I asked directly or indirectly for a donation (0 = direct, 1 = indirect), whether the subject was alone (0 = in group, 1 = alone), their gender (0 = male, 1 = female) and their estimated age (3-level categorical: 1 = 18-29 years old, 2 = 30-49, 3 = 50 and over), and the interaction between the urbanicity and type of request. Finally, I used the mean number of people observed walking pass (at a distance less than three meters from me) during the time of the collection for each block (i.e. direct/indirect request), and the place where the experiment was conducted was included in the model as a random effect.

5.4 Results

The strongest predictor of helping for the lost letter, dropped item, and jaywalking experiments was wealth. In all helping episodes (other than the charity collection that took place in the central area), there was a clear trend for helping rates to decrease in low-wealth neighbourhoods (Figure 5.1).
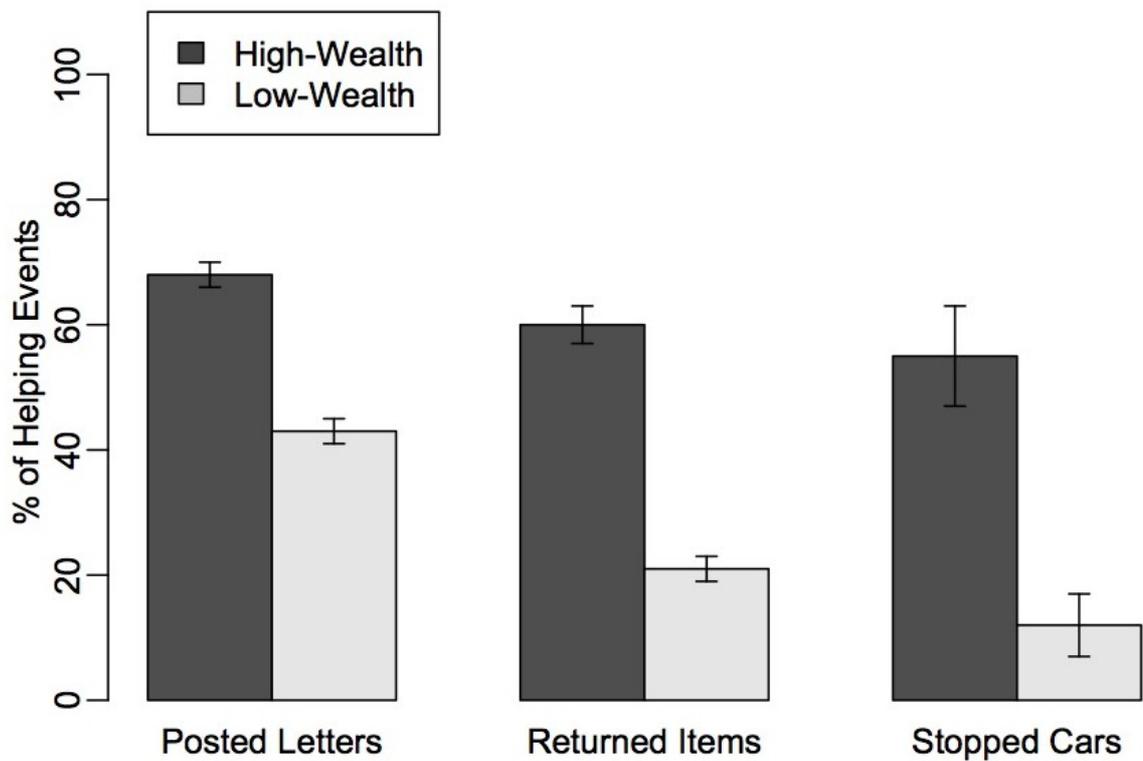
Figure 5.1 Bar plot with error bars of the percentage of helping episodes in high- wealth and low-wealth neighbourhoods for three help measures.

5.4.1 Were neighbourhoods of cities and towns environmentally different?

The table in Supporting materials 5.6.2 summarises the values of community variables recorded during the direct observations and transects. I found no significant difference between neighbourhoods of cities and towns in the mean number of people passing by in a 10 minutes interval (city: mean ± se = 35.35 ± 3.33; town: 27.38 ± 6.45), nor in the mean walking speed (in seconds) over a 10-metres distance (city: 6.44 ± 0.08; town: 6.20 ± 0.13). Significantly more cars passed by in neighbourhoods of cities rather than towns (city; mean ± se = 105.7 ± 7.99, town: 73.97 ± 10.45; t-test: t = 2.41, df = 25.57, p = 0.02). Moreover, a significant difference was found between neighbourhoods of different wealth, with more trash found in low-wealth neighbourhoods than high-wealth neighbourhoods (low-wealth: mean ± se = 18.21 ± 5.35, high-wealth: 5.84 ± 1.05; t-test: t = -2.27, df = 19.38, p = 0.03).

5.4.2 What predicted the return rate of lost letters?

Overall, 491 of the 911 lost letters (54%) were returned. In cities 57% (n = 322) of the letters were posted, compared to 49% (n = 150) in towns. Lost letters were more likely to be posted when left on windscreens (direct request) than when left on the pavement (effect size = -0.43; CI: -0.91, -0.15), even when controlling for the amount of trash on the street (effect size = -0.0004; CI: -0.01, 0.01). Letters where also less likely to be posted in low-wealth neighbourhoods (effect size = -1.95; CI: -2.01, -1.54), particularly in the direct-request condition (effect size = 1.27; CI: 0.58, 1.72; Figure 5.2; Table 5.2).

Urbanicity and the interaction between urbanicity and the type of request were also component variables of the top models, but their confidence intervals spanned zero, suggesting that they were not likely to affect help (Table 5.3).

Table 5.2 Top models (models within 2AICc units of the best model), with AICc values for model investigating the effects of population size on lost letters return rate. Request: type of request made, Wealth: wealth of neighbourhood, Urbanicity: urbanicity level of settlement, Trash: residual values for number of pieces of trash not explained by wealth of neighbourhood.

Model Rank	Parameters	df	AICc
1	Request + Wealth + Urbanicity + Request : Wealth + Urbanicity : Wealth	7	1009.14
2	Request + Wealth + Urbanicity + Request : Wealth	6	1009.73
3	Request + Wealth + Request : Wealth	5	1010.11
4	Request + Wealth + Urbanicity + Request : Wealth + Urbanicity : Wealth + Request : Urbanicity	8	1010.4
5	Request + Wealth + Urbanicity + Request : Wealth + Urbanicity : Wealth + Trash	8	1010.61

Table 5.3 Estimates, unconditional standard errors and confidence intervals for parameters included in the top models from Table 5.2.

