

PALACKÝ UNIVERSITY IN OLOMOUC

Faculty of Arts

Department of Psychology

DON'T BE MEAN JUST GO GREEN!

Nonconscious influences on pro-environmental behaviour



Bachelor thesis

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Proclamation (Prohlášení)

I, Anna Tabášková, hereby proclaim that I have made the thesis „Don't be mean, just go green“ by myself, under the supervision of Dr. Ivan H. Tuf and Mgr. Romana Žihlavníková, using only cited literature.

Místopřísežně prohlašuji, že jsem bakalářskou diplomovou práci na téma: „Don't be mean, just go green“ vypracovala samostatně pod odborným dohledem vedoucího diplomové práce a uvedla jsem všechny použité podklady a literaturu.

V Olomouci dne 25.3.2019

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Introduction

I felt my lungs inflate with the onrush of scenery—air, mountains, trees, people. I thought, "This is what it is to be happy."

Sylvia Plath in *The Bell Jar*

(1988, p. 79)

Every human being makes thousands of decisions every day. Just think of your daily morning routine. *You* wake up, put on the clothes *you* choose to wear and drink the coffee *you* decided to buy. As a wise man named Albus Dumbledore would say: “*It is our choices, Harry, that show what we truly are.*” But is it actually true? Do we have free will to decide over our actions or are they predetermined? Could it be possible that the toothpaste you use or food you eat for breakfast has been decided for you in advance?

Thinkers, artists, and scientists from a broad range of expertise have been trying to tackle the answers for centuries, however, to study one’s mind may safely be compared to studying the never-ending borders of our universe.

A great number of processes of our mind may never be fully explained, for they happen even without us being aware of them. When you think about it, what really made you buy a raspberry yoghurt for breakfast instead of the chocolate one? Now when being asked, you are likely to create thousands of sophisticated explanations. However, the reality is that your choice may simply be due to the fact that the raspberry yoghurt has a funny picture on the packaging that might have brought your attention to it or it was located more conveniently.

Non-conscious processes seem to play a great role in our decision-making and morality is no exception. Research has shown that when being in a disrupted environment, an individual tends to act to less morally. But there is no need to worry since the influence environment is also capable of enhancing human moral nature through the idea of cooperativeness and reputation. Since humans are social animals, they naturally eager to be part of a group, a gang. However, a very little number of groups would accept an immoral

individual. Research has shown that the presence of a simple picture of watching eyes leads to the inhibition of immoral acts.

Multiple studies have been conducted to examine some of the conscious, deliberate and sometimes rather complicated ways to confront some of the global issues we face, such as deforestation, overpopulation, plastic exploitation, climate crisis or littering. The initial idea of the present research occurred while reading *Thinking, Fast and Slow* by Daniel Kahneman and paper by Žihlavníková (2016), both of them addressing the topic of the role nonconscious mechanisms are to play in human decision-making. While the current and burning problems that affect our planet call for engagement from all scientific disciplines, we consider the potential possibility of nonconscious mechanisms being a rather effortless and nonaggressive method to positively affect the common well-being (and therefore more than worth testing).

In this paper, we aim to examine the role of automatic processes in the context of pro-environmental behaviour. Non-conscious mental processes make you buy the Hard Rock Café T-shirt everyone is wearing, give up on that diet you swore to stick to after Christmas and also repeatedly confuse the name of your current partner with the one you used to date earlier. But is it possible they could affect your pro-environmental behaviour just the same way? Could you actually trick your mind into being a little bit greener?

In Theory

1 Morality

It is these undeniable qualities of human love and compassion and self-sacrifice that give me hope for the future. We are, indeed, often cruel and evil. Nobody can deny this. We gang up on each one another, we torture each other, with words as well as deeds, we fight, we kill. But we are also capable of the most noble, generous, and heroic behaviour.

Jane Goodall

Have you ever lied to your parents? No? So maybe you have tried to copy your friend's homework because you have not had the time or you just did not feel like doing it yourself. Not even that? Then there surely must be a chance of you travelling without a valid ticket. Most of the people would agree that they have done at least one of the things mentioned above in the past. Similarly, some of them would also agree that at the time they were aware of the seemingly negligible wrongness of their behaviour.

The fact presents us with a number of questions. How can we tell the difference between right and wrong? What role does conscience play in our judgment? Is morality a universal concept throughout individuals? And does the view of moral choices differ over time or among cultures?

We face moral dilemmas daily. In schools, in our households, in our workplaces, among family members or friends. Imagine this situation: You are walking your way home from work in the late afternoon. The working hours seemed like years and you can barely carry on walking. You are hungry as a bear since you have not eaten much throughout the whole day, but what keeps you going is the thought of a well-deserved spinach pizza waiting for you at home as a reward for surviving today's work struggles. At last, you find yourself at home, surrounded by your flatmates, about to start watching Friends and eating dinner together. Suddenly, your roommate Timmy enters the room and you can tell he has not eaten anything today either. He complains that he does not have got any food at home but he could eat for three. With that regard, he looks at your pizza and you are confronted with a moral conflict.

The more friendly and altruistic thing would naturally be to offer Tim a slice of your pizza but it just seems so unfair. You have been looking forward to eating it since the sun

rose up today. And most likely he will not stop eating after one slice, then finally you are left with not even half of the pizza left, right?

Is there actually any bright side of sacrificing a slice or two? Other than making Tim unbelievably happy, a number of studies have reported the beneficial consequences of doing good, in other words acting morally or even altruistically (Brown, Brown, 2015; Poulin, 2014; Seppala, Rossomando, Doty, 2013). Altruistic emotions and behaviours are associated with greater life satisfaction, longevity, better stress management and overall well-being. A study (Schwartz, Sendor, 1999) on a patient diagnosed with multiple sclerosis (MS) investigated the impact of helping others on the physical and psychosocial aspects of well-being. The study found that the patients who participated in helping other MS patients through peer support actually experience greater benefits than their supported peers. The peer supporters have reported an improvement of self-awareness, self-esteem, confidence and role functioning.

In the following, I will try to cover some of the major theoretical approaches of the moral psychology, explore the nature of morality and define some of the related mechanisms, that could give us a clue about what are key factors determining whether we give or not the last slice of pizza to our friend.

1.1 Why do we (do not) act morally?

In the previous chapter, we have learned that from the scientific findings it seems that human beings are wired to behave morally and prosocial. But most of us would agree we do not always act like the living examples of angels sent from above. What are the main effects causing us to (not) listen to the best versions of ourselves and why we as a society and also as individuals need the concept of morality? In the following, I will explore the current scientific knowledge on the issue of neuropsychological aspects morality, social psychological perspective but also current work from the fields of anthropology, biology and I will briefly glance into the territory of economics.

Darwin (1981), Dawkins (2006), Barrett et al. (2007) and Churchland (2011) have all generally agreed that the need of morality could be explained and found already at the very beginning of human history, in the brains of our primate ancestors. When facing the cruel never-ending winter or the merciless drought, the one key skill of survival was the animal's **ability to cooperate**. Although it at first might not sound coherent with the classic Darwinist **survival of the fittest** approach, in light of the natural observations, cooperation and overall

prosocial behaviour has proved to be the most beneficial strategy of survival (Churchland, 2011). After all, the scenario of one man against one sabre-toothed tiger would most probably mean the man ending up as the tiger's dinner. A group of five men who are willing to fight against the tiger together is, on the other hand, a completely different story.

However, acts of cooperation are not a privilege of humankind in the animal kingdom. Experiments such as that conducted by Crawford (1937, in Chalmeau, Gallo, 1995) have shown evidence on the understanding of cooperation principles by non-human primates. Through the replication of Crawford's classic cooperation experiment, Plotnik et al. (2011) demonstrated that even animals that are not primates are capable of recognizing the benefits of coordination and the basic mechanism regarding cooperation. The experiment included two elephants who, if wanting to receive a tasty reward, had to simultaneously pull two ends of the same rope. Interestingly, not only did the elephants work together, but they also waited for the partner if he arrived later and understood there is no need of pulling the rope when the access of the partner to the rope was not possible. Another recent study involving model snakes and chimpanzees showed that when facing a possible danger, chimpanzees automatically alert all the other members of their group (Crockford, Wittig, Mundry, Zuberbühler, 2012). Overall, the studies presented thus far provide the evidence that non-human and human animals share the ability to cooperate which appears to be a fundamental skill for their survival.

Let us return back to the example of a prehistoric men gang fighting against the sabre-toothed tiger. If the group was to fight efficiently together, they had to **trust** each other. That is when morals come into play. Trust is a building stone of every society. Every family, friendship, romantic relationship or any kind of fellowship depends on it. In 1997, Knack and Keefer even found major evidence of the impact trust has on the economic and social success of individuals (Knack, Keefer, 1997). Furthermore, trust is also a hardly disregardable factor in global politics, business and the importance of it is noticeable throughout the whole history of humankind. Moral behaviour has been repeatedly associated with a higher level of trustworthiness and therefore willingness of the others to cooperate. The social aspects of trust have been a widely discussed topic but just until recently, not much has been said about the biological and neuropsychological side of the issue.

Could we actually find a physical equivalent of trust, a biological explanation of how does trust emerge? Kosfeld et al. (2005) conducted a study which was based on theoretical groundings of game theory and which showed the major effect of **oxytocin** (OT) on

interpersonal trustworthiness. In another study by Zak, Stanton and Ahmadi (2007) the impact of OT on generosity has been examined. The participants in this experiment have been given 40 IU OT or placebo injection. The probands received a certain amount of money afterwards and were told that they could (if they decide to) split the money with a stranger. Interestingly enough, the results show that the ones injected with OT were 80% more generous than the ones injected with a placebo. This and many other studies conducted on the matter of various virtuous relevant to moral behaviour such as charitable activities or empathetic reactivity (Barraza, McCullough, Ahmadi, Zak, 2011; Rodrigues, Saslow, Garcia, John, Keltner, 2009) reveal the essential role of oxytocin in prosocial behaviour.

In light of the findings from the previous article one may ask under which conditions do we fail to act morally. Much of the recent literature on moral behaviour and decision making pays particular attention to the role of emotions related to these subjects. Traditionally, it has been argued that **stress** and **time pressure** reduce the probability of prosocial and helping behaviour. Research in the field of behavioural economics such as that conducted by Leder, Häusser and Mojzisch (2013) have also shown that while being affected by acute stress, people tend to take more risks and make less strategically logical choices.

But what are the consequences in the moral context? Starcke, Polzer, Wolf, Brand published a paper (2011) in which they explored whether stress influences moral decision making. The experimenters used the everyday moral dilemmas and the Trier Social Stress Test in order to invoke stress response while working with the experimental group. When compared with the control group no significant differences have been found in the results regarding the stress itself. Therefore, in this experimental setting, it has not been confirmed that being under stress would make one act more egoistically. However, the individual's **cortisol stress reaction** correlated positively with egoistic decisions.

According to Kelly McGonigal (2015), the responses to stress are far more complex than what is a traditional perspective and that is why the results of the studies regarding the influence of stress on morality are ambiguous. Contrary to what is commonly believed, the reactions to stress differ from only the choices between fight or flight. McGonigal claims that when approached as a form of stimulation rather than a threat, stress not only activates prosocial instincts but also mitigates fear response while encouraging you to listen to the most courageous part of yourself. However, these processes are once again to be attributed to oxytocin, which is also released as a part of the stress reaction so McGonigal's statement is not completely on the contrary to the research by Starcke et al. (2011).

Some moral theorists have been arguing that when being in haste, people simply do not have the cognitive capacity to decide morally. As stated by Moberg (2000, p. 41): “*Time pressure bedevils ethical decision-making.*” In the classic social psychological experiment from 1973, Darley and Batson studied the impact of dimensional and situational variables on helping behaviour (Darley, Batson, 1973). Students of the theological department were given a task to give a short lecture to their schoolmates in a campus across the street. Half of the probands were to talk about the short story from the Bible Good Samaritan and the others on non-helping related topics. On their way to the campus, the students met a shoddy looking person that clearly needed help. The researchers have not found that the content of their talk would have an impact on their helping behaviour. On the other hand, what influenced the behaviour of the students was the following: First of the probands were told they do not need to rush to the other campus. The others, on the other hand, were vigorously urged to hurry, emphasizing they are already late for their speech. The likelihood of the group in haste to help the needy person was nearly 6 times lower than the ones that were still on time.

Broken Windows Theory: Tales from the city that never sleeps

The Broken Windows Theory (BWT) formulated by **Kelling and Wilson** (1982) proposes the idea that in neighbourhoods where petty crime and violations of certain injunctive norms were tolerated, others are likely to appear. They suggest, that targeting the minor signs of disorder- such as breaking windows and tagging the walls- could help to decriminalize these neighbourhoods.

In the mid-1990s, the approach based on BWT has been adopted by the New York mayor and police commissioner, who by addressing the less severe transgressions (the walls have been painted, the windows have been repaired) were able to reduce the city’s violent crime by more than 56 percent and soon after the successful New York application of the theory it had spread all over the U.S. (Kelling, Sousa, 2001).

However, the theory of Broken Windows is not new nor it is immune to the most current available research and applications. Before the theory was introduced by Kelling and Wilson in their renowned Atlantic article, social psychologist **Philip Zimbardo** had also studied the environmental cues and how they affect the criminal behaviour.

In his experiment from 1969 he intentionally left a car in the Bronx, which is considered the most dangerous, poor and redoubtable area of New York. From a view of an

uninformed passer-by the car the way he left it there seemed abandoned (e.g. the doors were open, the registration torn up). The experiment aimed to find whether the environment has an impact on human behaviour and so Zimbardo put another identical car under the same conditions into the location of a rich and very quiet area of California: Palo Alto. The results of the social-psychological experiment could not be more contrasting. In the Bronx, the first robbery happened within 10 minutes and after a day, the car was stripped for all of the important parts and the car itself destroyed. Contrary, the car in Palo Alto stayed in the same state for even more than a week. Zimbardo then decided to take action and he smashed the car himself. Soon after this intervention, the Californian passer-by began to join the destruction in the same manner as they would if coming from New York (Zimbardo, 1969).

Current research succeeds to confirm the grounds of the theory and further explores its implications. Keizer, Lindenberg and Steg (2008) conducted 6 field experiments to test if and how exactly does the tendency of disorder spread. The researchers have set one of the studies in the area where bikes are usually parked. Originally, the site's walls were clean and without any tags. In the disorder condition, however, there would be a sign vividly prohibiting graffiti accompanied by a wall filled with graffiti as a representation of the norm violation. Then an add-like leaflet has been attached to the bike handlebars of the participants. Since there were no collective bins in the alley, the "playing by the rules" option would mean to take the flyer with them and throw it away later. The researchers have counted every leaflet found hanging on another bike or on the floor as a sign of littering. The results show that the probability of littering in the disorder (*graffiti*) condition was more 2 times higher compared to the order (*non-graffiti*) condition.

Overall, from all of the studies mentioned above, one may conclude that the environment we find ourselves in has a significant impact on our moral decisions and actions. To refer back to hungry Tim, based on the theory one could predict that if you and Tim would live in a dirty unkempt flat, Tim would much more likely be tempted to steal the pizza from you. Luckily, some specific social concepts also keep him from doing so, one of which is **reputation**.

Reputation: The big brother that is watching over society

Imagine yourself being in Tim's situation. What drives you not to simply take the pizza and eat it? Some of the scientists argue that more than acting morally what people actually care about is to sustain a moral reputation (Bateson et al., 2013). To illustrate the claim on Tim's

case: What keeps Tim from stealing your pizza is not only the strong bond between you two, the emotions you share between each other (Greene, 2013) but maybe even more importantly the fact that he wants to avoid having the reputation of a thief. Same could be applied the other way around. One is more tempted to share a dinner with Tim to sustain being known for generosity and friendliness. This tendency is rather pragmatic since research shows that society tends to punish those not willing to cooperate and reward people who act in a prosocial way (Fehr, Gächter, 2000; Levine, Moreland, 2002a, 2002b).

Since humans are social animals, it is no surprise that they tend to engage in prosocial and sometimes even altruistic behaviour when it comes to their relatives and loved ones. However, what may come as a surprise is that it has been reported that people take these costly choices even in situations of extended kinship, when genetically unrelated strangers are involved (Baillon, Selim, & van Dolder, 2013).

This phenomenon could be explained by one of the leading theories in the altruistic behaviour research field: **reciprocal altruism**. Reciprocal altruism proposes an idea that people undertake costly altruistic behaviour mainly because they expect the recipient of the altruistic act to “payback” the service in the future. In other words, “*I scratch your back because you scratch mine*” (Greene, 2013, p. 32). The practical implication of this theory in our case with Timmy would mean that when we eat pizza with Tim, we are already expecting him to share a piece with us in the future too.

As it has already been said earlier in the paper, cooperation was and still is a key for human survival. Looking back again to the primaeval ages, the need of having someone to tell the prehistoric man about the whereabouts of a bison herd or a bear might have been the one crucial fact saving his life. However, Dunbar (2004) argues that the essential information that was needed to be shared the most were related not to the animals but rather the humans themselves. In the same vein Harari (2015) in his book *Sapiens: A Brief History of Time* argues that when deciding who to trust, who to hunt with or even whom to have offsprings with, reputation would be most likely the decisive factor to take account of. Both of the authors thus agree that **reputation** and **gossip** might have been an important aspect during the evolution of cooperation and in a broader sense, morality. Furthermore, the authors conclude that reputation and status are some of the main parts of the **indirect reciprocity theory** that attempts to explain the emergence of altruistic behaviour in situations that lack the prospect of eventual direct reciprocation.

Indirect reciprocity emerges in situations when the reward for altruistic behaviour does not come directly from the recipient of such action but a third party (Sigmund, 2012). Scholars believe that this indirectness might be a foundation stone of evolution of human cooperation (Ohtsuki & Iwasa, 2004; Riolo, Cohen, & Axelrod, 2001; Yoeli, Hoffman, Rand, & Nowak, 2013). The basic principle of the theory lies in an already explained influence of reputation in social interactions. Essentially, it means that by helping others, being cooperative and friendly we improve our public reputation. As a consequence of that, society approaches as more trustworthy, loyal and worthy of a future relationship. To paraphrase the saying related to reciprocal altruism, indirect reciprocity could be characterised as: *“I scratch your back in hope others will see me being a good friend and approach me in the same way.”*

A growing number of studies shows that people’s behaviour changes once they know they are being observed. A classic study by Bull and Robinson (1981) proofed the effect of eye gaze on pro-social behaviour. Interestingly enough, several studies have reported that the transition of behaviour occurred even when the stimuli of a real human observer was replaced by the simple image of watching eyes or eye-like spots on the background of the computer (Haley, Fessler, 2005; Oda, Niwa, Honma, Hiraishi, 2011). Furthermore, it has been shown that even in an anonymous environment, when there was no chance of direct future reciprocity, the image of eyes, which thus represents **an implicit reputational cue**, enhances cooperation, helping and altruistic behaviour (Ekström, 2012).