Parameter	Estimate	SE	Confidence Interval
Request	-0.43	0.21	(-0.91, -0.15)
Wealth	-1.95	0.3	(-2.01, -1.54)
Urbanicity	-0.11	0.4	(-0.93, 0.65)
Request : Wealth	1.27	0.31	(0.58, 1.72)
Urbanicity : Wealth	-0.51	0.27	(-2.01, 0.73)
Request : Urbanicity	-0.22	0.2	(-0.74, 0.30)
Trash	<0.001	0.004	(-0.01, 0.01)
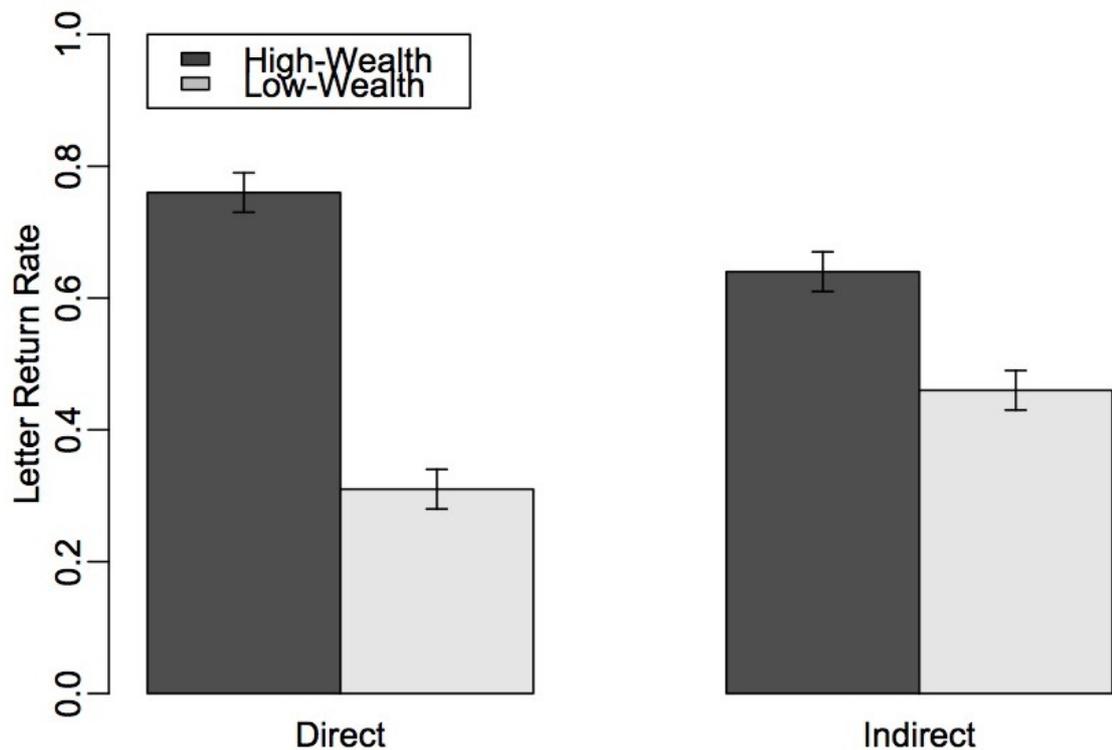
Figure 5.2 Bar plot with error bars of the interaction between type of request and wealth of neighbourhood for the lost letter experiment. Direct requests had a negative effect on return rate for letters left in low-wealth neighbourhoods.

5.4.3 What predicted helping in the dropped item experiment?

Overall, I received help in 33% of the instances in both cities (n = 89 on 272) and towns (n = 41 on 126). I was more likely to be helped in the high-wealth than in the low-wealth neighbourhoods (effect size = -0.21; CI: -0.12, -0.35) and when the subject was alone rather than in group (effect size = 0.18; CI: 0.12, 0.30; Figure 5.3; Table 5.4).

Table 5.4 Top models (models within 2AICc units of the best model), with AICc values for model investigating the effects of population size on helping in the dropped item experiment. Request: type of request made, Wealth: wealth of neighbourhood, Alone: whether the subject was alone or in a group, Gender: gender of subject, Load: number of people passing by.

Model Rank	Parameters	df	AICc
1	Wealth + Alone	4	849.41
2	Wealth + Alone Request : Wealth	5	849.7
3	Gender + Wealth + Alone	5	850.03
4	Gender + Wealth + Alone Request : Wealth	6	850.11
5	Wealth + Request + Load	5	850.29

Type of request, the interaction between wealth and the type of request, the gender of subjects, and the mean number of people passing by during observations were also component variables of the top models, but their confidence intervals spanned zero, suggesting that they were not likely to affect help in this experiment (Table 5.5).

Table 5.5 Estimates, unconditional standard errors and confidence intervals for parameters included in the top models from Table 5.4.

Parameter	Estimate	SE	Confidence Interval
Gender	0.03	0.03	(-0.43, 0.1)
Wealth	-0.21	0.04	(-0.12, -0.30)
Alone	0.18	0.04	(0.12, 0.30)
Request : Wealth	0.1	0.08	(-0.22, 0.15)
Request	0.02	0.02	(-0.05, 0.11)
Load	0.03	0.02	(-0.24, 0.51)
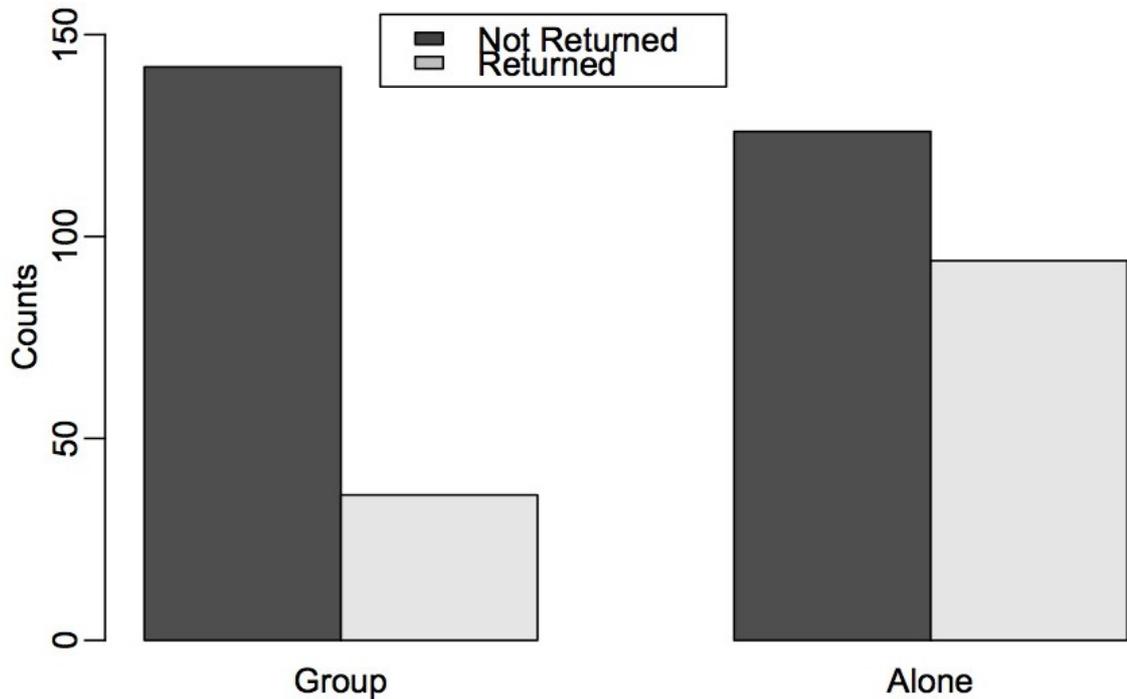
Figure 5.3 Bar plot of the counts of helping and non-helping episodes with subjects alone and subjects in group for the dropped item experiment.

5.4.4 What predicted helping in the jaywalking experiment?

In cities cars stopped to allow crossing the street 30% (n = 19 on 62 events) of the times, and in towns cars stopped 31% of the times (n = 9 on 28 events). Cars were less likely to stop for a jaywalker in the low-wealth neighbourhood than in the high-wealth neighbourhood (effect size = -0.44; CI: -0.11, -0.30; Table 5.6).

Table 5.6 Top models (models within 2AICc units of the best model), with AICc values for model investigating the effects of population size on helping in the jaywalking experiment. Wealth: wealth of neighbourhood, Gender: gender of subject.

Model Rank	Parameters	df	AICc
1	Wealth	3	701.3
2	Wealth + Gender	4	701.51

Gender of the subject was also a component of one of the top models, but confidence intervals for this variable spanned zero, suggesting that it had no effect on helping (Table 5.7). Urbanicity was not a component of any of the top models.

Table 5.7 Estimates, unconditional standard errors and confidence intervals for parameters included in the top models from Table 5.6.