Ekström (2012) conducted a field experiment in several Swedish supermarket branches where he tested whether the picture of eyes affects people’s willingness to donate money on charity. The customers of the store who recycle bottles and cans had to decide if they rather keep the money gained from the recycling or donate them to a charity. The study showed that by posting the picture of eyes on a recycling machine the probability of the participant donating money to a charity increased by 30 % compared to the condition of eye-like stimuli absence. Particularly, the influence of the image was found more effective in the days when the supermarkets were not overcrowded.

Findings of the research above are consistent with results of other experiments examining the phenomenon. For example, the field studies have shown that the employees were 3 times more likely to donate money to a shared “honesty box” for drinks in a coffee room when a picture of eyes was placed next to it (Bateson et al., 2006); that the image of eyes featured in the mailing inviting to elections succeeds to mobilize people to

vote (Panagopoulos, 2014); and that the cafeteria with a picture of eyes gets far less littered than the one with a beautiful painting of flowers (Ernest-Jones, Nettle, Bateson, 2011).

Though a number of convincing studies included earlier shows that the observational cues increase the probability of prosocial behaviour, one may ask whether the same cues are in the same way capable of preventing the acts of transgression. To put it simply, is it possible that by hanging a picture of eyes on your fridge, the pizza is going to stay 'safe and sound' from Tim? The answer to this question based on the current state of knowledge appears to be *YAY, HURAY!* For example, it has been found that students are less likely to cheat and take more rewards for completing a test than allowed in the presence of eyes-like stimuli (Žihlavniková, 2016); that the likeliness of cheating during an exam is lower when the subject sits opposite to a mirror (Diener, Wallbom, 1976); and that in areas where the pictures of watching eyes were posted the number of stolen bicycles decreased by 62 % (Nettle, Nott, & Bateson, 2012). Interestingly, results are even clear that the presence of a picture of eyes increases blood donation rates (Sénémeaud et al., 2017), positively influences pre-swimming shower behaviour (Ribbers, 2016) and promotes the hand hygiene compliance in public restrooms (Pfattheicher, Strauch, Diefenbacher, & Schnuerch, 2018).

The studies presented thus far provide the evidence that the picture of eyes enables the brain to automatically start self-conscious processes that lead to increased morality in our assessment of the particular situation. Neurological research traditionally attributes this phenomenon to the brain's inability to distinguish the difference between the presence of real human eyes and a simple picture of them (Haxby, Hoffman, Gobbini, 2000).

In view of all that has been mentioned so far, one may suppose a relationship exists between the presence of the observational cues and the increased probability of transgression prevention. However, much of the recent research has failed to confirm reliable evidence on the effect of the picture of eyes (Dear, Dutton, & Fox, 2019). To illustrate this, Cai et al. conducted 3 experiments to test whether the use of eyes images leads humans to modify their dishonest behaviour (Cai, Huang, Wu, & Kou, 2015). The chosen forms of dishonest behaviour included cheating motivated by appearing to be more intelligent or earning a higher amount of money. The researchers have not found any effect on adjustment of human behaviour when exposed to an eye image. The study, however, provides little explanation on why the implicit reputational cues failed to inhibit dishonest behaviour. Cai et al. suggest that one of the possible explanations could be that the eye images, despite being able to elicit

prosocial behaviour since the individual is motivated to be seen as **prosocial** by the others, lacks the ability to affect **self-awareness**. To put it simply, according to the researchers, in an anonymous environment one's motivation to act morally is to be approved by the others, however, the motivation to prevent dishonest behaviour is based on the foundations of positive self-approval. Cai et al. argue that the pictures of eyes may not be an efficient tool to establish self-perception mechanisms.

As Joshua Greene (2013, p. 44) states in his book *Moral tribes*: “...*reputation can enhance cooperation in two ways: by giving people incentives to demonstrate their cooperativeness and by giving people incentives to demonstrate their intolerance of noncooperativeness.*”

As such, reputation succeeds to be one of the influential forces to regulate human moral behaviour. However, reputation is also deeply connected to the particular group one wants keep up the behaviour for. Another possible explanation of the inconsistent evidence may be that when one belongs to a group that values different principles, these are to be followed rather so-called universal morals. (If Tim belonged to a group that does not share food, or even despises those who do so, the eye images might have opposite effect). Taken in account the limitations of the previous research and the number of unsuccessful replication studies, further investigation has been repeatedly recommended to examine the issue before the effect of eyes images, which represent the implicit reputational cues, is more clearly understood.

1.2 Theoretical basis of morality

Although the words morality and moral are quite frequent even in a non-academic context and have a rich semantic value, the definition of the concept is a rather problematic and unclear issue. However, to set a theoretical basis of this paper let us paraphrase Heidbrink's (1997, p. 16) definition of morality: “*Morality is a set of principles that help to distinguish right from wrong, good from evil.*” But where does morality come from? How is it possible that we are actually able to differentiate what is right and what is wrong?

The root of the term morality comes originally from a Latin word *mos*, which could be translated as a habit or a manner. From the conventional meaning of these words, we might deduce that morality is a matter of a social norm, a learned approach to certain situations and that it is something highly influenced by the **environment** surrounding us (Haidt, 2008; Bandura, 1969). According to this theoretical perspective, the culture we

live in, the social background, the circumstances we find ourselves to experience from cradle to grave, seem to have a significant impact on our moral thinking, decision making and even moral feelings (Bronfenbrenner, 1996).

Psychologist **Albert Bandura** held a similar view on the nature of morality's origins in a sense of the importance of observation. The social learning theory says that our moral behaviour tends to be highly influenced by our perception of the behaviour of others (Bandura, 1969). Similarly to the other learning-based theories, also in Bandura's theory the role of the environmental pressures, reinforcements and punishments are highly emphasized. The theoretical framework of social learning theory proposes the idea of moral behaviour being a result of processes such as observation, identification with the other observed individual and self-monitoring processes (Ward, Brown, 2015). Bandura's findings could be easily illustrated even in the case of Tim and the spinach pizza. In line with the social learning theory, if you see all of your other flatmates hesitating to share their dinner with Tim, you are not likely to sacrifice the slice of pizza either, thus leaving your friend's stomach growling. On the other hand, if you remember some of your other peers (especially in case of the admired ones) sharing their meals, there is a higher chance of you being more altruistic regarding your friend's hungry puppy eyes.

The question of the nature of morality is nearly as old as psychology itself (and maybe even older). Thinkers, philosophers and scientist from broad range of interdisciplinary field of research have been trying to unravel for centuries whether morality is an innate and universal dimension of self (**moral nativism** whose main figures are e.g. Noam Chomsky or Charles Darwin) or if it is a social concept, a set of rules we learn to master through social interactions (**moral empiricist approach** known from the British philosopher John Locke or the leading authorities of psychological school of behaviourism such as William James). In other words, the never-ending debate over nature versus nurture issue (Haidt, 2012).

Both theories by psychologists **Jean Piaget** and **Lawrence Kohlberg** though suggest a third approach to morality. According to their theories, we develop our ability to distinguish the difference between right and wrong through a process of cognitive advancement, the progression of thinking processes, etc. Piaget (1932) defines two types of moral thinking: heteronomous and autonomous. The theory characterizes the heteronomous morality (moral realism) as the early stage of childhood in which a child internalizes the moral values and rules of an authority figure (e.g. parents, teachers, older siblings) and obeys

those rules mainly because of the threat of punishment. Autonomous morality, on the other hand, is mainly based on the child's own restrictions and rules. A child is capable of understanding there is no ultimate right and wrong and begins to acknowledge other people's perspectives. Piaget claims that these stages of development are universal to all human children around the world.

How is it then possible that social acceptability of different moral choices, thinking and behaviour varies across cultural systems? For example, if a young 25-years old son calls his father by the first name, an American father would most likely respond in a pronouncedly different way than an Indian father would (Shweder, Mahapatra, Miller, 1990).

The issue of cross-cultural moral universality has been addressed by **Nucci and Turiel** (1978), who argue that it is highly important to distinguish the difference between **morality** and **social conventions**. Turiel views moral rules as universal prescriptions, protecting society from the mutual violating of each other's right. These restrictions cannot be changed by consensus for they appal at the very basics of human morality. An example of a moral rule could be for instance rules concerning fairness, stealing or physical harm on others. Conversely, social conventions stem from the shared knowledge of expected behavioural uniformities (Weston, Turiel, 1980). To put it more simply, social rules would be the ones related to the forms of greetings, the ways you address the teachers and authorities in an email conversation or even table manners and customs regarding the meal sharing (referring back to you, hungry Tim).

A recent study (Gold, Colman, Pulford, 2014) showed the cultural differences in moral behaviour between the Chinese and the British participants. The behaviour has been examined in an operationalized version of a renowned Trolley dilemma. In the version of the trolley dilemma used by Gold *et al.*, the participants were asked to make a decision that will affect the amount of money the experimenters donated to an orphanage. Firstly, all probands read the biographies of each child and informed that every child is going to be given enough money to provide one meal. An animation was shown to the participants in which a ball moved to a group of five children represented by the photos from the biographies. It has been clarified that the five children will lose their meal if the ball reaches them. Participants had the option to switch a lever, which would shift the ball's direction and move towards a single child, who would thus lose his portion of a meal. The researchers found that fewer Chinese than British probands were likely to take action and switch the lever to help the five children while leaving the single child without a meal. One may ask

what is the cultural difference causing the contrasting results. Chinese fatalism is a belief system commonly spread in Chinese culture, according to which all life events will happen inevitably and are to be attributed to fate. As a consequence, this is believed to impact judgment and behaviour. Chinese people then tend to let events (even the misfortunate) go in their natural course without one's interference and feelings of guilt.

The traditional psychoanalytic theory focuses mainly on the emotional consequences of moral actions. Specifically, the approach's main interest in moral psychology lies in the feelings caused by moral (or to be more precise moral and immoral) actions such as guilt, shame, anxiety, responsibility or fear (Covington, 2016; Kagan, Lamb, 1997). These emotions are to be in the psychoanalytic perspective attributed to the somewhat most adult-like part of the Self: **superego**. Hartl and Hartlová (2015, p. 576) define the concept of the superego as

(...) a part of the ego that is responsible for self-awareness, self-criticism and other processes of self-reflection. The nature of the superego also contains unconscious impulses, commands, and biases, which may come from life experiences and lead to a conflict with the present values and attitudes.

Before the structural model of personality and the term Uber Ich (Superego) has been formulated by **Sigmund Freud**, he often referred to the particular part of Self as *conscience*. **Conscience** in Freud's perspective plays a part of a censor who controls the other parts so they act in congruence with the internal behavioural standards of Self. With the term *Uber-Ich* and invention of tripartite model of the psyche, the concept of superego evolved from being the prude teacher with an ever-raised warning finger into somewhat more loving parent who strikes to motivate the individual to search for the best qualities of himself, "*higher nature of a man*" (Freud, Strachey, Freud, 1989; Frank, 1999).

"The formation of the superego occurs on an unconscious level, beginning in the first 5 years of life and continuing throughout childhood and adolescence and into adulthood, largely through identification with the parents and later with admired models of behaviour." (VandenBos, 2015, p. 1050) Based on the psychoanalytical theories, in the Tim-pizza situation your moral actions (whether you share your meal or not) would be mainly driven by the processes of self-consciousness, feelings caused by the applied decision and the influence of your internalized moral authorities.

Evolutionary perspective explains moral actions and judgments in respect to work of **Ch. Darwin** and **E. O. Wilson**. At first, it might seem that being compassionate, helping or even willing to sacrifice our own welfare would not be a logical or strategic step in order to survive. In her book *Braintrust: What Neuroscience Tells Us about Morality*, Churchland (2011, p. 13–14) though sums up the evolutionary perspective as follows:

Why do we, and other social mammals, care for others? This much we know: on average, such behaviour must, either directly or indirectly, serve the fitness of the animals involved. ... Depending on ecological conditions and fitness considerations, strong caring for the well-being of offspring has in some mammalian species extended further to encompass kin or mates or friends or even strangers, as the circle widens. This widening of other-caring in social behaviour marks the emergence of what eventually flowers into morality.

Piaget, Kohlberg, Turiel and even Freud claimed that is not in human's nature to act morally. On the other hand, theories based on the hypothesis of morality being a product of evolution mainly approach morality as an innate tool for “*a physically weak species whose evolutionary success depended on the ability to cooperate and live in groups.*” (Graham, Meindl, Beall, Johnson, Zhang, 2016, p. 125)

Current research also plays in cards of the scientists that claim humans are born with a sense of morality. Several studies have been carried out by Karen Wynn on the morality of babies and have reported that children as young as 3 months already know the difference between right and wrong (Bloom, 2010; Wynn, Bloom, 2014). A study by Tomasello and Warneken (2009) shows that even children younger than 18 months, who are just beginning to learn how to walk and talk, evince helping behaviour and empathetic concern.

1.3 Summary

However ambiguous the opinions on the nature of morality are, recent studies support the idea of humans being wired to act morally. Humans participate in moral behaviour even in a very early stage of life and the same phenomenon could be found throughout the whole animal kingdom.

Evolutionary psychologists and scholars from related fields have generally agreed that morality (particularly cooperation) is to some extent a product and at the same time a tool of natural selection. Cooperation is a basic precondition of survival meaning that the ones

capable of cooperating are more likely to survive and, in many cases, mutually benefit. Studies have also shown that there is a real biological base underlying the social processes related to morality since both the hormones oxytocin and cortisol affect the moral reaction in a situation of a social dilemma.

Furthermore, there are certain mechanisms that have been proven to shape the way humans respond to these situations. Broken Windows Theory explains that when signs of even minimal transgression occur, more are about to accompany them. The theory's implications include everything from a wide spread of sticking chewing gums under the school desks to an increased number of robberies in the bedraggled environment. Contrary to the effect of Broken Windows Theory, reputation and expectations of reciprocity seem to positively affect the human moral assessment. Since humans care very deeply what the others think about them, when feeling observed, they tend to act in the most representative and therefore cooperative way.

2 Decision-making processes

“You rely too much on the brain. The brain is the most overrated organ.”

Woody Allen

If one would be to go out to the streets and ask a number of random passers-by whether they think that humans are rational and logically-thinking beings, most of them would nod happily. And why would they not? The proofs of human creativity and cleverness can be observed all around us, whether it be the extraordinary inventions, the news of unbelievable space missions or the galleries filled with fascinating paintings. Yet the same brilliant humans who are capable of such remarkable things lock their keys inside the flat, leave their stoves on while leaving for vacation, call their current partners by the names of their ex-partners and repeat the same bad decisions again and again.

When looking back at some of the choices one took during his lifetime, one must ask himself: *Why did I do that?* It would be expected from a highly rational being that perceives himself as the peak of the evolution to have an answer to this question but the truth is that sometimes one simply does not know. Or in better words, it is one's *conscious mind* that does not have an explanation.

On May 23rd, 1987 Kenneth Parks assaulted his father-in-law and brutally killed his mother-in-law. Kenneth James Parks was at the time 23 years old Canadian, who had a happy marriage, an infant daughter, a very positive relationship with both of his in-laws and yet the not-known-about diagnosis of *homicidal somnambulism*. On the day of the murder, he drove 23 kilometres to the house of his wife's parents, broke in, choked his father-in-law unconscious and stabbed his mother-in-law to death without him being aware of it. While still being asleep he managed to drive himself to the nearest police station, were he, distraught and all covered in blood, told the officers: *“I think I have killed some people ... my hands,”* for that was the first time he realized he cut tendons in both of his hands, showing no signs of pain. The state Kenneth was experiencing is called *somnambulistic analgesia* and later would together with the EEG results serve as the crucial arguments in Kenneth's defence. In consequence of these findings, the jury acquitted him, deciding that Parks had not been in a sane, conscious state of mind during the entire period and therefore he has been found not responsible for his actions (Eagleman, 2012; Schenck, 2007).

The previous chapter has mainly addressed the human behaviour and decision-making in terms of conscious mechanisms, though some of the examples of the nonconscious processes have already been discussed. (See Broken Windows Theory, Implicit reputational cues) The following chapter will delve into the issue of free will, explain the paradigms of the prominent theory in human decision research dual-process theory. Moreover, nonconscious cognitive processes will be further examined, namely, we will focus on the mechanisms of priming and its effect on human behaviour.

2.1 The concept of free will: Are we in charge of our decisions?

The case of an individual having no power to control his violent and in extremity even homicidal behaviour is not as rare as one might think. In 1966, Charles Whitman climbed a university tower in Texas from where he shot and killed 17 innocent people including an unborn child. His actions are believed to be a result of a tumour, that was found during Whitman's autopsy, pressing his amygdala (Lavergne, 1997). An impulsive sexual behaviour with paedophilia has been displayed by a 40 years old man caused by an orbitofrontal tumour. Interestingly, after the tumour was removed, paedophilic preferences have disappeared and when the tumour recurred, the man began to be sexually interested in children again (Burns, Swerdlow, 2003).

All of these cases indicate that our decision-making and our behaviour is inseparably bound to the physical processes of one's body, which in result considerably threatens the idea of **free will**. Are we actually free to choose our next step if there is such strong a causality between the biological mechanisms and our decisions? For a further discussion of the issue, it is important to define what is meant by free will and decision-making.

Decision-making is *“the cognitive process of choosing between two or more alternatives, ranging from the relatively clear cut (e.g., ordering a meal at a restaurant) to the complex (e.g., selecting a mate).”* (VandenBos, 2015, p. 286) **Free will** could be characterized as the capability to choose, act and think voluntarily. Sam Harris (Harris, Ctiborová, 2015, p. 14) defines free will through two commonly spread premises: *“(1) that each of us could have behaved differently than we did in the past, and (2) that we are the conscious source of most of our thoughts and actions in the present.”* However, the actual existence of free will has been at a centre of a heated debate for centuries.

To illustrate the problem of free will, let us finally leave the tragedy of Tim's growling stomach and picture another situation: As you wake up in the morning and prepare

your breakfast, you feel the urge to listen to some music. What are you going to choose to play?

Humans experience a subjective sense of free will. That means that when you choose to play David Bowie's classic *Life on Mars* and sing your lungs out, it *feels* like your decision completely. In line with your belief, **libertarians** argue that people are free to choose, they are the agents deciding about their future states without any predestination (Fischer, Kane, Pereboom, Vargas, 2007). By this logic, if one would be able to travel back in time, he could change his choice.

Deterministic approach, also known as **hard determinism**, on the other hand, claims that every action is the only possible reaction to the certain past state (Evatt, 2010; Mouël, 2014). Everything that is, must be. When one hits a tennis ball with a certain force, it will fly at a certain speed. If you put ice in a warm environment, it will melt. The world is determined by the natural laws of physics. How could humans be the only exception? As Hawking and Mlodinow (2011, p. 45) state: „*Though we feel that we can choose what we do, our understanding of the molecular basis of biology shows that biological processes are governed by the laws of physics and chemistry and therefore are as determined as the orbits of the planets.*” In the deterministic universe, there is simply no place for free will.