Parameter	Estimate	SE	Confidence Interval
Gender	0.03	0.05	(-0.29, 0.58)
Wealth	-0.44	0.09	(-0.11, -0.30)

5.4.5 What predicted donations in the charity collection experiment?

In the charity collection experiment, direct donation requests held significantly different results from indirect requests (Chi-squared = 19.98, df = 1, p < 0.001; Bonferroni adjusted alpha levels 0.0125) and from general requests (Chi-squared = 39.65, df = 1, p < 0.001). On the other hand, no significant difference was found between indirect and

general requests for donations (Chi-squared = 4.55, df = 1, p = 0.03; Table 5.8). In the

global model, only direct and indirect donation requests were used in the 'type of

request' variable.

Table 5.8 Donations for the three treatments in the charity collection experiment.

	Direct	Indirect	General
No Donation	175	213	202
Donation	81	36	17

Overall, 21% of the subjects in cities and 25% of the subjects in towns contributed with a

donation. A total of n = 61 donations were made in cities and n = 56 in towns. Donations

were less likely to be made when the requests were indirect (effect size = -1.35; CI:

-2.73, -0.21), whereas subjects alone were more likely to make a donation than subjects

in a group (effect size = 0.33; CI: -0.16, 0.89; Table 5.9), although confidence intervals

for this variable spanned zero (Table 5.10).

Table 5.9 Top models (models within 2AICc units of the best model), with AICc values

for model investigating the effects of population size on donations. Request: type of

request made, Alone: whether the subject was alone or in a group, Load: number of

people passing by, Urbanicity: urbanicity level of settlement.

Model Rank	Parameters	df	AICc
1	Alone + Request + Alone : Request	5	831.91
2	Alone + Request + Urbanicity + Alone : Request	6	831.95
3	Alone + Request	4	831.97
4	Alone + Request + Load Alone : Request	6	832.03
5	Alone : Request + Load	4	832.08

Other components of the top models were urbanicity, the number of people passing by, and the interaction between the type of request for donations and whether the subjects was alone. Confidence intervals for both these variables spanned zero (Table 5.10).

Table 5.10 Estimates, unconditional standard errors and confidence intervals for parameters included in the top models from Table 5.9.

Parameter	Estimate	SE	Confidence Interval
Alone	0.33	0.23	(-0.16, 0.89)
Request	-1.35	0.22	(-2.73, -0.21)
Alone : Request	1.01	0.03	(-0.23, 3.4)
Urbanicity	-0.45	0.4	(-1.31, 0.37)
Load	-0.05	0.21	(-0.24, 0.99)

5.5 Discussion

In this study, I used four help measures and I aimed to test whether city-dwellers were less cooperative than town-dwellers and, if so, why. Moreover, I tested the influence of socio-economic factors on cooperation. I found no evidence that city-living is associated with lower pro-sociality. In all four experiments, city-dwellers were as likely as town dwellers to help. Interestingly, no significant differences were found between cities and towns in the two most commonly used (Amato, 1983; Levine et al., 1994; 2008) measures of load (i.e. number of people, walking speed) when measured at the neighbourhood level. This could suggest that environmental features found in city centres but not in town centres are responsible for the urban-rural variation in previous studies, as here the focus was on neighbourhoods rather than central areas. Nevertheless, here one help measure (i.e. the charity collection) was conducted in city

and town centres and no urban-rural variation in helping was recorded. One possible explanation for this discrepancy could be that the methodology of the experiment interfered with the normal charity collection. In particular, the long moments of indirect and general requests, as well as the presence of a single collector were atypical. This might have been more noticeable in small towns rather than in cities (personal observation), which could have led to a reduced number of donations made in towns in this experiment.

The main predictor of help was wealth, with rich neighbourhoods more likely to post a lost letter, to return a dropped item, and to allow a pedestrian to cross the road, than poor neighbourhoods. This finding adds to the evidence that socio-economic factors play an important role in shaping human behaviour (Frankenhuis et al., 2016; Korndorfer et al., 2014; Pepper & Nettle, 2017). Importantly, this correlation is consistent across different measures despite the fact that none of them implies any direct financial cost for the helper. This finding also suggests that the lack of urban-rural variation in cooperation in this study might be maybe due to the different level of analysis used compared to previous studies. In particular, here I employed a neighbourhood-level of analysis and looked at deprivation and crime in small areas where the experiments were conducted, rather than using overall city or town values of deprivation and crime. It seems that a city/town level of analysis is too broad to capture the effects of local deprivation. Specifically, cities have a wider range of neighbourhoods' wealth within (Pateman, 2011), thus an overall city/town wealth analysis wouldn't have caught this difference between urbanicity and wealth effects.

Moreover, it is interesting to notice that lost letters were less likely to be returned when dropped in low-wealth neighbourhoods in both direct and indirect requests. This

eliminates the possibility that letters are not returned as they might have been confused as litter when left on the pavement in low-wealth neighbourhoods, as the mean number of visible trash pieces was strongly correlated to the wealth of the neighbourhood. The strong negative effect of direct requests in low-wealth neighbourhoods instead might stem from the feelings of distrust and individualism found in these areas (Laurence & Heath, 2008), or from personal characteristics of individuals linked to the environment. Of particular relevance are the results of experimental studies that show the emergence of antisocial behaviour in resource scarcity (e.g. Brunnschweiler & Bulte, 2009; Gardner & West, 2004; Lynch et al., 1997; Prediger et al., 2014; Zizzo & Oswald, 2001; Zizzo, 2003). Spiteful and antisocial behaviour are considered evolutionarily beneficial in periods of scarcity because they increase the perpetrator's fitness relatively to the harmed competitor. In example, using the 'joy-of-destruction' game (Abbink & Herrmann, 2011), Prediger et al. (2014) find evidence for a strong positive relationship between scarcity of natural resources and spite. In this one-shot game, two players are given equal endowments and they can decide to sacrifice part of their endowment in order to lower the other players' payoff below its own (the 'money destruction' option). There is no monetary gain in money destruction. Prediger et al. (2014) conducted this game with pastorals in Namibia from two areas of different productivity and found evidence for a strong positive relationship between scarcity of natural resources and willingness to reduce another inhabitant's endowment at their own cost. It is suggested that the greater scarcity leads to greater competitive pressure and spiteful behaviour between individuals. It is possible that the lower return rates of letters, as well as the lower help rates for the dropped item and the jaywalking experiments, found in poor neighbourhoods rather than rich neighbourhoods, are underpinned by the greater competitive pressure present in resource scarcity.

For the charity experiment, direct and indirect requests had a strong effect on charity donations. Independently of urbanicity, direct requests were more than twice as likely than indirect requests to elicit a donation. These results are in accordance with results in the helping literature (Darley & Latane, 1968; Goldman et al., 1983) and the absence of the effect in the dropped item experiment is surprising. In contrast with my expectations, I also recorded higher helping from lone individuals than from individuals in groups. I expected individuals in a group to help/donate more than lone individuals as the presence of others would create the opportunity for reputation and reciprocity (West et al., 2007). Nevertheless, it is possible that single individuals were more prone to help than individuals in groups because no diffusion of responsibility (Clark & Word, 1974) between group members was possible. In particular, the diffusion of responsibility is used as a possible explanation for the bystander effect, suggesting that bystanders avoid helping when they believe someone else could or is providing assistance (Darley & Latane, 1968). Another explanation could be that in anonymity and de-individualisation, increase normative behaviour (Reicher, 1984). Under this circumstance, individuals would behave following what is believed the social norm of behaviour rather than following personal preference (Reicher, 1984; Wright et al., 1990). In particular, individuals in social groups experience a greater sense of social identity and are more likely to follow the group behaviour. Moreover, small-group membership is valued more in de-individualisation, suggesting that de-individualisation and group size interact in determining identification in social groups (Brewer, 1991; 1993; Reicher et al., 1995).

5.6 Supporting material

5.6.1 Key characteristics of neighbourhoods selected

	Urbanicity	Wealth	LSOA code	IMD decile	Income decile	Employment decile	Crime decile	Population size
Redruth	town	low	E01018911	2	2	2	1	1,656
Middlewich	town	high	E01018424	8	8	7	6	1,773
Abercynon	town	low	W01001144	1	1	1	1	1,652
Hawick	town	low	S01012360&2	1	1	2	1	884
Polesworth	town	high	E01031038	7	6	6	8	2,025
Wombourne	town	high	E01029675	9	8	6	6	1,495
Jaywick Clacton-on-Sea	town	low	E01021968	1	1	1	1	1,830
Camborne	town	low	E01018871	4	5	4	4	1,647
Saffron Walden	town	high	E01022076	9	7	8	8	1,772
Radstock	town	low	E01014469	4	5	5	7	1,380
St. Andrews	town	high	S01009730&29	10	8	10	10	1,180
Helensburgh	town	high	S01007388&92	10	10	10	9	1,157
Helensburgh East	town	low	S01007398&9	2	2	2	4	1,255

Note: Urbanicity refers to the size of the settlement in which the neighbourhood is found, whereas population size refers to the population size of the neighbourhood

(LSOA). Scottish neighbourhoods are based on two DZs. Wealth variable is determined from the national IMD, Income, Employment and Crime deciles.

	Urbanicity	Wealth	LSOA code	IMD decile	Income decile	Employment decile	Crime decile	Population size
Liverpool Cosby	city	high	E01006938	8	8	7	9	1,249
Liverpool Toxteth	city	low	E01006632	1	1	1	5	1,888
Glasgow Partick	city	high	S01010400&02	10	9	10	10	2,161
Glasgow Carlton	city	low	S01010037&8	1	1	1	1	1,669
Bristol Clifton	city	high	E01014544	8	10	10	8	1,631
Bristol Ashton	city	low	E01014501	3	3	3	5	1,927
Cardiff Pontcanna	city	high	W01001714	10	9	10	6	1,550
Cardiff Adamstown Splott	city	low	W01001696	1	1	1	1	1,595
Leeds Adel	city	high	E01011383	7	6	6	5	1,581
Leeds Beeston	city	low	E01011369	3	2	4	2	1,632
Newcastle Gosforth	city	high	E01008355	10	8	9	10	1,555
Newcastle Walker	city	low	E01008426	1	1	1	5	1,614
Edinbourgh Murrayfield	city	high	S01008883&2	10	10	10	3	1,745
Edinbourgh Leith	city	low	S01008777&6	1	2	1	2	1,947
Manchester Chorlton	city	high	E01005152	7	8	8	3	1,419
Manchester Harpurhey	city	low	E01005203	1	1	1	1	2,052
Sheffield Hallam	city	high	E01032585	8	8	8	10	2,178
Shaffield Parkhill Manor	city	low	E01007881	2	2	2	2	1,618
Birmingham Harborne	city	high	E01009077	3	4	3	5	1,809
Birmingham Aston	city	low	E01008901	1	1	1	3	1,773
Plymouth Elburton	city	high	E01015127	7	6	5	8	1,514
Plymouth Stonehouse	city	low	E01015155	1	1	1	1	1,882
Nottingham Beeston	city	high	E01013892	7	7	4	8	1,392
Nottingham Bilborough	city	low	E01013859	1	2	1	4	1,471

5.6.2 Results of observations and transects: Average values for the variables collected during observations and transects in each neighbourhood.

	Urbanicity	Wealth	Average Cars	Average Trash	Average People	Average Pace
Liverpool Cosby	city	high	112	11	12.2	6.36
Liverpool Toxteth	city	low	133	32	67.5	6.58
Glasgow Partick	city	high	132	1	21.4	6.09
Glasgow Carlton	city	low	91	104.5	52	6.67
Bristol Clifton	city	high	115.7	7	48	6.46
Bristol Ashton	city	low	182.5	6.2	60	7.01
Cardiff Pontcanna	city	high	62.5	15	34.7	6.33
Cardiff Adamstown Splott	city	low	149	6	27	6.3
Leeds Adel	city	high	143	2.45	30	7
Leeds Beeston	city	low	62.7	3	8.33	6.05
Newcastle Gosforth	city	high	71	3.7	15	6.41
Newcastle Walker	city	low	54	2.5	23	5.5
Edinbourgh Murrayfield	city	high	162	39	37.5	5.58
Edinbourgh Leith	city	low	132	1	21.4	6.09
Manchester Chorlton	city	high	89	17	32.4	6.47
Manchester Harpurhey	city	low	74.5	5	53	6.35
Sheffield Hallam	city	high	58.75	24.5	16	6.23
Shaffield Parkhill Manor	city	low	101	7.5	NA	6.92
Birmingham Harborne	city	high	53.25	16.5	17	6.57
Birmingham Aston	city	low	108	12.5	19	6.3
Plymouth Elburton	city	high	157	3	45	7.31
Plymouth Stonehouse	city	low	143	18	48	6.48
Nottingham Beeston	city	high	54.7	12	36	6.41
Nottingham Bilborough	city	low	106.7	11.5	32.5	6.6

	Urbanicity	Wealth	Average Cars	Average Trash	Average People	Average Pace
Redruth	town	low	40.7	4	65	6.44
Middlewich	town	high	71	3.7	15	6.41
Abercynon	town	low	42	7	7	6.33
Hawick	town	low	53	7.2	12	7.04
Polesworth	town	high	93	4	3.5	6.15
Wombourne	town	high	71.5	4	8	6.05
Jaywick Clacton-on-Sea	town	low	163	4	34	5.21
Camborne	town	low	127.4	12	36	6.51
Saffron Walden	town	high	40.7	4	65	6.44
Radstock	town	low	50.5	5	7.5	6.05
St. Andrews	town	high	67.5	3.33	68	6.38
Helensburgh	town	high	48.5	1.5	20	6.21
Helensburgh East	town	low	98	4.33	18	6.35

Chapter 6

Discussion

6.1 Overview and general results

Human cooperative tendency qualitatively exceeds that of any other species; we extensively cooperate with non-relatives that we are unlikely to meet again, thus in situations that provide little opportunity for reciprocity or reputation building. Cooperation also varies greatly depending on the environmental contexts. In particular, there is a widespread view that city life is linked with lower cooperative tendency than life in rural settings. This view has found empirical support in various studies (e.g. Korte, 1980; Amato, 1983; Steblay, 1987; Levine et al., 1994; 2008).

In this thesis, I investigated cooperation levels across different urban scales in different experimental contexts. I studied the effects of city-living on generosity in a dictator game and in self-reported measures of cooperation; the effects of city-living on trust and trustworthiness; and the effects of city-living on four real-world help measures as well as the features of city-life that affect cooperative behaviour. I aimed at understanding whether urban-rural differences in cooperative tendency existed and if these were consistent across different contexts and forms of helping. Moreover, I tested whether urban-rural variation in cooperation can be explained by differences in trust levels, stimuli load, anonymity, or a general diffusion of responsibility.

6.1.1 Urban residence effects on generosity

I used a dictator game and two self-report measures of cooperative behaviour to

investigate how urbanicity influences pro-sociality. I also controlled whether behaviour in the dictator game correlates with results from self-reported measures of cooperative behaviour in the real world. I used donations in the dictator game as proxy for generosity (Kahneman et al., 1986), and self-report measures' results as proxy for the levels of pro-sociality. Self-report measures asked to rate statements about self-perceived generosity (Rushton et al., 1982) or statements on the frequency in which one engages in prosocial activities (Smith & Hill, 2009). Based on the literature, my predictions were that city-dwellers would be less generous than town-dwellers. I also predicted that results from the dictator game and scores from the self-report measures would be correlated, with city-dwellers reporting fewer real-world cooperative acts than town-dwellers.