Since the states of the mind are bound to the brain states, which function on a biological level, they are therefore physically determined (Eagleman, 2012). Taking the scientific evidence in an account, it is still necessary to note that the sensation of one's free will is deeply rooted in human nature, as Kane aptly comments in *Four Views on Free Will* (2009, p. 6): “*...This picture of different possible paths into the future is also essential, I believe, to what it means to be a person and to live a human life.*”

After all, how could the decision to play Bowie be determined when we ourselves did not know that we would play *any* music an hour ago? One may argue that a choice of music is far from the inevitable causality of a racket hitting a ball since the number of songs to choose from seems unlimited whereas the ball's trajectory and speed are wholly determined by the common logic of physics. The determinists suggest that the forces influencing human actions are considerably more complex than causer of the natural events (such as the temperature that melts the ice, the racket and the tennis ball). The principle that causes the intricacy of the issue is called **butterfly effect** and was first introduced by an MIT meteorologist Edward Lorenz during his lecture in 1972 when he

asked the audience the following question: “*Does the flap of a butterfly’s wings in Brazil set off a tornado in Texas?*” (Lorenz, 1972) According to the paradigm of the butterfly effect, a slight difference in an action’s circumstances leads to a rapid change of the final outcome. The song you choose most probably is determined, but we cannot ever predict it due to the number of forces influencing your decision at the very moment of clicking the ‘search’ button. For instance, if you would wake up later or if you would meet one of your siblings in the kitchen, accordingly to the theory, you would be likely to choose a different song but your actions would remain determined by an almost unthinkable number of influences.

Another prominent philosophical approach is **compatibilism** also sometimes called **soft determinism**. Accordingly to compatibilists such as Michal Gazzaniga (2011), John Martin Fischer (2007), Daniel C. Dennett (1984) or Richard Dawkins (2006), the idea of free will is not excluded by the reality of the deterministic world. Compatibilism seeks to find a place for free will in the world that is governed by causality. The compatibilist attempts to secure the existence of free will at least to some extent lie in redefining the concept itself. There is a number of forms of compatibilism but in general the supporters of the approach claim the following in regards to the nature of free will: The world sustains to be ruled by the laws of causality (as in the determinist perspective) but an individual’s action should be considered free as long as the intention to act in a certain way is self-determined, in better words the decision originated within us (Dennett, 1984; Gazzaniga, 2011).

To make the point clearer, let us illustrate the idea by picturing the choice of morning music scenario once more. According to compatibilists, the crucial aspect of free will is the difference between (1) you, independently choosing the song and (2) you, being pushed to play it by your brother who otherwise intends play it himself. In both scenarios, Life on Mars would inevitably end up playing through your morning routine but whereas the action in (1) was determined by internal factors, the action in (2) was controlled by the external factors. Therefore, the first scenario is considered free in the compatibilist perspective and the second is not. However, since in both cases the situation’s result is the same, the issue of freedom of choice has been reduced to the freedom to control (Fischer, Ravizza, 2000). One might argue, that a person has always the option to resist or confront his brother and refuse to play the song, but a hard determinist would most likely answer that even this specific reaction is determined by the one’s upbringing, temperament and many other factors involved that predestine us to act in a certain manner (Harris, 2012).

The last philosophical school of thoughts is **indeterminism**. According to this approach, everything that happens is based on the principle of randomness and causality ceases to exist in the indeterministic world. However, indeterminism also fails to prove the reality of free will, since in the world where events happen upon the principle of chance rather than voluntary decision, the place for free will is just as limited as in the world that is fully determined.

From the theoretical perspective, it is harder to find the arguments allowing the existence of free will than one might expect. Taking all of the philosophical approaches mentioned above to account one might conclude there is no place for free will in the process of human decision making. Yet, due to the manner of good research ethics, one must put these theoretical preconceptions aside and examine them through a process of an unshakable testing method. That is why the following articles are dedicated to experiments that have been designed to study the problematic issue of free will.

Attempts to find the answer: challenging the impossible

There has been a number of attempts to verify or disprove the reality of free will throughout the history of experimental psychology and neurology. The most famous experiments are probably the ones conducted by an American neuroscientist **Benjamin Libet**. During these studies (Libet, 1985; Libet, Gleason, Wright, Pearl, 1993), participants have been asked either to push a button or flex their wrist and notice the specific moment when they decided to do so. Simultaneously, the participant's cerebral activity has been recorded through EEG. The study has provided evidence of an increased brain activity 350 milliseconds before the participant has acknowledged the "wanting" to move. A brain signal called *readiness potential* often serves as an argument for many of the free will sceptics however Libet himself did not interpret the findings of his studies in the same manner.

In the classic essay *Do we have free will?* (1999, p. 47) Libet states:

Human subjects became aware of the intention to act 350–400 ms after RP starts, but 200 ms. before the motor act. The volitional process is therefore initiated unconsciously. But the conscious function could still control the outcome; it can veto the act. Free will is therefore not excluded.

More recently, many studies have been conducted to re-examine Libet's findings and found the need to reinterpret them (for a review, see Gomes, 1998). However, Libet's work still remains to be highly influential for his attempts were one of the first ones in the field.

Free will (e.g. freedom of choice) is a heated topic even in the current decision research. In a social experiment conducted by Johansson (2005) participants were given pictures of two faces and asked to choose the one they found more attractive. The probands then further described what were the specific reasons behind their choice. However, the 'trick' of the experiment was that in some cases had the experimenter without the participant's knowledge switched the pictures. Hence, the opposite picture from the one they originally chose was presented to the participants as their initial choice. Interestingly, not only had most of the participants failed to notice the trick but when asked to explain their choice they invented new and very specific arguments for the preference of one over the other. This specific phenomenon is called **choice blindness** and illustrates the fragility of freedom of choice.

Other studies testing the viability of the choice blindness concept have confirmed Johansson's findings. High level of choice blindness has also been demonstrated for example in the context of consumer choice, when having to choose which taste of tea and jam do the probands like better (Hall, Johansson, Tärning, Sikström, Deutgen, 2010); or when discussing one's political preferences (Hall, Johansson, Strandberg, 2012).

Taken together, these results may be perceived as quite alarming, for they inform us about the lack of control we have over our decisions. To our knowledge, science has not yet been able to find sufficient and valid evidence of human free will. Until it is proven otherwise, we therefore for the purposes of the research adopt the deterministic approach.

It has been reported that the mechanisms, of which humans are not consciously aware of, play a significant role in our everyday decision making. According to the research, our thinking processes can be subtly manipulated due to the limited attention capacity of our brains (Eagleman, 2012).

In the following chapter, we will further examine the nonconscious mechanism behind the human decisions, explore the hidden secrets of our brains and possibly examine what were the factors influencing your specific choice of morning tune.

2.2 Brain, Fast & Slow: Invisible gorillas and more

We make thousands of decisions every morning and most of them without us even being aware of it. When cleaning our teeth, getting ready for work, eating our breakfast and yes, even choosing what song to play in the morning... Mornings are simply filled with decisions. If we would have to decide about every one of them consciously, our brains would quickly get tired and overloaded with information. That is why more than often people turn themselves from the rational (but also very time and energy demanding) cognitive strategies to the more simplifying alternatives that allow us to act, decide and think quicker (Ariely, 2008; Kahneman, 2012; McRaney, 2012).

The dualistic model of thinking processes was first introduced by Schneider and Schiffrin (1977; 1977) who divided the mental mechanism responsible for thoughts into two categories: **controlled** and **automatic**. Since then the idea of dualistic mind has become wildly popular among scholars and many have adopted it. While the names of the categories differ throughout the great number of relevant literature, the principle remains the same (Evans, Frankish, 2009). Automatic (automatic versus controlled: Shiffrin, Schneider, 1977); implicit (implicit versus explicit: Haefel et al., 2007); or Type 1 (Type 1 versus Type 2: Wason, Evans, 1974) thinking processes are commonly characterized as fast, intuitive and work with low effort regarding our cognitive capacity. Contrary, the controlled; explicit; Type 2 thinking demands more time, energy and works on the basis of consciously controlled attention.

One of the prominent theorists in the field of the dual mind is Daniel Kahneman, a renowned behavioural economist, Nobel Prize winner and the author of *Thinking, Fast and Slow*. Kahneman (2012) adopts the terminology that was originally used by Stanovich and West (2000) and addresses the two types of thinking as **System 1** and **System 2**.

System 1, operates quickly, intuitively, with minimum attention demanded and its main function is to “*effortlessly originate impressions and feelings that are the main sources of the explicit beliefs and deliberate choices of System 2.*” (Kahneman, 2012, p. 21) Swiftiness of the System 1 is believed to be attributed to its ability to ignore the specific details and uncertainties, simplify reality into general categories and take to account only the most current, urgent information (Kahneman, 2012).

According to scholars (Kahneman, 2012; Stanovich, West, 2000), System 1 is shared all across the animal kingdom and it includes the innate responses (such as the automatic

facial expression when tasting something sour) as much as the ones we learn through prolonged practice (e.g. reading, counting, riding a bicycle once you learn how to ride it). In our case, the smile on your face when hearing first tones of *Life on Mars* in the morning would illustrate perfectly the nature of System 1 in practice, since it is an *automatic* and *effortless* response.

Interestingly, it has been found that some of the processes governed by System 1 run even without one's voluntarily control. Look at the following line:

$$5-3=?$$

Most likely, the number 2 has appeared in your mind without any higher effort invested to do so from your side. Moreover, even if you would attempt not to make the estimation, it would be nearly impossible. The readiness of the System 1 to jump to quick conclusions is in most of the cases a mental advantage. Though, as we learn later, it also can cause a mistake that alters one's impressions significantly and therefore lead to highly irrational decisions (Ariely, 2008; Kahneman, Slovic, Tversky, 1982).

System 2 focuses on the mental activities that require a higher amount of conscious attention and effort and therefore manages the information processing at a slower pace (Kahneman, 2012). When a person finds herself in an unknown situation; when trying to recall the name of the new colleague that introduced herself five times already; or when trying to answer the question '*When was the song Life on Mars written?*'; all of these activities are the perfect examples of System 2, for they demand a certain amount of effort in order to be sufficiently solved.

Kahneman claims, that System 2 is the part of our thinking that we proudly label as *ourselves*, for it is the "*conscious, reasoning self that has beliefs, makes choices, and decides what to think about and what to do*" (2012, p. 21). System 2 decides which flavour of ice cream one orders on a hot sunny day, whether he is going to watch *Casablanca* or *Star Wars* in the evening and which song does he intend to play early in the morning. However, it is only capable to do so based on the impressions generated by his more straight-forward colleague System 1.

After all that has been already written in regards to the two systems separately, it is needless to further explore the mutual interaction of the systems and its practical implications. Common sense would suggest that System 2, the rational, slow and conscious type of thinking, has the final word over the brain under all circumstances. However, it has

been reported that our limited cognitive capacity affects the functioning of System 2 significantly (Chabris, Simons, 2010; Kahneman, 2012). In other words, in cases of extreme concentration, when the conscious system fully exploits its ability to pay attention, System 1 takes over. The specific state of **cognitive depletion** may lead to impulsive behaviour, inhibition of self-control (Muraven, Slessareva, 2003) and may even result in what Chabris and Simons (2010) call **inattention blindness**.

In 1999, cognitive psychologists Dan Simons and Christopher Chabris conducted a famous series of studies that would later massively change the way we perceive human perception. During the experiments, subjects were given a task to watch a video of two basketball teams- dressed in white and black- and count how many times had the players of the white team toss a ball between each other. Right after the video finished, the probands were asked about the number they counted. Yet what the participants have not known is that the toss-counting was not what mattered to the researchers. The counting task was used to fully engage the cognitive abilities (System 2) of the observers, so that their attention is completely diverted from situation that was actually tested: What has appeared in the middle of the video was one of the students, who fully dressed-up as gorilla looked in to the camera for, beat her chest and the calmly disappeared from the scene. Results of the research show that approximately half of the probands fail to notice the gorilla (Simons, Chabris, 1999).

The study of inattention blindness sheds light on the vulnerability of our cognition and reveals that the reliance on operations governed by our conscious thinking, System 2, does not necessarily lead to the correct solution.

Despite the undoubtable qualities of human mind, there is a growing number of works (Ariely, 2008; Brafman, Brafman, 2009; Kahneman et al., 1982; McRaney, 2012, 2013; Thaler, Sunstein, 2009) on just how easily so-called *rational* mind can be tricked and fooled by its own brain. In order to simplify reality, spare energy and time, to defend egos- the human brain has invented tons of sophisticated ways (whether it be heuristics or biases) to outsmart us and the inattention blindness is just one of the many strategies he uses.

Priming: Florida on my mind

Janiszewski and Wyer (2014, p. 4), the author of a complex review on the issue, define **priming** as following: “...is an experimental framework in which the processing of an initially encountered stimulus is shown to influence a response to a subsequently encountered stimulus.” In other words, priming is a cognitive process, during which the

exposure to a specific cue causally affects the individual's response to another cue. All of the information processing mechanisms (attention, comprehension, memory retrieval, inference, and response generation) have been found to be affected by the intuitiveness of priming (Janiszewski, Wyer, 2014).

In a famous experiment from 1990s Bargh, Chen and Burrow asked the participants (mostly university students aged eighteen to twenty-two) to formulate four-word sentences out of a set of 5 words they were given by the researchers. The participants in the experimental worked with words such as *bingo*, *Florida*, *careful*, *grey* or *wrinkle*, stereotypically associated with the elderly. Once the sentences were invented, the students were told to go to a room that was situated on a lower floor of the building, so that they participate in another experiment. In reality, what the researchers actually tested was not the students' verbal skills but the time it took them to walk to the other room. Bargh et al. claim that the participants that were primed with the elderly stereotype walked in a slower manner than the control group. Interestingly, there were no words related to speed or pace included in the given set of words. This suggests, that priming effects work even on the basis of rather complex associative principles (Bargh, Chen, Burrows, 1996) and at the same time makes us question our own rationality.

In the light of what has been said so far, how can you be certain that the choice of the song you played in the morning was really yours? An example of priming would be if you would watch the news the day before the breakfast and hear about a NASA Satellite flying around Mars. The association from the day before still may lead to the choice of music you make the morning after.

Additionally, when primed with words such as Mars, Space NASA, or Bowie's song itself other related terms, ideas and behaviour become more salient. Without your conscious knowledge, by reading these past few chapters, you have also been primed by galactic cues. Due to that, there is a higher probability of you to interpret even completely unrelated cues in regards to space-like topics. Take the following example and think of a word that could be hiding in the fragment:

ST_R_

Due to the priming effect, you are temporarily more likely to recognize the word STARS in comparison to for example the words STORM or STORY.

The implications of the priming mechanisms are far-reaching and the effect itself has been tested in various situations. It has been proven for example that subjects primed with a Red Bull logo, tend to drive faster and less carefully (Brasel, Gips, 2011); probands that were presented with pictures of library spoke more quietly (Aarts, Dijksterhuis, 2003); and participants exposed to pictures of superheroes act more prosocial (Van Tongeren et al., 2018). Apart from the academical research, the effect of priming is a wildly popular concept in the field of marketing (Bhargava & Chakravarti, 2009) and political campaigning (Kuhne, Schemer, Matthes, Wirth, 2011).

2.3 Summary

Jean-Paul Sartre, French existentialist philosopher, dramatist and novelist once famously said: “*We are our choices.*” But is it actually us who decide over the choices we make? Who is really in charge?

Thinkers, scientists, and specialists coming from a broad field of expertise have been debating over the topic of free will over centuries and based on their approach we may now recognize four main schools of thought: **libertarianism**, **compatibilism**, **indeterminism**, and **determinism**. Libertarians believe in free will based on the subjective feeling of voluntarily decision making while rejecting the idea of hard determinism. Compatibilists claim that the ideas of free will and the predetermined world do not necessarily exclude each other, for even in the world governed by causality an individual still has the power to make his own choices. According to the indeterminist approach, the generally valid law of causality does not exist and the world is guided by the unpredictable principle of randomness and chance. Contrary, determinism claims that every action inevitably leads to only possible reaction. Our decisions, behaviour and emotions are constantly being shaped by unknown factors and therefore there is no place for free will.

Despite the long history of the debate over free will, the answer remains unknown. In order to solve the endless problem number of researches has been conducted, the most famous one probably being the series of studies by Benjamin Libet. Results of Libet’s experiment prove an increased brain activity preceding controlled conscious decision to move one’s finger or wrist. By some, this is believed to be an argument in favour of biological determinism. However, even the author of the experiments admits there is still a place for free will humans can always veto the action of the nerves. Nevertheless, until the

dependence of human decisions on the biological factors of ourselves is disproved, we adopt for the purposes of the research **the determinist approach**.

Apart from biology, scholars also come to believe that our decisions are also dependent on the accurate functioning of two systems (**System 1** and **System 2** in Kahneman's terminology) which govern human information processing. System 1 operates quickly, automatically and without conscious voluntarily effort invested. On the other, the second system requires energy, concentration and time in order to function properly. When the attention of System 2 is fully exploited, System 1 takes over to further run the cognitive processes. Since some of the qualities of System 1 are generalization and simplification, its inadequate use may lead to flawed results.

An example of System 1 overtaking control is a cognitive process called priming. According to research, associations originated by specifically presented cue affect the way one responds to the following cues. The priming effect is present in many aspects of our daily lives and also appears to be one of the foundation stones of the current research.

3 Conservation psychology: Green is the new black

“The Earth is a fine place and worth fighting for.”

Ernest Hemingway

Let us picture a hypothetical situation one last time: Imagine you are a herder, who lives in a small town, where there are 4 other herdsmen and all the 5 of you depend on common pastures that are the resource of your livelihood. In the long term, the pastures can sustain to feed 80 sheep. That means that every herder should turn out to pasture only 16 of his sheep. Since the resources are limited, if you or even other herders decide to feed more sheep, the grass cannot regrow fast enough and as a result, the quality of the landscape is inevitably going to decline. Logically speaking, the ideal scenario in regards to collective prosperity is when every herder keeps the number of sheep in the herd at 16 or lower. However, it is to be expected that some of the herders will not follow the unwritten rule and therefore initiate the fall of the commons. Since this fact is clear to each of the herdsmen, they naturally try to maximize their own profit while it is possible which leads to exploitation and collapse of public resources (Greene, 2013; Hardin, 1968).

The outlined story is a classic example of the so-called **Tragedy of the commons** and was formulated by an American ecologist and philosopher Garrett Hardin in his article of the same title. Hardin’s parable sheds light on some of the main environmental issues we as a modern society face. Deforestation, overfishing, overpopulation or climate change are all considered the cases of the phenomena Tragedy of the commons. Individual action that leads to overexploitation (e.g. littering, overuse of single-use plastic or food waste) of natural resources (such as living space, energy or clean air) may be beneficial for the person in short term but it pays back terribly in a long run.

However, as Elinor Ostrom, a Nobel prize winner in Economic Sciences shows in her book *Governing the Commons* (1990), the tragedy itself is not unavoidable. Nowadays, policy-makers, economists, environmental activists and scientists from a broad field of expertise have shown increasing interest in answering the following questions: Under what circumstances does an individual choose to invest in the public interest instead of

maximizing his own benefits? What drives the motives to cooperate rather than enjoy the profits on his own? In the following chapter, the ways of influencing green and sustainable behaviour in our everyday lives will be explored.