Counter to the predictions, urbanicity did not affect generosity in the dictator game or in the self-reported measures of cooperative behaviour. In this study, I found no support for the hypothesis that city-life is associated with lower cooperative tendency (e.g. Amato, 1983; Levine et al., 1994; Levine et al., 2008). On the other hand, results showed a positive correlation between self-report measures of cooperative behaviour and donations in a dictator game, adding to the evidence that decisions made in economic games and the self-report measures of moral values are positively correlated (Peysakhovich et al., 2014).

6.1.2 Urban residence effects on trust and trustworthiness

A growing body of evidence from different fields suggest a negative role of city life on trust and cooperation (Anderson & Jane, 2011; Balliet et al., 2014; Dye, 2008; Gächter et al., 2004; Peen et al., 2010; Lederbogen et al., 2013; Lederbogen et al., 2011). In particular, city-dwellers are found to experience higher stress and anxiety levels via amygdala activation (Lederbogen et al., 2011). For example, Lederbogen and

colleagues (2011) showed that amygdala activity during social stress was stronger in city-dwellers than town-dwellers and suggested that the exposure to the socially stressful environment of cities over long periods of time would increase the risk of depression, chronic stress and anxiety, and coronary heart disease. The amygdala is required for a normal social cognition, and modulates fear responses (Adolphs & Spezio, 2006; LeDoux, 2000). Moreover, it affects facial processing, which can lead to reduced trust in others in situations of high social stimuli. In fact, an impaired amygdala response can make it difficult to interpret others' intentions (Adolphs & Spezio, 2006). As a consequence, lower trust levels in others reduce cooperation, as people are less inclined to invest in a cooperative exchange (House & Wolf, 1978).

I used a trust game (Berg et al., 1995) to investigate the effects of urbanicity on trust and trustworthiness. I expected city-dwellers to be generally less trusting and thus to keep more of the endowment than town-dwellers. Moreover, I expected city-dwellers to be less trustworthy and send back less money than town-dwellers regardless of where their interaction partner was from. In this experiment, I found a strong negative effect of urbanicity on the amount investors sent, thus adding evidence to a growing body of research showing that city life negatively affects trust towards strangers (e.g. Adolphs & Spezio, 2006; Balliet et al., 2014; Lederbogen et al., 2011; Gächter et al., 2004). In addition, I found that city-dwellers were as trusting towards other city dwellers as towards town dwellers, which demonstrates that the place of residence of the trustee was not used as a clue of trustworthiness. Trustworthiness, on the other hand, was not affected by urbanicity. City-dwellers were as trustworthy as town-dwellers, which contradicts the hypothesis that city life is associated with lower cooperative tendency.

The explanation for these results may be found in the fact that trust in others is affected by amygdala activity under stressful social stimuli of cities compared to towns (Adolphs

& Spezio, 2006), whereas trustworthiness stems from moral cognition rather than social cognition, thus the amygdala only plays a marginal role in this. Cortical regions of the prefrontal cortex and temporal lobes modulate moral cognition (Moll et al., 2003; 2005). This could explain why trust, but not trustworthiness, is affected by the environmental condition.

6.1.3 Urban residence effects on four help measures

I ran four real-world experiments in 36 neighbourhoods of cities and towns across the UK. I used 'lost letter', 'dropped item', 'jaywalking', and 'charity donations' experiments to test whether city-dwellers were less pro-social than town-dwellers across different forms of helping and, if so, to test what explains this urban-rural variation. In particular, I investigated whether "psychological overload", "diffusion of responsibility" or "perceived anonymity" often experienced in cities were responsible for lower levels of pro-sociality found in cities. Based on the literature, I predicted that people would help more in towns than in cities, and I expected higher help levels when people were directly approached for help (i.e. no bystander effect), and when asked to help in the presence of their social group (i.e. no anonymity). Moreover, I controlled for the effects of SES of the neighbourhood and its effect on cooperation. I predicted that help would be higher in high-wealth neighbourhoods than low-wealth neighbourhoods.

Results from the field experiments showed no evidence that city-living is associated with lower pro-sociality. In all four experiments, city-dwellers were as likely as town dwellers to help. Interestingly, no significant differences were found between cities and towns in the most commonly used measures of load (Amato, 1983; Levine et al., 1994; 2008) when measured at the neighbourhood level. Moreover, direct help requests were generally associated with higher help rates, whereas the presence of a social group did not elicit helping. The main predictor of help was wealth of the neighbourhood for all

help measures. This finding adds to the evidence that socio-economic factors play an important role in shaping human behaviour (e.g. Frankenhuis et al., 2016; Korndorfer et al., 2014; Pepper & Nettle, 2017). I suggest that the absence of urban-rural variation in cooperation levels may stem from to the different level of analysis used in this study compared to previous ones (i.e. neighbourhood wealth analysis versus city/town wealth analysis). I argue that cities have a wider range of wealth within compared to towns (Pateman, 2011), hence an overall city/town wealth analysis would have led to misleading results regarding the link between urbanicity and cooperation.

6.2 Methodological considerations

6.2.1 Reliability of AMT

I used a dual approach of laboratory and field studies for a comprehensive look at urban-rural variation in cooperative behaviour. In both approaches, I found no evidence of urban-rural differences in cooperation: city-dwellers were as generous (Chapter 3), trustworthy (Chapter 4), and helpful (Chapter 5) as town-dwellers. In addition, I found that donations in the dictator game were correlated with self-report measures of generosity. Altogether, these results would suggest a strong reliability of AMT for the study of human behaviour, and add support to an ongoing discussion on the generalisation of results drawn from this medium (Chandler et al., 2013; Ipeirotis, 2010; Rand, 2012).

Nevertheless, it could be argued that AMT was not able to detect any influence of SES on cooperation. Indeed, in the AMT studies, workers were asked to provide information on their average annual income, and this was not predictive of choices in lab games or of results in self-report measures. Income, however, is arguably descriptive of the socio-economic situation in which workers are living. In particular, to define wealth in the real-

world experiments I used the IMD, which is a multi-dimensional index composed of different domains relevant to deprivation (i.e. employment, income, health, education, services, crime; Payne & Abel, 2012). It is possible that the deprivation situation lived by subjects in real-world experiments is more significant than the information on personal income given by workers on AMT. In this study, only information on the urbanicity of the place of residence was gathered. It would be interesting to test the effectiveness of AMT using the same neighbourhood level of analysis used in the filed experiments (i.e. asking workers to provide a ZIP code and gathering information on the neighbourhood from US census).

6.2.2 Field experiments

The major concern about methodology in the field experiments is regarding the charity collections. Of the four help measures used in the field experiments, the charity collections were the only ones carried out in city and town centres instead of neighbourhoods. Even in this context, I found no effect of urbanicity on cooperation, although it should have been expected based on previous work which is also mainly conducted in central areas of cities and towns (e.g. Amato, 1983; Levine et al., 1994). I argue that, unfortunately, the procedure prevented me from creating a realistic setting for the experiment. I believe that indirect and general requests for a donation were perceived as unnatural and this perception was promoted further by the presence of a single collector (personal observation). This belief is supported by the few instances in which I have been directly questioned about my work during collections. It is possible that small towns' donations were affected more than cities' donations, leading to lower than normal cooperation in town centres in this study.