3.1 Nonconscious mental processes and current conservation psychology: Come to the green side we got David Attenborough

Whether you ride a bicycle or drive a car in order to get to work; whether you decide to eat a roast beef or Indian vegetarian curry for dinner; whether you choose a tropical summer holiday on distant islands or a local adventure for your vacation; whether you *recycle or not*; for every one of your decisions you would be able to find rather multiple rational, sophisticated explanations that would support your specific choice of action (Winter, Koger, 2009).

Vast majority of the current psychological research related to human-nature interactions and sustainability has been focusing on the dispositional characteristics of an individual predetermining him to certain response (Gatersleben, Murtagh, Abrahamse, 2014; Hinds, Sparks, 2008; Lévy-Leboyer, Bonnes, Chase, Ferreira-Marques, Pawlik, 1996; Sparks, Shepherd, 1992). Previous studies have mainly been attempting to prove the ways behaviour change can be triggered by affecting one's conscious beliefs, values, and opinions (Dolan et al., 2012).

However, more recently a growing number of researchers used the findings from moral and cognitive psychology to test the ways nonconscious incentives may modify environment-related actions (Marteau, 2017). In the previous chapters, we listed several mechanisms that affect our decision-making without us being conscious about it at the time. Is there a possibility they could similarly affect us in the environmental domain? Could they be one of the considerable tools to stop the herdsmen from putting their own profit first?

Nonconscious mental processes (System 1) are responsible for much of our automatic (and sometimes flawed) behaviour (Ariely, 2008). They make us eat a whole bucket of ice cream at once; buy the Hard Rock Café T-shirt everyone is wearing; and repeatedly confuse the name of our current partner with the one we used to date earlier. Is there a chance they could affect our pro-environmental behaviour in just the same way? Could we actually trick our mind into being a little bit greener? In the following articles, we will explore the most current scientific findings on the impact of earlier mentioned mechanisms when applied in the context of conservation attitudes and behaviour.

A mechanism that has been explained in the prior chapters is **priming**. It makes people drive faster when being influenced by the Red Bull logo, but does the same mechanism apply when attempting to increase the pro-environmental tendencies? Although some research has been carried out on other kinds of priming and its relevance in pro-environmental behaviour, only a few studies have attempted to investigate the effect of visual priming.

Zelenski, Dopko & Capaldi (2015) tested the idea in a series of studies, that included the previously explained Tragedy of the Commons. In the study, one group of participants was presented with the video fragments from the BBC's Planet Earth and then asked to play a simulation of a fish-themed version of the Tragedy of Commons. Results show that when people are primed with nature-related video (compared to a video about architecture) they are more likely to engage in cooperative and show sustainable intentions. Interestingly, consistent results have been found of the influence of David Attenborough's nature documentaries on pro-environmental attitudes regardless of the subject's mood, trust, or subjective feelings of nature relatedness.

A short film has also been used to study priming in the study conducted by Bimonte, Bosco, & Stabile (2019). The subjects of the experiment were asked to first watch a short video about a lifecycle of a smartphone and afterward answer a questionnaire that would be later analysed. While the questionnaire remained the same for both of the experimental groups the videos were varied to study to explore two types of priming. First of the groups would watch a video with unpolluted nature and video would end with the smartphone being recycled and sold again in a shop window. In the other case, the video would be set in an industrial grey environment with chimneys and factories in the background when the phone was showed ending up in a dump. The participants of the experiment were then asked about their preference for a new smartphone: If they would buy a new phone and one of the choices would recyclable what aspects would play a role in their decision-making. Both of the framings were expected to cause a different response based on priming. The video showing pure uncontaminated nature makes salient the concept of the reality we would lose if we do not implement sustainable policy. In other words, "*The hold paradise option*" as called by Bimonte et al. (2019, p. 3). On the other hand, the polluted and contaminated land shows that conservation practices are essential to sustain and improve the quality of the environment (i.e. "*the escape-hell option*" (Bimonte et al., 2019, p. 3). Findings are clear

that the so-called “*hold paradise*” type of nudging influences human behaviour more efficiently than the more sceptical and catastrophic scenario.

Referring to Kelling & Wilson’s **Broken Windows Theory**, an influential (and now a classic) study on littering by Cialdini, Reno, & Kallgren (1990) has shed light on the role of a social norm and the effect of the surrounding environment in pro-environmental behaviour. The main hypothesis of the research is that perceived signs of littering cause more littering. In the experimental condition, the floor of the parking lot, where the experiment was set, had been covered with cigarette butts, paper cups, candy wrappers, and handbills. On the contrary, the other studied group has experienced the parking lot being completely cleaned of all litter. Furthermore, half of the studied group had encountered an experimental confederate who would drop a large handbill on the floor before reaching the parking lot. A similar handbill has been placed on all cars in the neighbourhood. The level of littering was measured by the number of drivers dropping their handbill on the ground. The findings show that the subjects that were displayed by the littered environment also tend to litter more. Interestingly, the reaction to the confederate's act of littering also depended on the nature of the environment. By littering in an otherwise clean environment the norm became more salient and therefore caused the subject to litter less. As mentioned above, Keizer et al. (2008) found that littering also increases when different signs of disorder such as graffiti and tags are present in the environment. (Chapter 1.1 to find more about the study)

Human attention has been shown to be naturally attracted and responding to face-like objects. Moreover, we tend to see them even in the situation when there are no actual faces present (i.e. pareidolia; Chakroff & Young, 2014). A particular formation of clouds, a shape of a front side of a car or even seeing Jesus in your morning toast (Liu et al., 2014) or Elvis in a potato chip (Voss et al., 2012) remind us of things most familiar to us; human faces. Findings from conservation sciences suggest that this human disposition could be used in order to positively influence attitudes to nature and its protection (Huxley, 1957). Further, cognitive psychology has revealed that human attention is particularly drawn to eyes and eye-like objects. This hypothesis is supported by the data from the research by Manesi, Van Lange, & Pollet (2015). In their research, they have found that ‘**eye-spots**’ (i.e. eye-like markings) promote human conservation attitudes towards the butterflies that have such ornaments on their wings. While not ignoring some scepticism towards the hypothesis (Meleady et al., 2017), we propose that the **Watching Eyes Effect** may positively affect conservation and pro-environmental decision making and attitudes.

In line with our presumptions, research by Bateson et al. (2015) shows a positive effect of pair of watching eyes on so much debated social issue of littering. In the field experiment, that was set at a university campus, useless leaflets were attached behind the handlebars of the students' bicycles by the researchers. The study found that a leaflet with watching eyes on itself is considerably less likely to be dropped on the floor or become a litter than the one without the eyes. The findings from another study conducted by Ernest-Jones et al. (2011) confirmed the robustness of the previous study when it showed that the level of littering in a student canteen decreases by placing a pair of eyes in the room.

Overall, an increasing number of studies has proved environmental and conservation psychology to be a viable focus of study when attempting to combat current issues that the world faces globally. Both of the fields are relatively recent and unexplored territories thus worth considering further growth of applying prior knowledge in new consequences as well as pioneering new scientific exploration.

3.2 Summary

Our society currently faces multiple social and environmental issues such as deforestation, poverty, climate change or overpopulation. The awareness of the possible implications of these planet-changing processes spreads all around the world and challenges researchers from a broad range of specialization to unite in order to find efficient solutions for the future.

According to Hardin (1968), these problems of a global character can be explained by a metaphoric parable and famous dilemma Tragedy of the Commons. The Tragedy of Commons illustrates how shared lands could be exploited when individuals focus on individual profit rather than sustainable steps for the future.

The vast majority of psychological research has been trying to tackle these issues by addressing them in terms of conscious behavioural change. However, research has also confirmed that in some cases, the famous effects such as priming effect, watching-eyes effect or Broken Windows Effect influence human actions in a similar way.

Empirical part

4 Research problem

We make thousands of decisions daily. Or at least we *think so*. Many of our actions are committed and decisions decided without our conscious knowledge. (Eagleman, 2012) The influences that guide our decisions and actions are more than often invisible, making it thus hard to believe, that our choices are not independent on rules of causality that seem to govern the world.

As described in the theoretical part, most of the current research in the field of conservation psychology has been focused on the dispositional characteristics of the self in interaction with the environment to facilitate behavioural change. This paper suggests that addressing the nonconscious, automatic system of information processing may be equally effective in terms of adapting common behaviour to the seriousness of global issues we face. It has been found, that pro-environmental behaviour can be triggered **The Priming effect**, **Watching Eyes effect** and **Broken Windows effect**.

Humans care about their reputation dearly. So much so that implicit reputational cues have been shown to adjust moral actions and decision making. It has been found that in the presence of the image of eyes humans act more pro-socially (to put in better words: up to the expectations of the social group one wants to belong to). This effect is called “**Watching eyes effect**” and has been proven to be an effective cue in multiple environments.

Contrary to the previously described effect, when being influenced by the **Broken Windows Effect**, people are believed to act less morally and commit more misdeed. Several studies have shown that in an environment where there is a vivid sign of a transgression, more are about to accompany them.

Priming is a cognitive process, that works on associative principle and can be characterized as a mechanism during which the exposure to a specific cue (whether it be visuals, sounds, thoughts, etc.) causally affects the individual’s response to another cue.

4.1 The aim of the research

The aim of the research paper was to test the influence of the chosen independent variables to determine whether they would influence recycling behaviour.

The specific goals of the study are expressed as follows:

The main aim was to determine whether the visual stimuli (in our case the picture of Watching Eyes, the picture of a Fox or a wall covered with Graffiti) would have an effect on compliance with the recycling rules.

The second aim was to resolve whether the selected stimuli differ in their effectiveness in compliance with the recycling rules.

4.2 Research hypothesis

In the research paper, we wish to test the following hypotheses that are expected to expand due to the nature of the experiment.

H1: The presence of non-conscious stimuli influences the probability of violating the recycling norm.

H2: The stimuli differ among each other in the probability of violating the recycling norm.

5 Methodological framework of the study

In this chapter, we describe the methodological framework of the experiment. Firstly, logistics and the procedure of the research are going to be explored. Then we describe the ethical aspects and finally, the methods of data analysis are going to be explained.

5.1 The logistics and procedure of the research

The process of research is characterised in the following chapter. We explore the methods that were used and describe the experimental conditions. Secondly, we further clarify the nature of the used stimuli.

In order to accomplish the aims of the study, we chose to conduct a field experiment (i.e. series of field experiments, therefore an experimental between-group design was chosen). Recycling containers, each consisting of four bins, labelled “Plastic”, “Paper”, “Metal & Glass” and “Residual” were situated at the main train stations in two cities located in the Czech Republic: Olomouc and Ostrava. Various visual stimuli (Picture of Watching Eyes, picture of a Fox, wall covered in Graffiti) that we chose to test three major psychological effects, Watching Eyes Effect, Pro-environmental Priming, and Broken Windows Effect, were placed above each of the recycling containers on different days. The stimuli believed to be triggering the specific effects will be further described in the chapter Stimuli. For every “waste collection”, the cue was left above the container for 24 hours after which we had collected the contents of each bin and sorted it accordingly to the four types of waste. The focus of the study was the amount of misplaced and correctly placed waste. Further, in order to sort the waste correctly, we gathered the information about the specific rules of sorting the waste during an excursion to a waste sorting line, through consultations with the employees of the Station Cleaning Service and from the website www.jaktridit.cz. Right after the waste was sorted, the data was rewritten into a MS Excel table (Appx. 1).

Both in Ostrava and in Olomouc, for each cue, the data set consisted of a matrix of waste. The data set thus consists of $4 \times 2 = 8$ such data matrices. We then used these matrices for further analysis which will be described in Methods of data analysis.

Size wise, we have collected and sorted 4555 pieces of waste throughout the experiment (Tab. 1 for sample sizes of each condition).

Cue	Amount of collected data
Without stimuli ('none')	1060
Broken Windows: Graffiti	1187
Implicit reputational cues: Watching eyes	1606
Pro-environmental Priming: Fox	702

Table 1. Sample sizes, i.e. number of collected waste for each condition

Experimental conditions

The experiment was located at the main train stations of two cities in the Czech Republic Olomouc and Ostrava. Furthermore, in both of the areas, we chose two of the waste containers as experimental settings. The choice of the specific containers was based on the results of pilot studies, which we ran approximately a month prior to the full-scale research. We have decided to feature two recycling containers in both of the cities to maximize the chance of excluding other intervening variables that may affect the study. The stimuli were presented in the same way in both cities and in all locations (Fig. 1, Appx. 3).



Figure 1. The Watching Eyes stimulus in the experimental environment

Stimuli

3 types of stimuli were used in the series of field experiments, to fulfil our aims, whereas all of them were chosen based on the certain psychological theory they are believed to support. The stimulus of the Broken Windows Effect was in the research represented by a wall covered in **Graffiti**. The cue that we expected to serve as a Pro-environmental Priming cue through was a picture of a **Fox** in an environment that resembled typical Czech forests. As the third stimulus, we used a picture of **Watching Eyes** which is the implicit reputational cue.

Initially, we have used a mirror instead of a steady picture, however, the stimulus has been changed after the pilot study when the mirror has been broken by a random passer-by. We then decided to continue with a stimulus that has been used in a study on reputational cues by Žihlavníková (2016). We chose the Picture of a Fox on the basis of social network poll, where it won over two other nature-related images with the 70% representation of votes for the Fox over the others. The Graffiti cue was inspired by an influential study by Keizer et al. (2008).

5.2 Ethical aspects

Due to the nature of the design of the study, no harm, stressful or dangerous situations have been caused upon the participants. There has been no personal data gathered, therefore informed consent process has not been needed.

The only humans involved were the employees of cleaning service, with whom we agreed not to clean the particular containers used for experiments and occasionally to check whether the cues have not been damaged.

5.3 Methods of data analysis

We conducted the collecting in Ostrava 11 times, using two waste containers thus equals 22 in total. The collecting in Olomouc was conducted 12 times, using again two containers thus equals 24 in total. The total numbers differ due to the need for further data since the number of wastes throughout collecting differs.

We decided not to include one of the sets of the collected data due to the fact that the waste bin was full. Therefore, some of the individuals may have put a piece of waste to an incorrect collecting bin because they thought they could not do otherwise.

Another set of the data had to be eliminated from the research due to the fact that the picture of a Fox had been torn down of the wall. Since the experimental conditions had been disrupted in this case, the data collected that day could not be counted with. In the following articles, we explain the reasons why Bayesian probabilities were used in order to estimate the results of the research.

Bayesian statistics method vs Laplace probabilities

In bin k only waste of quantity w_k should be discarded. There are 4 bins $k = 1 \dots 4$ and therefore only 4 types of waste to be discarded (because one of the bins — bin 4 — is labelled “Residual” (i.e. to be used for waste that does not belong in bins 1 ... 3. However, in bin k , waste of quantity w_j , which belongs in one of the other bins, has also been collected. We do not tally which false items were in the recycling bin. The researchers and, presumably, worldwide users of such labelled recycling bins, assume that there is a fraction of contents in the bin that should not be in the bin — these we labelled as ‘incorrect’ content. For each container, we count, how many correct items were in the labelled recycling bin and how many false items were therein as well. Then the fraction $\frac{w_k}{w_k+w_j}$ of correctly disposed waste is estimated (this is directly derivable from the data entries of identified waste in each bin).

This fraction is not, however, a probability. It would be a probability in a **Laplacian paradigm if $w_k + w_j$ is a very large number** - which is not in this experimental setting. A further flaw in using a Laplacian probability paradigm is the **impossibility of estimating the uncertainty about the fraction $\frac{w_k}{w_k+w_j}$** — it is not uncertainty that can be estimated by a z -score, because a Laplacian probability is not normally distributed for at least 3 reasons: (a) the domain of a normal distribution is $-\infty < z < +\infty$ for a random variable z ; (b) the uncertainty about $\frac{w_k}{w_k+w_j}$ - irrespective of how it is calculated, is not symmetric for Laplace probabilities, as $0 \leq \frac{w_k}{w_k+w_j} \leq 1$; (c) if $\frac{w_k}{w_k+w_j}$ is close to 1 or 0, the uncertainty calculated by z -scores will be out of bounds (e.g. the likelihood function for the cue “Fox” in Appx. 4).

We now move further to demonstrate why we use the methods of Bayesian statistics to estimate both the probability and its uncertainty of finding the correct trash (i.e. the trash that has been correctly placed in the bin with the appropriate label) in the bin.

In Bayesian statistics, the probability s is a random variable with $0 \leq s \leq 1$ and we look for the ML (most likely) probability s_{ML} as the position where the likelihood function of s is a maximum. Bayes Theorem states

$$\Lambda_{\text{post}} = \textit{evidence} \times \Lambda_{\text{prior}}$$

As more and more evidence is accumulated, the posterior likelihood (not: probability) changes.

For the results of an experimental design like the one being presented here, we do not know a prior (hence the index ‘prior’) what the evidence will be. Hence, we must use a Jeffreys prior.

$$\text{Jeffreys prior is } \Lambda_{\text{prior}} = \frac{1}{\pi\sqrt{s}\sqrt{(1-s)}} = \frac{1}{\pi} s^{-\frac{1}{2}}(1-s)^{-\frac{1}{2}}.$$

The *evidence* is the data. If s is the probability (not a number!) of waste w_k being discarded in the correct bin, then $(1-s)$ is the probability (again: not a number!) of finding waste $w_j \neq w_k$ in bin k .

The *evidence* is

$$\textit{evidence} = \textit{pdf}(\text{B}\varepsilon(\alpha, \beta), s)$$

$$\textit{evidence} = \textit{constant} \cdot s^{w_k} \cdot (1-s)^{w_j}$$

with some constant *constant* to be determined by integrating the probability density function over the domain of s .

The parameters α, β of the Beta distribution $\text{B}\varepsilon(\alpha, \beta)$ are related to its probability density function via

$$\textit{pdf}(\text{B}\varepsilon(\alpha, \beta), s) = \frac{\Gamma(\alpha + \beta)}{\Gamma(\alpha) \cdot \Gamma(\beta)} s^{\alpha-1} (1-s)^{\beta-1}$$

We, therefore, obtain, using Jeffreys prior,

$$\Lambda_{\text{post}} = \textit{pdf}(\text{B}\varepsilon(\alpha, \beta), s) \Lambda_{\text{prior}}$$

$$\Lambda_{\text{post}} = \textit{constant} \times s^{\alpha-1} \cdot (1-s)^{\beta-1} \cdot s^{-\frac{1}{2}} \cdot (1-s)^{-\frac{1}{2}}$$

and

$$\textit{pdf}(\text{B}\varepsilon(\alpha, \beta), s) = \textit{constant} \cdot s^{w_k} \cdot (1-s)^{w_j}$$

Comparing the exponents, we obtain

$$\alpha - 1 - \frac{1}{2} = w_k \quad \text{and} \quad \beta - 1 - \frac{1}{2} = w_j.$$

The ML probability is the mode of Λ_{post} . So

$$s_{\text{ML}} = \text{mode} = \frac{(\alpha-1)}{(\alpha-1)+(\beta-1)} = \frac{w_k + \frac{1}{2}}{w_k + w_j + 1}.$$

We observe that the integration constant need not be calculated for calculating the ML Bayesian probability. We also observe that the mode, rather than the expectation value, of the Beta distribution converges to the Laplace probability, and, for large w_k (implying that w_j must also increase towards infinity) $s_{\text{ML}} \square \frac{w_k}{w_k + w_j} \square p_{\text{Laplace}}$. We clarify how to deal with the uncertainties of the mode(s) (by using confusion matrices) in the Methods section.

Methods of data analysis

Above each waste-collecting set of 4 bins, a cue was placed (if none was placed, we call it “no cue”). All data needed for the research was rewritten right after each measurement into a MS Excel table. Firstly, we counted modes for every of the specific given cues. The mode for waste k with w_k correct items and w_j incorrect items is $\text{mode}_k = \frac{w_k + \frac{1}{2}}{w_k + w_j + 1}$. **We graph all 4 likelihood functions Λ_{post}** (an example in Appx. 4).

Then we calculate the transition between the likelihood functions for two cues cue_A and cue_B , pairwise, leading to false and true assignments for each pair of cues. This leads to the confusion matrix $\begin{pmatrix} \text{True}_{\text{cue}_A} & \text{False}_{\text{cue}_A} \\ \text{False}_{\text{cue}_B} & \text{True}_{\text{cue}_B} \end{pmatrix}$.

The effectiveness of one cue over another cue so manifest in the off-diagonal elements (for example, if $\text{mode}_A < \text{mode}_B$, then $\text{False}_{\text{cue}_B} = \int_0^{\text{transition}} pdf(\text{BE}(\alpha_B, \beta_B), s) ds$). The numerical values of these off-diagonal elements are a measure of the significance of the effectiveness difference between the two cues.

Expressed differently, but mathematically equivalently, the trace of the confusion matrix must be very close to 2 if the difference in effectiveness between the two cues is significant.

6 Results

The aim of the present study was to determine whether the chosen visual stimuli would have an effect on compliance with the recycling rules. Additionally, we aimed to examine whether the cues vary in their effectiveness to impact compliance with the recycling rules.

We used 3 cues in order to test the recycling behavioural change and a control group without use of any stimuli to set a baseline for comparison of the results. All of the used stimuli affected the compliance with recycling rules (Fig. 2, Fig.3, Fig. 4, Fig. 5).

Further, the results of the ‘Graffiti’ condition are not significantly different from the control group, i.e. the condition where none of the stimuli were used. Also, the differences between the effects of ‘Watching Eyes’ and ‘Fox’ are significantly different. Otherwise, the stimuli differ among each other significantly (Tab. 2).

6.1 Distributions of the cue ML probability distributions

H1: The presence of non-conscious stimuli influences the probability of violating the recycling norm.

If we assume that the ML Bayesian probability is drawn from a sample (our sample has 16 modes), then we compute the distribution of these modes (i.e. the ML Bayesian probabilities). As is to be expected, these distributions are Beta distributions. The mode of each distribution is an indicator of whether further samples will cluster about the mode of this distribution. Below are the Beta distributions of the samples drawn from the population specified by the cue.

Without stimuli

We note that (Fig. 2) the mode (=0,548) of the population of the cue “**Without Stimuli**” is **more than 50%** — an indication that inhabitants of both cities tend to abide by the expectation of separating waste — but the adherence is not very strong.

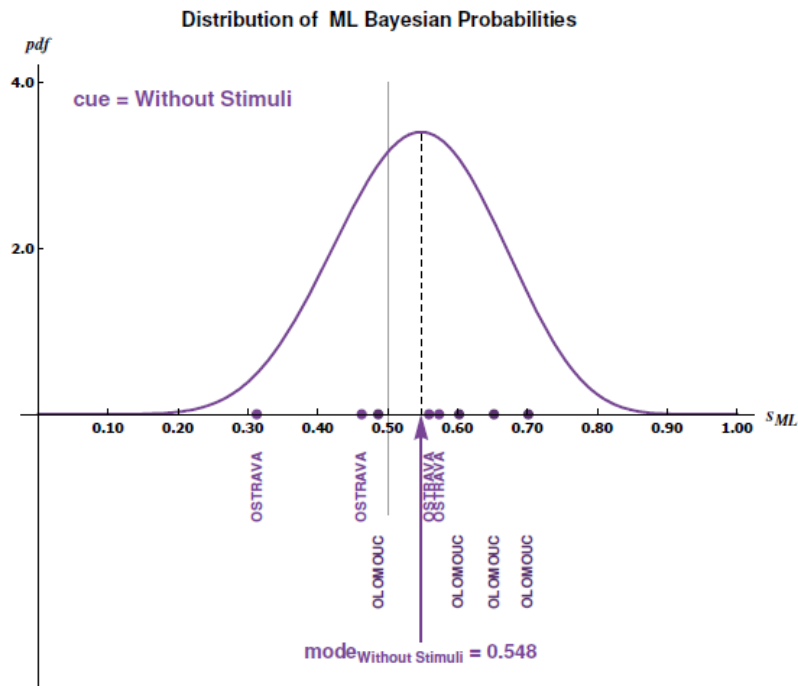


Figure 2. Probability of waste placed correctly under control condition

Graffiti

We note that the mode of the population of the cue “Graffiti” is **less than 50%** (Fig. 3) -an indication that the presence of non-conscious stimuli (this case the Graffiti) influences the probability of violating the recycling norm. If the mode is less than 50% it indicates the compliance with recycling rules less likely due to chance. Interestingly, some of the measurements show that even in the condition ‘Graffiti’ the compliance with the rules was very high.

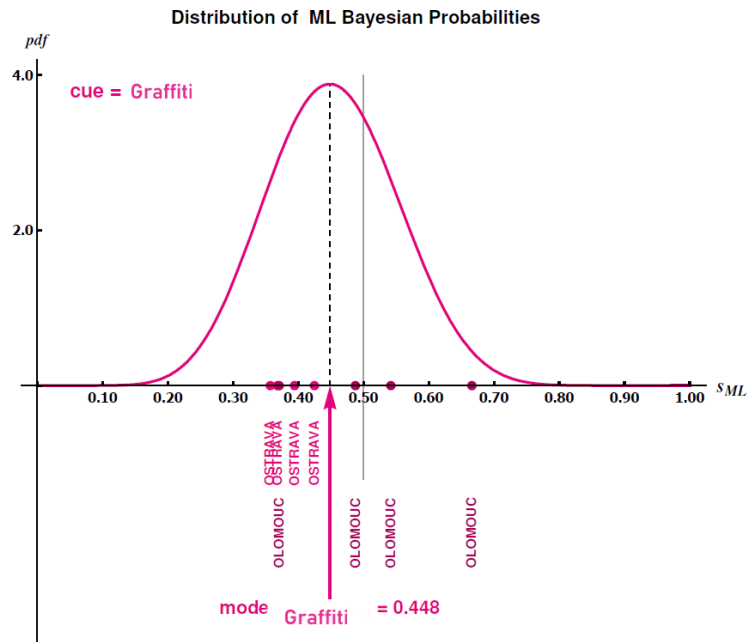


Figure 3. Probability of waste placed correctly under the Graffiti condition

Watching eyes

We note that the mode of the population of the cue “Watching Eyes” (=0,809) is **much more than 50%** (Fig.4) - an indication that “Watching Eyes” is a very effective cue, therefore, the presence of non-conscious stimuli (this case Watching eyes) influences the probability of violating the recycling norm.

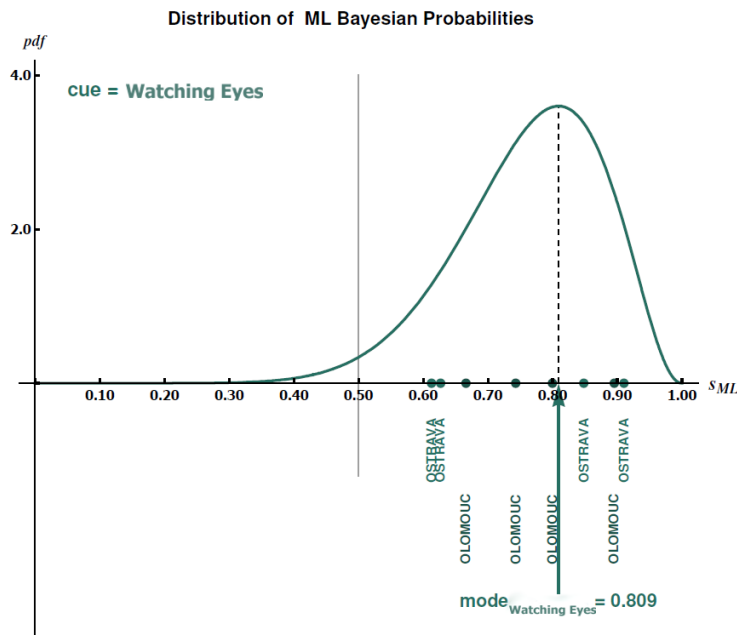


Figure 4. Probability of waste placed correctly under the condition of Watching Eyes

Picture of a Fox

We note that the mode of the population of the cue “Fox” is **very much more than 50%** (Fig. 5) — an indication that “Fox” is a very effective cue, we conclude that therefore the presence of the non-conscious stimuli influences the probability of violating the recycling norm. Interestingly, one may observe the mode $_{\text{fox}}$ is higher than mode $_{\text{Watching Eyes}}$.

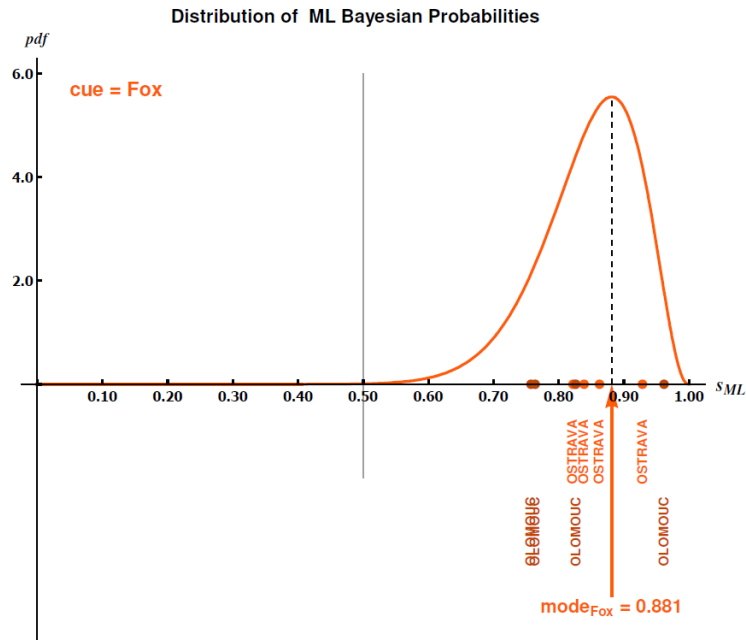


Figure 5 Probability of waste placed correctly under the condition of Picture of a Fox

6.2 Differences among stimuli

H2: The stimuli differ among each other in the probability of violating the recycling norm.

To analyse the differences among the stimuli' effectiveness, we compare the distributions of the ML Bayesian probabilities of cues pairwise. We then use the log-likelihood ratio; formally, we compute a statistic, called Wilks.

The cues “**Graffiti**” and “**Without Stimuli**” have not been found significantly different (Tab. 2). The same can be said in regards to “**Watching Eyes**” and “**Fox**”. All other cues are pairwise significantly different.

A significance test using ML methods, however, does not allow for ranking significances based on how small the p-value is. Thus, for example, the differences between “Graffiti” and “Fox” cannot be interpreted as more significant than the differences between “Graffiti” and “Watching Eyes”. Nevertheless, both are highly significantly different.

1 2	Graffiti	Without Stimuli	$\Lambda_{\text{Wilks}} = 2.73$	$p_{\text{Value}} = 25.5 \%$	n.s.
1 3	Graffiti	Watching Eyes	$\Lambda_{\text{Wilks}} = 17.8$	$p_{\text{Value}} = 0.0135 \%$	* significant
1 4	Graffiti	Fox	$\Lambda_{\text{Wilks}} = 26.2$	$p_{\text{Value}} = 0.000202 \%$	* significant
2 3	Without Stimuli	Watching Eyes	$\Lambda_{\text{Wilks}} = 10.8$	$p_{\text{Value}} = 0.447 \%$	* significant
2 4	Without Stimuli	Fox	$\Lambda_{\text{Wilks}} = 19.3$	$p_{\text{Value}} = 0.00641 \%$	* significant
3 4	Watching Eyes	Fox	$\Lambda_{\text{Wilks}} = 2.94$	$p_{\text{Value}} = 23.0 \%$	n.s.

Table 2: Tests for significant differences: Wilks

7 Discussion

The aim of the research paper was to determine whether the chosen visual stimuli affect compliance with recycling rules. Additionally, the differences among the cues have been examined while taking into account the control condition.

The findings of the research show that all of the chosen visual stimuli affect recycling behaviour in line with a broad range of relevant international literature and support our prior expectations. However, we also found multiple adaptations of the research and some studies that denied the existence of the studied effects. The following lines will attempt to explain the ambiguity of the data and clarify the dissimilarities between the current paper and the contradicting studies. Firstly, we will examine specific experiments of the listed stimuli separately and continue with a general discussion over the study. Furthermore, limits, implications, and prospects of future research will be discussed.

7.1 Broken Windows Effect

In the current research, the stimuli of a wall covered with **Graffiti inhibited the compliance with recycling rules**. These findings are in line with the previous research, conducted by Keizer et al. (2008) who used the same stimulus. In the experiment, Keizer intentionally violates a specific environmental norm by tagging the wall and studies whether the level of littering is going to increase under such a condition. He thus reacts on a classic study by Cialdini et al. (1990) through showing that a disorder-like cue can cause a cascade reaction and induce a transgression even of a different type (contrary to Cialdini who found that the same type disorder spreads in the presence of signs of disorder), i.e. by violating a certain norm, an individual makes the option of transgression salient and enabling the other to appear more likely. Recent studies also confirm that littering causing more littering (Schultz, Bator, Large, Bruni, & Tabanico, 2013; Weaver, 2015). Evidence found in our research supports the concept of Graffiti decreasing the level of compliance to rules (in our case recycling).

However, some differences could be found between our and Keizer's experiments. In order to enhance the saliency of a norm being violated, a sign namely prohibiting Graffiti has been installed right next to the tags on the wall during Keizer's experiment. Thus, it meant to make the transgression even more obvious, more salient. Taking this technique into

account, we question whether including the same procedure in our experiment would increase the transgression against recycling rules and we invite to further examination.

Interestingly, according to our findings, in some of the studied situations when tags on the wall were used as stimuli, the compliance with the recycling rules has not decreased. Moreover, the probability of a person to be compliant with the rules has been in some of the cases found to be significantly above the pure chance (Fig. 3).

We argue the possible explanation may be that people are already used to graffiti in an environment of train stations and therefore do not consider it a norm transgression. When examining the results more thoroughly, we find the extreme situation to be recycling plastic in Olomouc (Appx. 5). Recently, much of the public awareness in Olomouc has been brought to the issue of plastic exploitation through various workshops, public debates, and screening of relevant documentaries. A possible explanation that we offer is that people pay particular attention to the recycling of plastics because of the known consequences that are currently a commonly discussed topic in the Czech Republic and the overall slight tendency of Czechs to recycle plastic. This argument is supported by the evidence we found when studying the recycling behaviour under the condition of no stimuli used (Appx 5) and the data found in a public opinion study by Krajhanzl, Chabada, & Svobodová (2018).

The vast majority of the current research is sceptical of the idea of the Broken Windows Effect. These critical voices mainly arise on the bases of conflicting results of empirical research on the existence of connections between disorder and its potential causes (For an overview see O'Brien, Farrell, Welsh, 2019). Further, a common critic of available studies supporting the theory of Broken Windows is that the majority of them fail to take account of the sociological and demographical factors of the tested neighbourhood that may have a significant impact on the contagiousness of spreading the disorder. Such neighbourhood characteristics include for example the level of poverty, racial composition or stability (Fagan, Davies, 2001; Sampson, Raudenbush, 1999). In his research, Sampson (See also Sampson, 1997) focuses particularly on the importance of "*collective efficacy*" which is defined as "*the linkage of cohesion and mutual trust with shared expectations for intervening in support of neighbourhood social control.*" (Sampson, Raudenbush, 1999, p. 612–613). Similarly to the way the level of self-efficacy differs among individuals, certain ability or efficacious behaviour varies among neighbourhoods. Collective efficacy is then manifested in the neighbourhood's trust in collective ability and willingness to maintain public order.

Current research attempts to address the critical arguments mentioned above by locating the experiments into two various sites of a general character and thus eliminating the possibility of intervening conditions. However, we are aware of the potential effects the specific context of train stations may have on the results and invite to further investigation in other types of environments that will test the viability of the effect and enrich the knowledge of the concept in a broader perspective.

7.2 Implicit Reputation cue of Watching eyes

The findings of our research support the evidence of prior studies for **in all studied conditions the effect of Watching Eyes has been found to increase the pro-environmental attitudes**. Research from cognitive and evolutionary psychology proposes the idea that displaying eye images can cause an increase of prosocial or at least normative behaviour. The effect of ‘Watching Eyes’ has been widely explored in various conditions. The image of Watching Eyes has been proven to decrease the level bicycle thefts (Nettle et al., 2012), positively affect the charitable giving (Ekström, 2012; Fathi, Bateson, & Nettle, 2014), increase blood donation rates (Sénémeaud et al., 2017), to positively affect the hand hygiene compliance in a public restrooms (Pfattheicher et al., 2018) and even to promote pre-swimming shower behaviour (Ribbers, 2016).

On the contrary, several studies have also failed to replicate the Watching Eyes Effect (Cai et al., 2015; Manesi & Pollet, 2017). The number of studies that did not support the existence of the phenomenon creates ambiguity and space for conversation over the topic in academic publicity. In the following sentences, we will explore the differences between the current experiment and some of the prior studies.

The effect of Watching Eyes has not been found to decrease the presence of dishonest behaviour in the research by Cai, Huang, Wu, & Kou (2015). In the study, the researchers have focused on cheating related to the possibilities of gaining economic profits and seeming more intelligent to others. The findings were consistent in multiple various tasks and showed no significant difference in the dishonesty between the control and the experimental condition.

A recent study by Manesi and Polet (2017) supported the result of the previously mentioned paper when testing the effect of Watching Eyes. Manesi and Polet argue that the effect has mainly been studied in the context of normative prosocial and cooperative behaviour. Further, they explain that the Watching Eyes Effect may occur in these normative

situations as a habitual response rather than an actual act of helping or prosocial behaviour. They questioned whether the phenomenon is also viable in situations when the potential social rewards and sanctions are not as clear and obvious. The findings of their research have failed to confirm the Effect of Watching Eyes to influence helping when tested with the ‘Lost letter method’. The method examines whether the chance of an individual picking a (seemingly) lost letter and returning it increases in the presence of Watching Eyes. Manesi and Polet (2017) suggest that findings of the research support their initial hypothesis of the effect only being viable in normative situational contexts.