On another note, the methodological approach used to test direct and indirect requests in the lost letter experiment generated interesting results. On one hand, direct requests

(i.e. letters left on windscreens) were more likely to be successful, in line with results from other studies (Darley & Latane, 1968; Goldman et al., 1983). This would suggest that the approach is sound. On the other hand, direct requests also had the opposite effect when carried out in deprived neighbourhoods, which requires an explanation that deviates from the diffusion of responsibility literature. This result can be better explained considering the evidence that shows the emergence of antisocial behaviour in situation of deprivation (Brunnschweiler & Bulte, 2009; Gardner & West, 2004; Lynch et al., 1997; Nettle et al., 2011). In this scenario, individuals would be more prone to discard the letter found in deprived neighbourhoods as an act of antisocial behaviour (e.g. simple littering) stemming from the environmental conditions they live in.

6.3 Cities and cooperation

The most striking result constant throughout this study is that city-dwellers are as cooperative as town dwellers, which is in contrast with previous theories and empirical studies (see Korte, 1978; Steblay, 1987 for reviews). Theoretically, this result fits Gans' idea (1962; 1967) that city-life per se has no actual impact on social behaviour. Gans argues that factors independent from urbanicity, such as individual's age, ethnicity or SES, shape pro-social responses. Therefore, factors such as overload, population size and density, generally associated with urbanicity, have no direct influence on pro-sociality. Gans suggests that the only possibility to find urban-rural differences is if urban and rural populations differ in their social traits – if, for example, the urban population is constituted by mainly working-class individuals and the rural by mainly middle-class individuals.

Here, I argue that the urban population does differ from the rural population in the way that it experiences a wider range of deprivation. I also argue that this difference has erroneously led to the belief that urbanicity was causing the reduction in cooperation

levels. Instead, deprivation, which is linked to urbanicity, affects cooperation. Instances like this happen when a factor of confusion (i.e. deprivation) acts on both the 'cause' (i.e. urbanicity) and the 'effect' (i.e. cooperation) under study (Simpson's paradox: Simpson, 1951; Blyth, 1972; Wagner, 1982). A solution to the problem is to identify the factor of confusion and study it apart.

In this study, I looked at deprivation separately and found that it affects cooperation directly. Moreover, I showed that urbanicity and deprivation are linked, as cities are found to have a wider range of deprivation compared to towns (Pateman, 2011). Thus, previous studies finding urban-rural variation in cooperation when looking at an overall city/town level of deprivation analysis might be explained under this light. The real cause of decreased cooperation (i.e. deprivation) might have been concealed by the misleading results.

6.4 Deprivation and cooperation

The strongest result from the field experiments was that cooperation was negatively affected by deprivation levels of the neighbourhood. I found that in high-wealth neighbourhoods people were more likely to post a lost letter, to return a dropped item and to allow a pedestrian to cross the road, than low-wealth neighbourhoods. Interestingly, none of these help measures implies a direct financial cost to the helper. This result is in line with several recent studies that show the impact of socio-economic factors on human behaviour and cognition (e.g. Frankenhuis et al., 2016; Pepper & Nettle, 2017).

For example, in conditions of deprivation, trust and cooperation are hindered (Falk et al., 2015; Hill et al., 2014) and antisocial behaviour is more likely to emerge (Brunnschweiler & Bulte, 2009; Gardner & West, 2004; Prediger et al., 2014). Moreover, in deprived

compared to advantaged conditions, there is a tendency to invest less money and energy in education and child rearing (Blanden & Gregg, 2004; Hango, 2007; Sirin, 2005) as well as in health-related behaviours (Brennan et al., 2009; Mobley et al., 2006; Mackenbach et al., 2008; Nettle, 2010; White et al., 2009); people tend to have children sooner (Nettle, 2010; Smith, 1993); and they are more likely to use drugs, smoke, and drink alcohol (Mackenbach et al., 2008; Melotti et al., 2011; Legleye et al., 2011; Schroeder & Hoffman, 2014).

These changes in behaviour can be explained by future discounting and the preference for present rewards that arise in such deprived conditions (Frankenhuis et al., 2016). Indeed, people experiencing socio-economic limitations are generally more impulsive and risk-prone, more pessimistic about the future and more present-oriented than people in socio-economic prosperity (Adams & White, 2006; Hill et al.; 1997; Hill et al., 2014; Daly & Wilson, 2005; Pepper & Nettle, 2017). These cognitive biases are considered an adaptation to harsh and unpredictable environments, as in these circumstances future rewards are less likely to be gained (Frankenhuis et al., 2013; Frankenhuis et al., 2016; Mittal & Griskevicius, 2014) and thus people are less willing to delay any possible compensation.

In particular, according to life history theory, living in harsh environments triggers a switch to a short life history strategy, leading to lower investments in the long-term in health, in reproductive strategy, as well as in investment in offspring. For example, under this framework, Pepper & Nettle (2013) theorised and tested the idea that the cue given by the environment was leading to future and delay discounting. They found that the strongest association with future discounting was bereavements, and, more importantly, they found a SES gradient in perceived mortality risk as being beyond control, which in turn led to fatalistic behaviour. Moreover, the impact of future discounting on cooperation

116

can be seen in a Prisoner's Dilemma game (Luce & Raïffa, 1957). The iterated Prisoner's Dilemma is considered to be an experimental test of the discounting problem (Daly & Wilson, 2005; Stephens et al., 2002; Stevens & Hauser, 2004). Players can choose between the short-term reward of defecting or the long-term reward of cooperating. Studies show that discounting correlates with cooperation with individuals who highly devalue future rewards being less likely to cooperate.

Nevertheless, a number of studies also report the opposite effect of deprivation on cooperation (Cote et al., 2012; Kraus et al., 2010; Kraus et al., 2011; Piff et al., 2010; Piff et al., 2012). In particular, Piff et al. (2010; 2012) theorise that lower class individuals are more pro-social than their high-wealth counterparts because they relay on others for their future to a greater degree. Despite the value of these studies, a number of methodological differences may explain the opposite results. Firstly, Piff et al. use laboratory or online experiments rather than field studies; secondly, they extensively use a student sample, which is arguably representative of the overall population; moreover, the socio-economic status is mostly self-reported, or is a perceived status in an experimentally manipulated ranking. All these differences in the experimental setup are likely to produce different results.

In conclusion, results from the present support the findings that deprivation hinders cooperation. This link between SES and lower cooperation levels is of extreme relevance in today's world, where we face global challenges for which we need a cooperative effort (e.g. O'Brien & Leichenko, 2000) on one hand, and on the other hand, urbanisation and inequality are raising rapidly (Aldonas, 2007).

6.5 Urbanisation and inequality

Urbanisation mostly consists of poor people migrating to cities in search for new job opportunities (Zopf, 2017). In poorer countries, this migratory trend expected to continue (UN DESA, 2016), nevertheless cities of developing countries are struggling to cope with both the speed and the scale of this migration. It is unlikely that urbanisation will translate in wellbeing for the population (Beall et al., 2011; Muggah, 2014), as suggested by the evidence that already today the vast majority of the urban population of developing countries live in slums. These issues have raised awareness for the necessity of policies aimed at controlling urbanisation and creating a liveable urban environment (UN DESA, 2016; Zopf, 2017).

Objectives of these policies are mainly: 1) to slow down the pace of migration from rural to urban environments by enhancing rural livelihoods; 2) involving local people; and 3) improving the liveability of cities. It is debated whether enhancing rural development could actually slow the pace of urbanisation, as well as whether rural environments could actually sustain a bigger population (UK DFID, 2017; "Urbanisation: The Brown Revolution", 2002). Moreover, most countries have a rural development policy in place, but not many have an urban policy (UK DFID, 2017). Whereas population involvement as proven to be an essential step in promoting social cohesion, trust in others as well as in policy-makers, and relief from the perceived anonymity (Muggah, 2012; UK DFID, 2017; Parkinson et al., 2006). This, in turn, would lead to the improved liveability of cities.