The studied situations of Manesi & Polet (2017) research and the current one differ significantly. Not many people would expect their behaviour to have any consequences for them specifically in the Manesi & Polet scenario, however, in the current research conducted by us, some of the participants may feel personally involved in the situation (meaning that they may think of the consequences for them personally). A more pragmatic view on differences between the two situational conditions is that recycling is perceived as more normative behaviour than the selfless act of sending the letter.

Other possible explanations of the inconsistent support and significant differences among the recent investigation of the effect might be found in the following studies. Based on the research by Krátký, McGraw, Xygalatas, Mitkidis, & Reddish (2016) we conclude that a pertaining limitation of our research might be the particular nature of the picture. Research by Krátký et al. examined the influence of dimensionality of agency cues on the Watching Eyes Effect. The featured experimental stimuli of the research were a 3-D fake human head and a 2-D picture of the same object. The Effect of Watching Eyes has been found to increase fairness, however only when a 3-D cue was used as an experimental stimulus.

In the previously mentioned study by Cai et al. (2015) that failed to confirm the Watching Eyes Effect the used stimulus by the researchers is a picture of Egyptian eyes. Overall, findings from across the research have yielded somewhat inconsistent support and we propose that the specific choice of a picture of eyes plays a significant role in the results of the research.

Manesi, Van Lange, & Pollet (2016) found that eyes with direct gaze can serve as a reminder of norms and reputation. Compared to eyes that were closed or not paying attention, the picture of Watching Eyes was significantly more effective in mitigating the

sense of anonymity and therefore possibly causing the individual to act prosocially. Numerous studies suggest that different colours of the eyes used as a stimulus cause various replies (Elliot, Maier, Moller, Friedman, & Meinhardt, 2007; Kleisner, Kočnar, Rubešová, & Flegr, 2010). Moreover, Pauwels, Declerck, & Boone (2017) note that “*the valence of the portrayed eyes (whether they are kind or unkind)—especially in studies that make use of realistic rather than abstract depictions of eyes—would be of crucial importance in shaping our expectations and subsequent behavior.*” According to their findings, unkind and not kind eyes show to be more efficient in promoting prosocial behaviour. Galvanised by the knowledge from above-listed studies, we applied a similar picture of eyes to the research by Žihlaviniková (2016) by which we hope to enrich already expansive research conducted by her focusing on the concept of Watching Eyes Effect.

The current findings correspond with prior studies of the tendency to act more pro-environmentally due to perceived monitoring. Both studies by Ernest-Jones et al. (2011) and Bateson et al. (2015) suggest that the level of littering decreases in the mere presence of eyes. In the same vein, Manesi et al. (2015) report that ornaments on butterfly wings that resemble human eyes may cause higher conservation attitudes towards them. Current research offers support of the prior studies since the evidence is clear that the pictures of Watching Eyes increased compliance with the recycling rules under all conditions.

Prior evidence shows that the **amount of other people in the immediate** presence has a significant impact on the results (Bateson, Callow, Holmes, Redmond Roche, & Nettle, 2013; Bateson et al., 2015; Ernest-Jones et al., 2011; Powell, Roberts, & Nettle, 2012). According to literature, we argue that a sense of “*natural surveillance*” induces the self-regulation and people, therefore, act up to an acceptable norm. This fact is not particularly surprising, quite the contrary, it would be striking if the pictures of human eyes would lead to the behavioural change and real observers would not affect us anyhow. Bateson has found that the presence of others in the immediate vicinity (<6 and more) increases the effectivity of eye images (Bateson et al., 2013). However, what may one strike as a surprise is that this phenomenon is viable to only a certain level. Data by Bateson et al. (2013, 2015) contrast with the results of Ernest-Jones et al. (2011) and Powell et al. (2012) which say that the eye images have a larger effect on human behaviour when there are only a few people around rather than when the environment is busy.

From these findings, we propose that in the mere presence of others one loses the sense of anonymity and therefore the prosociality effect of the eyes increases. Yet once the

environment gets crowded the individual activities become less visible and that may lead to a reduction of the images' effectiveness. Although the research approach provides data with high ecological validity due to the experimental approach the direct assessment of the interaction between the number of real potential observers and the stimulus effectiveness was not possible. We attempt to face this limitation by placing the experiments in various locations and studying the effect during both working and weekend days.

Another limitation of the present research lies in its practical applicability. We acknowledge that it may not be possible to hang or stick a picture of eyes at all times and conditions in public spaces. Therefore, research on the impact of a similar picture on the packaging or the waste itself could be a possible future path of research. Further investigation would be useful to explore whether the effect of the images would have a similar effect with a different picture that is not as frightening. This may possibly be more plausible to package designers and enlarge the applicability of our findings. The same criticism and suggestions are valid for the following stimulus.

7.3 Pro-environmental Priming

The present study shows that **conservation behaviour could be induced through priming with a Picture of a Fox in nature**. Priming continues to be broadly widely researched psychological concept which has been found viable in marketing (Bhargava & Chakravarti, 2009;), communications, political campaigning (Kuhne et al., 2011), and policy-making. Surprisingly, findings by Van Tongeren et al. (2018) have revealed that priming could be used to prime prosocial behaviour even through using images of superheroes.

As mentioned in the theoretical background, until recently, there has been only a little reliable evidence on the role of visual priming in inducing environmental preservation activities. The present study sought to obtain data that would help to address these research gaps. The results of the current experiment suggest that priming nature-related cues could induce compliance with recycling norms. The findings observed in this study mirror those of the previous studies by Bimonte et al. (2019) and Zelenski et al. (2015) that also focused on the impact of visual priming on conservation behaviour. Although the study has successfully demonstrated that pro-environmental behaviour can be promoted with a large sample size and high ecological-validity, a number of caveats need to be noted regarding the present study.

One source of weakness in this study that could have affected our findings is that we only tested a single picture of nature: a picture of a Fox drinking out of the stream in the forest. The picture has been chosen based on an online poll that was conducted prior to the research itself. In the poll, 6 pictures illustrating Czech nature have been presented to an online audience who later elected the mentioned picture. Several specific characteristics of the particular picture may play a significant role in the results.

Firstly, the green colour itself has been shown to promote pro-environmental attitudes (Martins & Rudell, 2014). It is probable that an image of a forest or a meadow may influence the conservation behaviour in a different way than for example a dune or water surface.

Moreover, as said earlier pictures with eyes also may have an impact on human prosocial behaviour (Bateson et al., 2015; Manesi et al., 2015) and therefore an image of a living creature with eyes might also have a different impact than a landscape image. However, it is needed to be said that in literature Watching Eyes Effect is mostly direct gaze and both eyes are usually showed. A study by Manesi et al. (2016) showed that compared to Watching Eyes the exposure to eyes that do not pay attention promotes prosocial behaviour significantly less. The Picture of a Fox shows a fox who is clearly not observing the participant. However, we would like to acknowledge a possible effect the presence of a living creature may possibly cause.

Additionally, it is up to further research to find whether a picture of a plant or a flower would have the same impact as a living animal. It is to be expected that an animal image would resolve in a stronger emotional response and therefore an increase of pro-environmental activities. The research the conducted by Manesi et al. (2016) has revealed that an image of a flowers does not lead to a higher inclination to help another person. In the research by Ernest-Jones et al. (2011), the image of flowers was found to inhibit littering much less significantly than the Watching Eyes, the effect of the flower images itself was however not yet been explored. We suggest, it may positively affect conservation behaviour.

Further, previous studies have proved affect to play an important role in previous research focusing on priming conservation behaviour. The research by Bimonte et al. (2019) examined two various scenarios one of which would illustrate the environment wanted to be sustained (inducing positive emotions) and the other one disrupted nature filled with factories etc., a possible alternative future of the environment if planet-sustaining actions will not be taken (inducing emotions such as fear and anxiety). Inspired by the results of the

research that showed the „*hold to paradise*“ scenario to be more effective, we used a picture inducing similar feelings. We hypothesise that pictures inducing hope could be attributed to more pro-active behaviour than the ones related to less positive emotions. However, since our experiment did not focus on the particular issue these further research is therefore recommended.

Prior research has noted the effectiveness of the images to be moderated by the size of the image (Bateson et al., 2015). Though the difference between the stimuli ‘Picture of Watching Eyes’ and ‘Picture of a Fox’ has not been found significant, a probable explanation of the slight difference is that the results were influenced by the measurements of the images. Comparatively to the images of eyes, the picture of the Fox was almost twice as large. The large size of the Picture of a Fox may complicate the experiment’s potential practical implications since it is not very plausible to designers of the packaging of potential litter. Further investigation of alternating the protocol in terms of sizes of the images is therefore recommended. Another possible path of future research lies in studying the impact of the image of an animal on the packaging itself. Could it be possible that the wrapping featuring an image of an animal (With eyes!) being more likely to be disposed of correctly?

Lastly, all pictures selected as potential stimuli were examples of nature as it is commonly perceived in the Czech Republic. The findings from social psychology show that people tend to prefer and develop more positive feelings towards stimuli already familiar to them (i.e. **mere-exposure effect**, Hansen & Wänke, 2009; Park & Stoel, 2005; Pliner, 1982).

7.4 General discussion over the conducted experiments

The study has gone some way towards enhancing our understanding of the role of nonconscious mechanism in the conservation domain. The results of the present experiments would seem to suggest that all of the classic psychological theories tested could be applied in the context of protecting the environment. However, it is needed to be noted that these data must be interpreted with caution.

The conducted experiments have a number of limitations from both the scientific and real-life applicability perspectives. One of the most important criticisms needed to be stated is that a lot of people may not know how to dispose of the specific piece of waste. Therefore, their choice of the correct bin is not up to prosociality. We reflected the fact in the method of analysing the results by using the **Bayesian statistics method**.

While the current study did not focus on the impact of **verbal messages** that would accompany used stimuli, it is a common practice in the prior research. It is plausible that by doing so, the norms would become even more salient and could induce more significant changes in the desired behaviour. In some cases, it is less straightforward to decide which is the correct way of sorting a specific piece of waste. Concrete guidelines of the more problematic cases may also have a positive impact. By placing these instructions above the bins not only will the person be surer about the correct way to dispose of the particular waste but once again, the norms will become more salient.

Interestingly, from the results (Fig. 2), we can see that even in the control condition without the use of any stimuli the mode (=0,548) of the population of the cue **“Without Stimuli”** is **more than 50%**. Though the tendency is not strong, the data reported here appear to confirm the results of prior research that inhabitants of the Czech Republic are above-average conscientious sorters of waste in comparison with the rest of the European Union (Krajhanzl et al., 2018). Therefore, further investigation is needed to find whether similar results would be found in other countries where sorting waste may not be as common as in the Czech context.

Another class of limitation stems from our lack of information about the individuals participating in the experiments. It goes without debate that individual characteristics and attitudes towards protecting nature vary among people. Though the current research has not set the aim to explain the interaction between the mentioned factors and how they may interact with the studied effects, it is likely these may significantly influence the effectiveness of the stimuli. To enrich the present understanding of the role of the particular nonconscious processes in conservation behaviour, the personality factors and attitudes are yet to be investigated.

Due to the design of the experiments, we were not able to specify the situational variables that may play a significant role in the decisions of the studied group. According to the “Good Samaritan” classic social experiment by Darley & Batson (1973), people’s helping behaviour changes notably once they are in a rush or under **time pressure**. Further, Mendl (1999) notes that the effect of **stress** and hormones involved in stress reaction may significantly influence our cognitive processes though the exact changes are a matter of a considerable discussion in the field.

Numerous studies have revealed that **gender** is an important factor in behaviour towards the environment (Bimonte et al., 2019; Dietz, Kalof, & Stern, 2002; Vicente-Molina, Fernández-Sainz, & Izagirre-Olaizola, 2018). Since we have not focused on this particular

aspect in the current research and the design did not allow as to contrast how gender influences conservation activities, this hypothesis cannot be confirmed or disproved based on our findings. However, we would like to acknowledge the fact that the information on the ratio between the number of men and women participating is not known and therefore the possible implication of such ratio influencing the results is possible. For these reasons, findings of the research should be approached with caution since the stimuli may affect women and men in a different way.

Notwithstanding these limitations, the study suggests that compliance with recycling norms can be increased by the use of images priming nature-like images and the images of eyes. When studying the Broken Windows Effect, we have found the mode of the population of the cue “Graffiti” to be less than 50% (= 0,448) which indicates that tags may decrease the probability of compliance with recycling rules. We have attempted to face and balance some of the mentioned limitations by locating the experiments in two cities, in both of which different locations have been used and the experiments have been run for several days, both working and weekend days to exclude these possible interfering variables. Due to these aspects of the research design, the key strengths of the present study are its large sample size (N= 4555), high ecological validity, and representability.

The practical applicability of the findings was one of the key factors to initialise the experiments. It has been shown that graffiti has a negative effect on compliance with recycling norms. While stressing the need for further research due to the limitations brought up in the earlier articles, we hope for a possible implementation of these results in public policy policies. Looking forward, we realise that the size and form of the pictures may be a potential obstacle to implement the results of the other featured experiments. Therefore, alternating both the form and the sizes of the pictures are worth further testing. Another interesting path of future research is to test whether the presence of eyes or nature-related elements on the packaging itself makes a difference in terms of conservation activities.

8 Conclusions

The study has brought a level of understanding of how non-conscious automatic processes can alter pro-environmental behaviour.

We conclude the following from the series of experiments:

- Interestingly, even in the control group, a trend of compliance with the recycling rules is observable.
- All of the three visual stimuli we chose to test influence the compliance with recycling rules.
- The Picture of Watching Eyes and Picture of a Fox are capable of invoking recycling behaviour.
- Presence of graffiti inhibits the compliance with the recycling rules
- While the difference between the Picture of Fox and Watching Eyes Picture is not significant, Picture of a Fox has been found most effective in promoting the compliance with recycling rules.

9 Summary

Most probably every one of us has some time during his life committed an act that he was not proud of. Similarly, there is a high chance that we can all collectively nod if asked whether we ever had done something good for someone else. But how do we actually judge whether some act is an act of goodness or evil? Where does the idea of morality emerge from? And is it possible we could be wired to be good? Philosophers, writers and scientists... they all have been trying to solve the mystery of morality for years. Prior research suggests that morality is an innate concept. It has been shown that even children at a very young age emerge in pro-social behaviour. Signs of altruism and cooperativeness have also been found all across the animal kingdom.

Various voices of evolutionary psychology have said **cooperation** has and had the function of a tool and at the same time a product of natural selection. Those who cooperated had a higher chance of survival. Further, neuroendocrinological and neuropsychological research has shed light on the biological aspects of cooperation by revealing the importance of oxytocin and cortisol in the human responses to situations of moral nature.

However, biology is hardly the only influence that affects our behaviour in situations demanding moral sense. Multiple nonconscious mechanisms constantly preoccupy our attention and act on their behalf. According to the **Broken Windows Effect**, in an environment where signs of even minimal transgression are vivid, more transgression is going to appear. On the other side of the moral spectrum, an effect of **Watching Eyes** has been proven to positively shape human behaviour. While humans are highly sociable beings, they care deeply about what others think about them. As a result, reputation and expectations of future benefits have been shown to alter the ways we act.

Moral or not - can we actually be held responsible for our actions? The debate over the existence of free will is possibly at least as heated (if not more) as the one over morality. There are 4 main schools of thought based on their way to approach the issue of free will: **Libertarianism, Compatibilism, Indeterminism, and Determinism**. The issue will possibly not ever be resolved in its full complexity. However, until the human's decision making is proven independent of the biological mechanisms, we (for the purposes of the research) adopt the deterministic perspective.

Other than the biological mechanisms, scientists also believe, that our actions are dependent on the proper functioning of two systems responsible for cognitive processes. **System 1** is automatic, implicit and works very quickly, efficiently and without the need for focused attention. On the contrary, **System 2** is much slower, for its responsibilities lie in operating controlled actions demanding high effort and attention. When System 2 is preoccupied, System 1 takes over which in result sometimes may lead to flawed results.

One of the mechanisms that are based on this specific feature of the mind is priming. **Priming** is a nonconscious cognitive process that occurs when an individual is presented with a cue of certain nature and his future actions are influenced by this cue. The phenomenon is commonly practiced in marketing, communication, and political campaigns.

Recently, an increasing number of psychologists have begun to examine the role of psychology in combating current global issues. Together with the climate crisis, waste pollution constitutes a major societal and environmental problem around the globe, that requires involvement from all across the scientific spectrum. **Conservation psychology** has much to offer in terms of understanding the mechanism related to the human-nature relationships, sustaining the environment, and explores wildly possible solutions to the issues brought up earlier. As to protecting the environment, the main focus of conservation psychology in the present day are the dispositional factors determining one's level environmental awareness, willingness to act pro-environmentally etc. However, it has been proven that some of the nonconscious mechanisms (such as priming, Broken Windows Effect or Watching Eyes Effect) influence human behaviour in just the same way.

Consequently, the current study sets two aims to test this. Firstly, we wanted to understand the particular stimuli impact the way people align their behaviour to the rules of recycling. Secondly, we wished to find out whether there are any differences among the stimuli in their effectiveness of doing so. 3 visual stimuli were selected along with a control group to enhance the understanding of 3 influential theories of nonconscious mental processes: an image of a **Fox** in a nature environment, focusing thus on Pro-environmental Priming; **an image of Watching Eyes** to test viability of the Watching Eyes Effect; and **Graffiti** as a sign of disorder challenging the Broken Windows Theory that way. Differences among the cues were expected not only due to the different nature of the stimuli (the tags expected to negatively influence the compliance with rules) but also in the terms of effectiveness.

The 3 stimuli were placed above the recycling bins, in train stations of two cities in the Czech Republic- Olomouc and Ostrava. After the measurement, the waste (N= 4555) in each of the bins (“Plastic”, “Paper”, “Metal & Glass” and “Residual”) has been sorted to find out the number of waste which was correctly (i.e. incorrectly) disposed of.

In conclusion, the evidence of the current study suggests **conservation behaviour can be enhanced in the presence of eye images and images of pure nature**. Contrastingly, according to our findings, **people tend to act less pro-environmentally when signs of disorder such as Graffiti are present**. However, interestingly, in some of the cases, the compliance with the rules stayed high even in the Broken Windows conditioning. Notwithstanding the limitations discussed in earlier chapters, probable explanations of these effects should be stated. Since humans are sociable animals, we care about our reputation and if we are seen as cooperative beings. We argue, that the images of eyes induce the feeling of surveillance and therefore people tend to act more prosocially to keep up their reputation. Priming of nature-related cues makes the ideal scenario salient and we then try to preserve it. Lastly, when signs of disorder are present in the mere vicinity, the norms are likely to be further violated.

While the picture of a Fox has been found to be the most effective in terms of influencing compliance with recycling rules, the difference between the stimuli and eye images was not significant. Consequently, both of the stimuli are to be recommended for potential practical use.

The present research contributes to a growing body of work that studies the ways our decision-making can be enhanced to protect the environment. Future empirical work could focus on the specific interaction of individual characteristics and the studied stimuli. Also, modifying the forms of used stimuli may help us to come to a better understanding of the processes behind this and enlarge the extent of the practical applicability of the findings.

References

- Aarts, H., & Dijksterhuis, A. (2003). The silence of the library: Environment, situational norm, and social behavior. *Journal of Personality and Social Psychology*, *84*(1), 18–28. doi.org: 10.1037/0022-3514.84.1.18
- Ariely, D. (2008). *Predictably irrational: The hidden forces that shape our decisions*. New York, NY: Harper.
- Baillon, A., Selim, A., & van Dolder, D. (2013). On the social nature of eyes: The effect of social cues in interaction and individual choice tasks. *Evolution and Human Behavior*, *34*(2), 146–154. doi.org: 10.1016/j.evolhumbehav.2012.12.001
- Bargh, J. A., Chen, M., & Burrows, L. (1996). Automaticity of social behavior: Direct effects of trait construct and stereotype activation on action. *Journal of Personality and Social Psychology*, *71*(2), 230–244. doi.org: 10.1037/0022-3514.71.2.230
- Barraza, J. A., McCullough, M. E., Ahmadi, S., & Zak, P. J. (2011). Oxytocin infusion increases charitable donations regardless of monetary resources. *Hormones and Behavior*, *60*(2), 148–151. doi.org: 10.1016/j.yhbeh.2011.04.008
- Barrett, L., Dunbar, R. I. M., & Lycett, J. (2007). *Evoluční psychologie člověka*. Praha: Portál.
- Bateson, M., Nettle, D., Harper, Z., Kidson, A., Stone, R., & Penton-Voak, I. S. (2013). The watching eyes effect in the Dictator Game: It's not how much you give, it's being seen to give something. *Evolution and Human Behavior*. *34*(1), 35–40
doi.org: 10.1016/j.evolhumbehav.2012.08.004
- Bateson, M., Callow, L., Holmes, J. R., Redmond Roche, M. L., & Nettle, D. (2013). Do Images of 'Watching Eyes' Induce Behaviour That Is More Pro-Social or More Normative? A Field Experiment on Littering. *PLoS ONE*, *8*(12), e82055.
doi.org: 10.1371/journal.pone.0082055
- Bateson, M., Nettle, D., & Roberts, G. (2006). Cues of being watched enhance cooperation in a real-world setting. *Biology Letters*, *2*(3), 412–414.
doi.org: 10.1098/rsbl.2006.0509

- Bateson, M., Robinson, R., Abayomi-Cole, T., Greenlees, J., O'Connor, A., & Nettle, D. (2015). Watching eyes on potential litter can reduce littering: Evidence from two field experiments. *PeerJ*, 3, e1443. doi.org: 10.7717/peerj.1443
- Bhargava, S., & Chakravarti, A. (2009). Empowered Consumers = Benevolent Consumers? The Effects of Priming Power on the Appeal of Socially Responsible Products. *ACR North American Advances*, 36, 831-832. Retrieved 14 April, from acrwebsite.org/volumes/14606/volumes/v36/NA-36
- Bimonte, S., Bosco, L., & Stabile, A. (2019, June 10). Nudging pro-environmental behavior: Evidence from a web experiment on priming and WTP. *Journal of Environmental Planning and Management*, 1–17. Retrieved April 11, from www.tandfonline.com/doi/abs/10.1080/09640568.2019.1603364. doi.org: 10.1080/09640568.2019.1603364
- Bloom, P. (2010, May 5). The Moral Life of Babies. *The New York Times*. Retrieved 10 February, from www.nytimes.com/2010/05/09/magazine/09babies-t.html
- Brafman, O., & Brafman, R. (2009). *Sway: The Irresistible Pull of Irrational Behavior*. New York: Broadway Books.
- Brasel, S. A., & Gips, J. (2011). Red Bull “Gives You Wings” for better or worse: A double-edged impact of brand exposure on consumer performance. *Journal of Consumer Psychology*, 21(1), 57–64. doi.org: 10.1016/j.jcps.2010.09.008
- Bronfenbrenner, U. (1996). *The ecology of human development: Experiments by nature and design*. Cambridge, Mass: Harvard University Press.
- Brown, S. L., & Brown, R. M. (2015). Connecting prosocial behavior to improved physical health: Contributions from the neurobiology of parenting. *Neuroscience & Biobehavioral Reviews*, 55, 1–17. doi.org: 10.1016/j.neubiorev.2015.04.004
- Bull, R., & Gibson-Robinson, E. (1981). The Influences of Eye-Gaze, Style of Dress, and Locality on the Amounts of Money Donated to a Charity. *Human Relations*, 34(10), 895–905. doi.org: 10.1177/001872678103401005
- Burns, J. M., & Swerdlow, R. H. (2003). Right Orbitofrontal Tumor With Pedophilia Symptom and Constructional Apraxia Sign. *Archives of Neurology*, 60(3), 437–440. doi.org: 10.1001/archneur.60.3.437

- Cai, W., Huang, X., Wu, S., & Kou, Y. (2015). Dishonest behavior is not affected by an image of watching eyes. *Evolution and Human Behavior*, 36(2), 110–116. doi.org: 10.1016/j.evolhumbehav.2014.09.007
- Cialdini, R. B., Reno, R. R., & Kallgren, C. A. (1990). A focus theory of normative conduct: Recycling the concept of norms to reduce littering in public places. *Journal of Personality and Social Psychology*, 58(6), 1015–1026. doi.org: 10.1037/0022-3514.58.6.1015
- Covington, C. (2016). The Origin of Morality: The Origin of Morality. *British Journal of Psychotherapy*, 32(1), 3–20. doi.org: 10.1111/bjp.12180
- Crockford, C., Wittig, R. M., Mundry, R., & Zuberbühler, K. (2012). Wild chimpanzees inform ignorant group members of danger. *Current Biology: CB*, 22(2), 142–146. doi.org: 10.1016/j.cub.2011.11.053
- Darley, J. M., & Batson, C. D. (1973). „From Jerusalem to Jericho": A study of situational and dispositional variables in helping behavior. *Journal of Personality and Social Psychology*, 27(1), 100–108. doi.org: 10.1037/h0034449
- Darwin, C. (1981). *The descent of man, and selection in relation to sex*. Princeton, N.J: Princeton University Press.
- Dawkins, R. (2006). *The selfish gene*. Oxford; New York: Oxford University Press.
- Dear, K., Dutton, K., & Fox, E. (2019). Do ‘watching eyes’ influence antisocial behavior? A systematic review & meta-analysis. *Evolution and Human Behavior*, 40(3), 269–280. doi.org: 10.1016/j.evolhumbehav.2019.01.006
- Dennett, D. C. (1984). *Elbow room: The varieties of free will worth wanting*. Cambridge, Mass: MIT Press.
- Diener, E., & Wallbom, M. (1976). Effects of self-awareness on antinormative behavior. *Journal of Research in Personality*, 10(1), 107–111. doi.org: 10.1016/0092-6566(76)90088-X
- Dietz, T., Kalof, L., & Stern, P. C. (2002). Gender, Values, and Environmentalism. *Social Science Quarterly*, 83(1), 353–364. doi.org: 10.1111/1540-6237.00088

- Dolan, P., Hallsworth, M., Halpern, D., King, D., Metcalfe, R., & Vlaev, I. (2012). Influencing behaviour: The mindspace way. *Journal of Economic Psychology*, 33(1), 264–277. doi.org: 10.1016/j.joep.2011.10.009
- Dunbar, R. I. M. (2004). Gossip in Evolutionary Perspective. *Review of General Psychology*, 8(2), 100–110. doi.org: 10.1037/1089-2680.8.2.100
- Eagleman, D. (2012). *Incognito: The secret lives of the brain*. New York: Vintage Books.
- Ekström, M. (2012). Do watching eyes affect charitable giving? Evidence from a field experiment. *Experimental Economics*, 15(3), 530–546. doi.org: 10.1007/s10683-011-9312-6
- Elliot, A. J., Maier, M. A., Moller, A. C., Friedman, R., & Meinhardt, J. (2007). Color and psychological functioning: The effect of red on performance attainment. *Journal of Experimental Psychology: General*, 136(1), 154–168. doi.org: 10.1037/0096-3445.136.1.154
- Ernest-Jones, M., Nettle, D., & Bateson, M. (2011). Effects of eye images on everyday cooperative behavior: A field experiment. *Evolution and Human Behavior*, 32(3), 172–178. doi.org: 10.1016/j.evolhumbehav.2010.10.006
- Evans, J., & Frankish, K. (Ed.). (2009). *In two minds: Dual processes and beyond*. Oxford: Oxford University Press.
doi.org: 10.1093/acprof:oso/9780199230167.001.0001
- Evatt, C. (2010). *The myth of free will*. Sausalito, CA.: Cafe Essays.
- Fagan, J. A., & Davies, G. (2001). *Street Stops and Broken Windows: Terry, Race and Disorder in New York City*. *Fordham Urb. Law J.*, 43, 539–614.
doi.org: 10.2139/ssrn.257813
- Fathi, M., Bateson, M., & Nettle, D. (2014). Effects of Watching Eyes and Norm Cues on Charitable Giving in a Surreptitious Behavioral Experiment. *Evolutionary Psychology*, 12(5), 878–887. doi.org: 10.1177/147470491401200502
- Fehr, E., & Gächter, S. (2000). Cooperation and Punishment in Public Goods Experiments. *American Economic Review*, 90(4), 980–994. doi.org: 10.1257/aer.90.4.980

- Fischer, J. M., Kane, R., Pereboom, D., & Vargas, M. (2007). *Four Views on Free Will*. Oxford: Blackwell Publishing.
- Fischer, J. M., & Ravizza, M. (2000). *Responsibility and control: A theory of moral responsibility*. Cambridge: Cambridge Univ. Press.
- Frank, G. (1999). Freud's concept of the superego: Review and assessment. *Psychoanalytic Psychology, 16*(3), 448–463. doi.org: 10.1037/0736-9735.16.3.448
- Freud, S., Strachey, J., & Freud, S. (1989). *The ego and the id*. New York: Norton.
- Gatersleben, B., Murtagh, N., & Abrahamse, W. (2014). Values, identity and pro-environmental behaviour. *Contemporary Social Science, 9*(4), 374–392. doi.org: 10.1080/21582041.2012.682086
- Gazzaniga, M. S. (2011). *Who's in charge? Free will and the science of the brain*. New York, NY: HarperCollins.
- Gold, N., Colman, A. M., & Pulford, B. D. (2014). Cultural differences in responses to real-life and hypothetical trolley problems. *Judgment and Decision Making, 9*(1), 65–76.
- Gomes, G. (1998). The Timing of Conscious Experience: A Critical Review and Reinterpretation of Libet's Research. *Consciousness and Cognition, 7*(4), 559–595. doi.org: 10.1006/ccog.1998.0332
- Graham, J., Meindl, P., Beall, E., Johnson, K. M., & Zhang, L. (2016). Cultural differences in moral judgment and behavior, across and within societies. *Current Opinion in Psychology, 8*, 125–130. doi.org: 10.1016/j.copsyc.2015.09.007
- Greene, J. D. (2013). *Moral tribes: Emotion, reason, and the gap between us and them*. New York: The Penguin Press.
- Haefel, G. J., Abramson, L. Y., Brazy, P. C., Shah, J. Y., Teachman, B. A., & Nosek, B. A. (2007). Explicit and implicit cognition: A preliminary test of a dual-process theory of cognitive vulnerability to depression. *Behaviour Research and Therapy, 45*(6), 1155–1167. doi.org: 10.1016/j.brat.2006.09.003
- Haidt, J. (2008). Morality. *Perspectives on Psychological Science, 3*(1), 65–72. doi.org: 10.1111/j.1745-6916.2008.00063.x

- Haidt, J. (2012). *The righteous mind: Why good people are divided by politics and religion*. New York: Pantheon Books.
- Haley, K. J., & Fessler, D. M. T. (2005). Nobody's watching? *Evolution and Human Behavior*, 26(3), 245–256. doi.org: 10.1016/j.evolhumbehav.2005.01.002
- Hall, L., Johansson, P., & Strandberg, T. (2012). Lifting the Veil of Morality: Choice Blindness and Attitude Reversals on a Self-Transforming Survey. *PLoS ONE*, 7(9), e45457. doi.org: 10.1371/journal.pone.0045457
- Hall, L., Johansson, P., Tärning, B., Sikström, S., & Deutgen, T. (2010). Magic at the marketplace: Choice blindness for the taste of jam and the smell of tea. *Cognition*, 117(1), 54–61. doi.org: 10.1016/j.cognition.2010.06.010
- Hansen, J., & Wänke, M. (2009). Liking What's Familiar: The Importance of Unconscious Familiarity in the Mere-Exposure Effect. *Social Cognition*, 27(2), 161–182. doi.org: 10.1521/soco.2009.27.2.161
- Harari, Y. N. (2015). *Sapiens: A brief history of humankind*. London: Vintage Books.
- Hardin, G. (1968). The Tragedy of the Commons. *Science*, 162(3859), 1243–1248. doi.org: 10.1126/science.162.3859.1243
- Harris, S. (2012). *Free will*. New York: Free Press.
- Harris, S., & Ctiborová, K. (2015). *Svobodná vůle*. Dybbuk.
- Hartl, P., & Hartlová, H. (2015). *Psychologický slovník*. Praha: Portál.
- Hawking, S. W., & Mlodinow, L. (2011). *The grand design: New answers to the ultimate questions of life*. London: Bantam.
- Haxby, J. V., Hoffman, E. A., & Gobbini, M. I. (2000). The distributed human neural system for face perception. *Trends in Cognitive Sciences*, 4(6), 223–233. doi.org: 10.1016/S1364-6613(00)01482-0
- Heidbrink, H. (1997). *Psychologie morálního vývoje*. Praha: Portál.
- Hinds, J., & Sparks, P. (2008). Engaging with the natural environment: The role of affective connection and identity. *Journal of Environmental Psychology*, 28(2), 109–120. doi.org: 10.1016/j.jenvp.2007.11.001
- Chabris, C. F., & Simons, D. J. (2010). *The invisible gorilla: And other ways our intuitions deceive us*. New York: Crown.

- Chakroff, A., & Young, L. (2014). The Prosocial Brain. In L. M. Padilla-Walker & G. Carlo (Ed.), *Prosocial Development* (pp.90–111). Oxford: Oxford University Press
doi.org: 10.1093/acprof:oso/9780199964772.003.0005
- Chalmeau, R., & Gallo, A. (1995). Cooperation in primates: Critical analysis of behavioural criteria. *Behavioural Processes*, 35(1–3), 101–111. doi.org: 10.1016/0376-6357(95)00049-6.
- Churchland, P. S. (2011). *Braintrust: What neuroscience tells us about morality*. Princeton, N.J: Princeton University Press.
- Janiszewski, C., & Wyer, R. S. (2014). Content and process priming: A review. *Journal of Consumer Psychology*, 24(1), 96–118. doi.org: 10.1016/j.jcps.2013.05.006
- Johansson, P. (2005). Failure to Detect Mismatches Between Intention and Outcome in a Simple Decision Task. *Science*, 310(5745), 116–119.
doi.org: 10.1126/science.1111709
- Kagan, J., & Lamb, S. (1997). *The emergence of morality in young children*. Chicago: The University of Chicago Press.
- Kahneman, D. (2012). *Thinking, fast and slow*. London: Penguin Books.
- Kahneman, D., Slovic, P., & Tversky, A. (Ed.). (1982). *Judgment under uncertainty: Heuristics and biases*. Cambridge; New York: Cambridge University Press.
- Keizer, K., Lindenberg, S., & Steg, L. (2008). The Spreading of Disorder. *Science*, 322(5908), 1681–1685. doi.org: 10.1126/science.1161405
- Kelling, G. L., & Sousa, W. H. (2001). *Do Police Matter? An Analysis of the Impact of New York City's Police Reforms civic report 22*. New York: Manhattan Institute for Policy Research. Retrieved 13 April, from media4.manhattan-institute.org/pdf/cr_22.pdf
- Kleisner, K., Kočnar, T., Rubešová, A., & Flegr, J. (2010). Eye color predicts but does not directly influence perceived dominance in men. *Personality and Individual Differences*, 49(1), 59–64. doi.org: 10.1016/j.paid.2010.03.011
- Knack, S., & Keefer, P. (1997). Does Social Capital Have an Economic Payoff? A Cross-Country Investigation. *The Quarterly Journal of Economics*, 112(4), 1251–1288. Retrieved 12 February, from www.jstor.org/stable/2951271.