Evidence can be found in the success of organisations such as Slumdwellers International (SDI; http://skoll.org/organization/slum-dwellers-international/). SDI is a network of community-based organisations of people living in slums in over 30 countries

of Africa, Asia and South America. It was created to give local initiatives more voice by 'joining forces' with other realities and to help to influence governments to implement their urban development scheme. These organisations provide invaluable information and data on local needs, and can pressure authorities to address them. It is no surprise then that the UN DESA (2016) suggests handling more power over to local authorities and local people as a vital part of a positive urbanisation process.

6.5.1 UK policies

Also in the UK policies addressed at improving the state of cities are improving. Targeted interventions on unemployment, crime, education and health have enhanced liveability in the most deprived urban neighbourhoods (Parkinson et al., 2006). In particular, following policies implementations, there have been significant improvements in the quality of housing, and in the incidence of certain typologies of crime. However, incidence of robbery and of violent crime, as well as poor health, remain high in deprived urban areas. Crime policies are particularly important in the urban setting, as crime rates are higher in urban than rural environments and particularly in the most deprived areas of urban environments (Parkinson et al., 2006). Government measures against crime (i.e. Neighbourhood Wardens and the Street Crime Initiative) had a positive effect in the last decade, and it seems that promoting social responsibility could – once again – be fundamental in the developmental success of the areas. On a local level, for example, the most successful areas have been those that worked on creating social cohesion. Policies were aimed at enhancing community involvement and identity, to help inhabitants in accessing the job market, and to increment work opportunities (Parkinson et al., 2006). Thus, it appears of primary importance to raise awareness and involvement in local administration.

6.6 Conclusion

This work makes a substantial contribution to the urban-rural literature and to the field of human cooperation. Here, I showed evidence against the common belief that city-dwellers are less cooperative than town-dwellers, and argued that this variation may be a by-product of the association between urbanicity and deprivation. Moreover, I add experimental evidence to the research on the negative impacts of deprivation on behaviour.

6.6.1 Future work

Results from this study suggest a strong influence of SES on pro-sociality, probably via shifted priorities (i.e. future discounting). Also economic inequality, often linked to urbanicity, influences behaviour, with higher risk taking behaviours in increased inequality (Payne et al., 2017). All this raises the question of whether the current interventions aimed at growing participation in public and community cooperation, which are believed to be of critical importance in improving the conditions of the urban deprived (Section 6.5), are effective homogeneously among the population and, if not, how they can be implemented. For example, the commonly used nudges (Thaler & Sustein, 2009; Raihani, 2013) might not have the desired effect when individuals are immersed in an environmental condition that triggers fatalistic behaviours, as they do not offer short-term benefits. An interesting direction for future work could aim at clarifying the behavioural consequences of living in harsh environmental conditions, at discerning the separate impacts of different SES factors on cooperative behaviour, and at better understanding how the common interventions are perceived between individuals of different environmental backgrounds (Jung & Data, 2016). The outcome could lead to the creation of more effective interventions, giving a vital new tool for policy makers.

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Appendix I

A) Instructions for the Dictator Game

<u>Dictators</u>

WELCOME!

To enter, please provide here your worker ID

Note that your worker ID is needed to ensure you get your bonus.

If you don't remember your worker ID you can find it out opening this link in a new window:
https://www.mturk.com/mturk/dashboard

- - - - -

Thank you, you are now ready to start the game!

** GAME INSTRUCTIONS **

You are Player 1

You have been allocated a bonus of $1.00.
You can choose how much of this bonus to give to Player 2.

Your worker ID and Player 2's worker ID will remain anonymous.

- - - - -

First, please answer two questions correctly to ensure your HIT is accepted.

1. You have a bonus of $1.00. If you decided to send $0.10 to Player 2, your bonus would be:

$0.10
$0.40
$0.90

- - - - -

2. If you decided to send to Player 2 $0.90, your bonus would be:

$0.10
$0.40
$0.90

- - - - -

Well done! You answered the questions correctly.

You have been allocated a bonus of $1.00!

You can choose to send any of this bonus to Player 2.
Player 2 won't find out your Worker ID and you won't know the Worker ID of Player 2.

- - - - -

How much would you like to send to Player 2?

Please indicate your choice below.

YOU WILL KEEP	PLAYER 2 WILL GET	PLEASE CHOOSE ONE
$ 0.00	$ 1.00	
$ 0.10	$ 0.90	
$ 0.20	$ 0.80	
$ 0.30	$ 0.70	
$ 0.40	$ 0.60	
$ 0.50	$ 0.50	
$ 0.60	$ 0.40	
$ 0.70	$ 0.30	
$ 0.80	$ 0.20	
$ 0.90	$ 0.10	
$ 1.00	$ 0.00	

- - - - -

You have successfully transferred the money!

- - - - -

Before completing the HIT, please answer the following six questions.

1. What is your gender?

2. What is your age?

3. What is your approximate annual income?

4. Where do you currently live?
(e.g. Springfield Township, Union County, New Jersey)

5. Where did you grow up?
(e.g. Springfield Township, Union County, New Jersey)

6. For most of your life, you lived in:
(e.g. Springfield Township, Union County, New Jersey)

- - - - -

That is the end of the game!

To complete the HIT and ensure it will be accepted please enter your mystery word below in the box on the Mechanical Turk tab before submitting.

Your mystery word is:
BOOK

Thank you for completing the game!

Have you copied your mystery word?!
Then tick 'EXIT' to leave the game.

EXIT

- - - - -

Thank you for taking our survey.

- - - - - - - - - -

B) Instructions for Questionnaire

WELCOME!

To enter, please provide here your worker ID

┌─────────────────────────────┐
│   │
└─────────────────────────────┘

Note that your worker ID is needed to ensure you get your bonus.

If you don't remember your worker ID you can find it out opening this link in a new

window: https://www.mturk.com/mturk/dashboard

- - - - -

Welcome!

Please take a moment to read over this description of the survey you are about to take.

When you are ready to proceed, click "Next".

You are being asked to participate in a survey. The questions are about how you respond

in day to day situations. You are eligible to participate in this study if you are at least 18

years of age. There are no right or wrong answers and all responses are anonymous.

NOTE - This survey may require 5-7 minutes to complete. For this you will be awarded a

$0.40 bonus to be added to your $0.20 participation fee.

You will earn a **total of $0.60** for completing the survey.

At the end of the survey you will find the mystery word to enter on the Mechanical Turk tab before submitting your HIT - you will only receive the payment if you complete the whole survey and provide the mystery word.

Participation in this study is voluntary. You may refuse to participate or discontinue your involvement at any time. The survey results will be stored on a secure server and you should not put your name or any identifying personal information on the questionnaire.

- - - - -

Thank you for taking the time to complete this survey.

You will now see a number of statements that may or may not describe you.

Please indicate how much each statement describes you.

- - - - -

I am known by family and friends as someone who makes time to pay attention to others' problems.

Does not describe me at all
Describes me poorly
Somewhat describes me
Generally describes me
Describes me well
Describes me greatly

When it comes to my personal relationship with others, I am a very generous person.

It makes me very happy to give to other people in ways that meet their needs.

It is just as important to me that other people around me are happy and thriving as it is that I am happy and thriving.

I am usually willing to make personal sacrifices if I stand a chance of helping someone

else in need.

My decisions are often based on concern for the welfare of others.

- - - - -

You will now see a list of acts.
Please, check the category that conforms to the frequency with which you have carried out these acts.

- - - - -

Please, only select NA if you have never encountered the situation (e.g. you never met someone who needed help pushing their car) or can not carry out the action listed (e.g. you can not donate blood).

Never	Once	More than once	Often	Very often	NA

I have helped push a stranger's broken car.
I have given money to charity.
I have given money to homeless people.
I have made change for a stranger.
I have given directions to a stranger.
I have donated blood.
I have donated goods or cloths to a charity.
I have done volunteer work for a charity.
I have held the door open for a stranger.
I have allowed someone to go ahead in a queue.
I have helped carry a stranger's belongings (i.e. luggage, prams)
I have pointed out a clerk's error in undercharging me for an item.
I have given a stranger a lift in my car.
I have looked after a neighbour's pets or children without being paid for it.
I have let a neighbour whom I didn't know too well borrow an item of some value to me (ie. a dish, tools)
I have bought "charity" Christmas cards deliberately because I knew it was a good cause
I have helped an acquaintance to move house.
I have offered my seat on a bus/train to a stranger.
I have helped a handicapped or elderly stranger across a street.

- - - - -

Thank you for completing this survey!

To complete the HIT and ensure it will be accepted please enter your mystery word below in the box on the Mechanical Turk tab before submitting.

Your mystery word is:
NOVEL

Thank you for completing the game!

Have you copied your mystery word?!
Then tick 'EXIT' to leave the game.

EXIT

- - - - -

Thank you for taking our survey.

- - - - - - - - - -

Appendix II

Supplementary Figure 1. Screenshot of Player's 1 (investor) choice in the Trust Game. Investors were asked to choose how much of their endowment they wanted to send to the other Player (from $0.00 to $0.50, in $0.05 increments). Note: the highlighted text informs the residence of the other Player. In the condition where the residence is the same, in the highlighted box appears the copied and pasted text entry that the Player gave when answering where they were from.

Supplementary Figure 2. Screenshot of Player's 2 (trustee) choice in the Trust Game. Trustees were asked to choose how much of the endowment received they wanted to send back to the investor (from $0.00 to $0.45 or $1.05 depending on the condition, in $0.05 increments).

Instructions for the Trust Game

Investors

WELCOME!

To enter, please provide your worker ID here

Note that your worker ID is needed to ensure that you get your bonus.

If you don't remember your worker ID you can find it out by opening this link in a new tab or window:
https://www.mturk.com/mturk/dashboard

- - - - -

Thank you, you are now ready to start the game!

** GAME INSTRUCTIONS **

You are Player 1

Both you and Player 2 have been allocated a $0.50 bonus.

You have the opportunity to send some, all, or none of
your $0.50 bonus to Player 2.
Whatever amount you decide to send will be tripled before reaching the other player.

Player 2 will then decide how much money to send back to you
and how much money to keep.

Your worker ID and Player 2's worker ID will remain anonymous.

- - - - -

First, please answer two questions correctly to ensure your HIT is accepted.

1. If you decided to send $0.10 to Player 2, how much will she/he receive?

$0.10
$0.30
$1.20

- - - - -

2. If you decided to send $0.40 to Player 2, how much will she/he receive?

$0.10
$0.30
$1.20

- - - - -

Well done! You answered the comprehension questions correctly.

To proceed, please tell us where do you currently live?
(e.g. Springfield Township, Union County, New Jersey)

[   ]

- - - - -

You have been allocated $0.50!

You can choose to send any amount of this bonus to Player 2.

Remember: the amount sent will be tripled before reaching the other player. Player 2 will
then decide how much money to send back to you.

Player 2 won't find out your Worker ID and you won't know the Worker ID of Player 2.

- - - - -

Player 2 is from:

DALLAS, TEXAS

How much would you like to send to Player 2?

Please indicate your choice below.

YOU WILL SEND	PLAYER 2 WILL GET	PLEASE CHOOSE ONE
$ 0.00	$ 0.00	
$ 0.05	$ 0.15	
$ 0.10	$ 0.30	
$ 0.15	$ 0.45	
$ 0.20	$ 0.60	
$ 0.25	$ 0.75	
$ 0.30	$ 0.90	
$ 0.35	$ 1.05	
$ 0.40	$ 1.20	
$ 0.45	$ 1.35	
$ 0.50	$ 1.50	

- - - - -

You have successfully transferred the money!

Before completing the HIT, please answer the following five questions.

1. What is your gender?

2. What is your age?

3. What is your approximate annual income?

4. Where did you grow up?
(e.g. Springfield Township, Union County, New Jersey)

5. How much money do you expect to receive from Player 1?
(e.g. $0.00; $1.50)

$

- - - - -

That was the end of the game!

To complete the HIT and ensure it will be accepted please enter your mystery word below in the box on the Mechanical Turk tab before submitting.

Your mystery word is:
 TREE

Thank you for completing the game!

Have you copied your mystery word?!
Then tick 'EXIT' to leave the game.

EXIT

- - - - -

Thank you for taking our survey.

- - - - - - - - - -

WELCOME!

To enter, please provide your worker ID here

Note that your worker ID is needed to ensure that you get your bonus.

If you don't remember your worker ID you can find it out by opening this link in a new tab or window:
https://www.mturk.com/mturk/dashboard

- - - - -

Thank you, you are now ready to start the game!

** GAME INSTRUCTIONS **

You are Player 2

Both you and Player 1 have been allocated a $0.50 bonus.

Player 1 has the opportunity to send some, all, or none of
her/his $0.50 bonus to you.
Whatever amount Player 1 decides to send will be tripled before reaching you.

You will then decide how much money to send back to Player 1
and how much money to keep.

Your worker ID and Player 2's worker ID will remain anonymous.

- - - - -

First, please answer two questions correctly to ensure your HIT is accepted.

1. If Player 1 decided to send $0.10 to you, how much will you receive?

$0.10
$0.30
$1.20

- - - - -

2. If Player 1 decided to send $0.40 to you, how much will you receive?

$0.10
$0.30
$1.20

- - - - -

Well done! You answered the comprehension questions correctly.

To proceed, please tell us where do you currently live?
(e.g. Springfield Township, Union County, New Jersey)

```
┌─────────────────────────────────┐
│                                 │
│                                 │
└─────────────────────────────────┘
```

- - - - -

You have been allocated $0.50!

Player 1 can choose to send any amount of her/his $0.50 bonus to you.

Remember: the amount sent will be tripled before reaching you. You will then decide how much money to send back to Player 1.

Player 2 won't find out your Worker ID and you won't know the Worker ID of Player 2.

- - - - -

Player 1 is from:

```
┌─────────────────────────────────┐
│    DALLAS, TEXAS                │
└─────────────────────────────────┘
```

And she/he has sent you: $0.15
Which means you have received: $0.45

How much of the $0.45 received do you want to send back to Player 1?

Please indicate your choice below.

YOU WILL SEND	YOU WILL KEEP	PLEASE CHOOSE ONE
$ 0.00	$ 0.45	
$ 0.05	$ 0.40	
$ 0.10	$ 0.35	
$ 0.15	$ 0.30	
$ 0.20	$ 0.25	
$ 0.25	$ 0.20	
$ 0.30	$ 0.15	
$ 0.35	$ 0.10	
$ 0.40	$ 0.05	
$ 0.45	$ 0.00	

- - - - -

You have successfully transferred the money!

Before completing the HIT, please answer the following five questions.

1. What is your gender?

2. What is your age?

3. What is your approximate annual income?

4. Where did you grow up?
(e.g. Springfield Township, Union County, New Jersey)

5. How much money do you expect to receive from Player 1?
(e.g. $0.00; $1.50)

$

- - - - -

That was the end of the game!

To complete the HIT and ensure it will be accepted please enter your mystery word below in the box on the Mechanical Turk tab before submitting.

Your mystery word is:
 ONE

Thank you for completing the game!

Have you copied your mystery word?!
Then tick 'EXIT' to leave the game.

EXIT

- - - - -

Thank you for taking our survey.

- - - - - - - - - -