- Kosfeld, M., Heinrichs, M., Zak, P. J., Fischbacher, U., & Fehr, E. (2005). Oxytocin increases trust in humans. *Nature*, *435*(7042), 673–676. doi.org: 10.1038/nature03701
- Krajhanzl, J., Chabada, T., & Svobodová, R. (2018). *Vztah české veřejnosti k přírodě a životnímu prostředí: Reprezentativní studie veřejného mínění*. Brno: MUNI Press.
- Krátký, J., McGraw, J. J., Xygalatas, D., Mitkidis, P., & Reddish, P. (2016). It Depends Who Is Watching You: 3-D Agent Cues Increase Fairness. *PLOS ONE*, *11*(2), e0148845. doi.org: 10.1371/journal.pone.0148845
- Kuhne, R., Schemer, C., Matthes, J., & Wirth, W. (2011). Affective Priming in Political Campaigns: How Campaign-Induced Emotions Prime Political Opinions. *International Journal of Public Opinion Research*, *23*(4), 485–507. doi.org: 10.1093/ijpor/edr004
- Lavergne, G. M. (1997). *A sniper in the Tower: The Charles Whitman murders*. Denton: University of North Texas Press.
- Leder, J., Häusser, J. A., & Mojzisch, A. (2013). Stress and strategic decision-making in the beauty contest game. *Psychoneuroendocrinology*, *38*(9), 1503–1511. doi.org: 10.1016/j.psyneuen.2012.12.016
- Levine, J. M., & Moreland, R. L. (2002a). Group reactions to loyalty and disloyalty. *Advances in Group Processes*, *19*, 203–228. doi.org: 10.1016/S0882-6145(02)19008-4
- Levine, J. M., & Moreland, R. L. (2002b). Socialization and Trust in Work Groups. *Group Processes & Intergroup Relations*, *5*(3), 185–201. doi.org: 10.1177/1368430202005003001
- Lévy-Leboyer, C., Bonnes, M., Chase, J., Ferreira-Marques, J., & Pawlik, K. (1996). Determinants of Pro-Environmental Behaviors. *European Psychologist*, *1*(2), 123–129. doi.org: 10.1027/1016-9040.1.2.123
- Libet, B. (1985). Unconscious cerebral initiative and the role of conscious will in voluntary action. *Behavioral and Brain Sciences*, *8*(4), 529–539. doi.org: 10.1017/S0140525X00044903
- Libet, B., Gleason, C. A., Wright, E. W., & Pearl, D. K. (1993). Time of Conscious Intention to Act in Relation to Onset of Cerebral Activity (Readiness-Potential). In B. Libet, *Neurophysiology of Consciousness* (249–268). Boston: Birkhauser. doi.org: 10.1007/978-1-4612-0355-1_15

- Libet, B. W. (1999). Do We Have Free Will? *Journal of Consciousness Studies*, 6(8–9), 47–57.
- Liu, J., Li, J., Feng, L., Li, L., Tian, J., & Lee, K. (2014). Seeing Jesus in toast: Neural and behavioral correlates of face pareidolia. *Cortex*, 53, 60–77.
doi.org: 10.1016/j.cortex.2014.01.013
- Manesi, Z., & Pollet, T. V. (2017). No Support for the Watching Eyes Effect Across Three „Lost Letter" Field Experiments. *Letters on Evolutionary Behavioral Science*, 8(1), 12–15. doi.org: 10.5178/lebs.2017.56
- Manesi, Z., Van Lange, P. A. M., & Pollet, T. V. (2015). Butterfly Eyespots: Their Potential Influence on Aesthetic Preferences and Conservation Attitudes. *PLOS ONE*, 10(11), e0141433. doi.org: 10.1371/journal.pone.0141433
- Manesi, Z., Van Lange, P. A. M., & Pollet, T. V. (2016). Eyes Wide Open: Only Eyes That Pay Attention Promote Prosocial Behavior. *Evolutionary Psychology*, 14(2), 203–210. doi.org: 10.1177/1474704916640780
- Marteau, T. M. (2017). Towards environmentally sustainable human behaviour: Targeting non-conscious and conscious processes for effective and acceptable policies. *Philosophical Transactions of the Royal Society A: Mathematical, Physical and Engineering Sciences*, 375(2095). doi.org: 10.1098/rsta.2016.0371
- Martins, C., & Rudell, F. (2014). Seeing Green and Going Green: The Effects of Priming on Environmentally Friendly Behavior. *NA - Advances in Consumer Research*, 42, 799–799. Retrieved 7 April. from www.acrwebsite.org/volumes/1017426/volumes/v42/NA-42
- McGonigal, K. (2015). *The upside of stress: Why stress is good for you, and how to get good at it*. New York: Avery.
- McRaney, D. (2012). *You are not so smart: Why you have too many friends on Facebook, why your memory is mostly fiction, and 46 other ways you're deluding yourself*. New York: Avery.
- McRaney, D. (2013). *You can beat your brain: How to turn your enemies into friends, how to make better decisions, and other ways to be less dumb*. London: Oneworld.
- Meleady, R., Abrams, D., Van de Vyver, J., Hothrow, T., Mahmood, L., Player, A., Leite, A. C. (2017). Surveillance or Self-Surveillance? Behavioral Cues Can Increase

- the Rate of Drivers' Pro-Environmental Behavior at a Long Wait Stop. *Environment and Behavior*, 49(10), 1156–1172. doi.org: 10.1177/0013916517691324
- Mendl, M. (1999). Performing under pressure: Stress and cognitive function. *Applied Animal Behaviour Science*, 65(3), 221–244. doi.org: 10.1016/S0168-1591(99)00088-X
- Moberg, D. J. (2000). Time Pressure and Ethical Decision-Making: The Case for Moral Readiness. *Business & Professional Ethics Journal*, 19(2), 41–67. Retrieved 10 February, from www.jstor.org/stable/27801220.
- Mouël, C. le. (2014). Self and the Paradox of Free Will. *Psychological Perspectives*, 57(1), 25–49. doi.org: 10.1080/00332925.2014.874904
- Muraven, M., & Slessareva, E. (2003). Mechanisms of Self-Control Failure: Motivation and Limited Resources. *Personality and Social Psychology Bulletin*, 29(7), 894–906. doi.org: 10.1177/0146167203029007008
- Nettle, D., Nott, K., & Bateson, M. (2012). 'Cycle Thieves, We Are Watching You': Impact of a Simple Signage Intervention against Bicycle Theft. *PLoS ONE*, 7(12), e51738. doi.org: 10.1371/journal.pone.0051738
- Nucci, L. P., & Turiel, E. (1978). Social Interactions and the Development of Social Concepts in Preschool Children. *Child Development*, 49(2), 400. doi.org: 10.2307/1128704
- O'Brien, D. T., Farrell, C., & Welsh, B. C. (2019). Looking Through Broken Windows: The Impact of Neighborhood Disorder on Aggression and Fear of Crime Is an Artifact of Research Design. *Annual Review of Criminology*, 2(1), 53–71. doi.org: 10.1146/annurev-criminol-011518-024638
- Oda, R., Niwa, Y., Honma, A., & Hiraishi, K. (2011). An eye-like painting enhances the expectation of a good reputation. *Evolution and Human Behavior*, 32(3), 166–171. doi.org: 10.1016/j.evolhumbehav.2010.11.002
- Ohtsuki, H., & Iwasa, Y. (2004). How should we define goodness?—Reputation dynamics in indirect reciprocity. *Journal of Theoretical Biology*, 231(1), 107–120. doi.org: 10.1016/j.jtbi.2004.06.005
- Ostrom, E. (1990). *Governing the commons: The evolution of institutions for collective action*. Cambridge ; New York: Cambridge University Press.

- Panagopoulos, C. (2014). Watchful eyes: Implicit observability cues and voting. *Evolution and Human Behavior*, 35(4), 279–284.
doi.org: 10.1016/j.evolhumbehav.2014.02.008
- Park, J., & Stoel, L. (2005). Effect of brand familiarity, experience and information on online apparel purchase. *International Journal of Retail & Distribution Management*, 33(2), 148–160. doi.org: 10.1108/09590550510581476
- Pauwels, L., Declerck, C., & Boone, C. (2017). Watching Eyes and Living up to Expectations: Unkind, Not Kind, Eyes Increase First Mover Cooperation in a Sequential Prisoner's Dilemma. *Games*, 8(2), 20–33. doi.org: 10.3390/g8020020
- Pfattheicher, S., Strauch, C., Diefenbacher, S., & Schnuerch, R. (2018). A field study on watching eyes and hand hygiene compliance in a public restroom. *Journal of Applied Social Psychology*, 48(4), 188–194. doi.org: 10.1111/jasp.12501
- Piaget, J. (1932). *The moral judgment of the child*. Oxford, England: Harcourt, Brace.
- Plath, S. (1988). *The bell jar*. Toronto u.a: Bantam Books.
- Pliner, P. (1982). The Effects of Mere Exposure on Liking for Edible Substances. *Appetite*, 3(3), 283–290. doi.org: 10.1016/S0195-6663(82)80026-3
- Plotnik, J. M., Lair, R., Suphachoksakun, W., & de Waal, F. B. M. (2011). Elephants know when they need a helping trunk in a cooperative task. *Proceedings of the National Academy of Sciences*, 108(12), 5116–5121.
doi.org: 10.1073/pnas.1101765108
- Poulin, M. J. (2014). Volunteering predicts health among those who value others: Two national studies. *Health Psychology: Official Journal of the Division of Health Psychology, American Psychological Association*, 33(2), 120–129.
doi.org: 10.1037/a0031620
- Powell, K., Roberts, G., & Nettle, D. (2012). Eye Images Increase Charitable Donations: Evidence From an Opportunistic Field Experiment in a Supermarket. *Ethology*, 118, 1096–1101. doi.org: 10.1111/eth.12011
- Riolo, R. L., Cohen, M. D., & Axelrod, R. (2001). Evolution of cooperation without reciprocity. *Nature*, 414(6862), 441–443. doi.org: 10.1038/35106555

- Rodrigues, S. M., Saslow, L. R., Garcia, N., John, O. P., & Keltner, D. (2009). Oxytocin receptor genetic variation relates to empathy and stress reactivity in humans. *Proceedings of the National Academy of Sciences of the United States of America*, *106*(50), 21437–21441. doi.org: 10.1073/pnas.0909579106
- Sampson, R. J. (1997). Neighborhoods and Violent Crime: A Multilevel Study of Collective Efficacy. *Science*, *277*(5328), 918–924. doi.org: 10.1126/science.277.5328.918
- Sampson, Robert J., & Raudenbush, S. W. (1999). Systematic Social Observation of Public Spaces: A New Look at Disorder in Urban Neighborhoods. *American Journal of Sociology*, *105*(3), 603–651. doi.org: 10.1086/210356
- Sénémeaud, C., Sanrey, C., Callé, N., Plainfossé, C., Belhaire, A., & Georget, P. (2017). The watching-eyes phenomenon and blood donation: Does exposure to pictures of eyes increase blood donation by young adults? *Transfusion and Apheresis Science: Official Journal of the World Apheresis Association: Official Journal of the European Society for Haemapheresis*, *56*(2), 168–170. doi.org: 10.1016/j.transci.2016.11.001
- Seppala, E., Rossomando, T., & Doty, J. R. (2013). Social Connection and Compassion: Important Predictors of Health and Well-Being. *Social Research: An International Quarterly*, *80*(2), 411–430.
- Shiffrin, R. M., & Schneider, W. (1977). Controlled and automatic human information processing: II. Perceptual learning, automatic attending and a general theory. *Psychological Review*, 127–190.
- Shweder, R. A., Mahapatra, M., & Miller, J. G. (1990). Culture and moral development. In J. W. Stigler, R. A. Shweder, & G. Herdt (Ed.), *Cultural psychology: Essays on comparative human development* (pp.130–204). Cambridge, England: Cambridge University Press. doi.org: 10.1017/CBO9781139173728.005
- Schenck, C. (2007). *Sleep: The mysteries, the problems, and the solutions*. New York: Avery.
- Schneider, W., & Shiffrin, R. M. (1977). Controlled and automatic human information processing: I. Detection, search, and attention. *Psychological Review*, *84*(1), 1–66. doi.org: 10.1037/0033-295X.84.1.1

- Schultz, P. W., Bator, R. J., Large, L. B., Bruni, C. M., & Tabanico, J. J. (2013). Littering in Context: Personal and Environmental Predictors of Littering Behavior. *Environment and Behavior*, *45*(1), 35–59. doi.org: 10.1177/0013916511412179
- Schwartz, C. E., & Sendor, R. M. (1999). Helping others helps oneself: Response shift effects in peer support. *Social Science & Medicine*, *48*(11), 1563–1575. doi.org: 10.1016/S0277-9536(99)00049-0
- Sigmund, K. (2012). Moral assessment in indirect reciprocity. *Journal of Theoretical Biology*, *299*(5), 25–30. doi.org: 10.1016/j.jtbi.2011.03.024
- Simons, D. J., & Chabris, C. F. (1999). Gorillas in our midst: Sustained inattention blindness for dynamic events. *Perception*, *28*(9), 1059–1074. doi.org: 10.1068/p281059
- Sparks, P., & Shepherd, R. (1992). Self-Identity and the Theory of Planned Behavior: Assessing the Role of Identification with „Green Consumerism“. *Social Psychology Quarterly*, *55*(4), 388–399. doi.org: 10.2307/2786955
- Stanovich, K. E., & West, R. F. (2000). Individual differences in reasoning: Implications for the rationality debate? *Behavioral and Brain Sciences*, *23*(5), 645–665. doi.org: 10.1017/S0140525X00003435
- Starcke, K., Polzer, C., Wolf, O. T., & Brand, M. (2011). Does stress alter everyday moral decision-making? *Psychoneuroendocrinology*, *36*(2), 210–219. doi.org: 10.1016/j.psyneuen.2010.07.010
- Thaler, R. H., & Sunstein, C. R. (2009). *Nudge: Improving decisions about health, wealth, and happiness*. New York: Penguin Books.
- Van Tongeren, D. R., Hibbard, R., Edwards, M., Johnson, E., Diepholz, K., Newbound, H., Green, J. D. (2018). Heroic Helping: The Effects of Priming Superhero Images on Prosociality. *Frontiers in Psychology*, *9*, 1–7. doi.org: 10.3389/fpsyg.2018.02243
- VandenBos, G. R., & American Psychological Association. (2015). *APA dictionary of psychology*. Washington, DC: American Psychological Association.
- Vicente-Molina, M. A., Fernández-Sainz, A., & Izagirre-Olaizola, J. (2018). Does gender make a difference in pro-environmental behavior? The case of the Basque

- Country University students. *Journal of Cleaner Production*, 176, 89–98.
doi.org: 10.1016/j.jclepro.2017.12.079
- Voss, J. L., Federmeier, K. D., & Paller, K. A. (2012). The Potato Chip Really Does Look Like Elvis! Neural Hallmarks of Conceptual Processing Associated with Finding Novel Shapes Subjectively Meaningful. *Cerebral Cortex*, 22(10), 2354–2364.
doi.org: 10.1093/cercor/bhr315
- Ward, J. T., & Brown, C. N. (2015). Social Learning Theory and Crime. In J.D Wright *International Encyclopedia of the Social & Behavioral Sciences*, 409–414. London: Elsevier.
- Warneken, F., & Tomasello, M. (2009). Varieties of altruism in children and chimpanzees. *Trends in Cognitive Sciences*, 13(9), 397–402. doi.org: 10.1016/j.tics.2009.06.008
- Wason, P. C., & Evans, J. St. B. T. (1974). Dual processes in reasoning? *Cognition*, 3(2), 141–154. doi.org: 10.1016/0010-0277(74)90017-1
- Weaver, R. (2015). Littering in context(s): Using a quasi-natural experiment to explore geographic influences on antisocial behavior. *Applied Geography*, 57, 142–153.
doi.org: 10.1016/j.apgeog.2015.01.001
- Weston, D. R., & Turiel, E. (1980). Act-rule relations: Children's concepts of social rules. *Developmental Psychology*, 16(5), 417–424. doi.org: 10.1037/0012-1649.16.5.417
- Winter, D. D. N., & Koger, S. M. (2009). *Psychologie environmentálních problémů*. Praha: Portál.
- Wynn, K., & Bloom, P. (2014). The moral baby. In *Handbook of moral development*, 2nd ed , 435–453. New York, NY, US: Psychology Press.
- Yoeli, E., Hoffman, M., Rand, D. G., & Nowak, M. A. (2013). Powering up with indirect reciprocity in a large-scale field experiment. *Proceedings of the National Academy of Sciences*, 110(Supplement 2), 10424–10429.
doi.org: 10.1073/pnas.1301210110
- Zak, P. J., Stanton, A. A., & Ahmadi, S. (2007). Oxytocin Increases Generosity in Humans. *PLoS ONE*, 2(11), e1128. doi.org: 10.1371/journal.pone.0001128

Zelenski, J. M., Dopko, R. L., & Capaldi, C. A. (2015). Cooperation is in our nature: Nature exposure may promote cooperative and environmentally sustainable behavior. *Journal of Environmental Psychology, 42*, 24–31. doi.org: 10.1016/j.jenvp.2015.01.005

Zimbardo, P. G. (1969). The human choice: Individuation, reason, and order versus deindividuation, impulse, and chaos. *Nebraska Symposium on Motivation, 17*, 237–307.

Žihlavnikova, R. (2016). *Mind Your Reputation*. Palacky University Olomouc.
doi.org:10.13140/RG.2.2.22940.90244

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Appendix 1: Inventory from 10th of April, Watching Eyes, Ostrava

		Labels of the bins (the content that should be inside)			
		Plastic labelled bin	Paper labelled bin	Glass and metal labelled bin	Residual labelled bin
The actual content inside	Plastic ins.	78	8	0	9
	Paper ins.	2	26	0	5
	Glass + metal ins.	0	0	52	9
	Residual ins.	8	12	2	38

Complete Detailed Inventory of Collected Waste from 10th of April under the condition of Watching Eyes, Ostrava:

Number of the correctly placed pieces of waste coloured light blue

Appendix 2: Stimuli



Watching Eyes Stimulus



Picture of a Fox Stimulus,

Source:

nationalgeographic.com/photography/contests/contest-2015/gallery/week-9-nature/13/



Graffiti Stimulus

Appendix 3: Environmental conditions of the experiment



Watching Eyes Experimental Environment



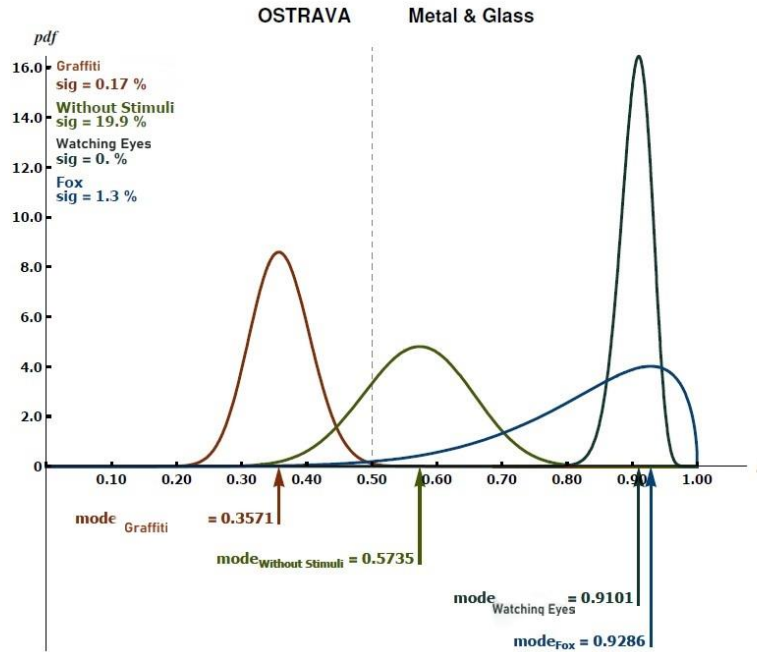
*Fox Pro-environmental Priming
Experimental Environment*



*Graffiti Broken Windows Experimental
Environment,*

Appendix 4: All distributions of 4 cues in Ostrava: Metal and Glass

5	OSTRAVA	Graffiti	Metal & Glass	0.357143	BetaDistribution [38.5, 68.
8	OSTRAVA	Without Stimuli	Metal & Glass	0.573529	BetaDistribution [20.5, 15.
6	OSTRAVA	Watching Eyes	Metal & Glass	0.910072	BetaDistribution [127.5, 13
7	OSTRAVA	Fox	Metal & Glass	0.928571	BetaDistribution [7.5, 1.5]



Graph of all distributions of 4 cues in Ostrava: Metal and Glass

Appendix 5: Detailed Table of results in Olomouc

OLOMOUC	Plastic	Graffiti	mode = 0.67	sig = 0.000051 %
OLOMOUC	Plastic	Without Stimuli	mode = 0.7	sig = 6.2×10^{-6} %
OLOMOUC	Plastic	Watching Eyes	mode = 0.8	sig = 6.9×10^{-22} %
OLOMOUC	Plastic	Fox	mode = 0.83	sig = 1.0×10^{-11} %
OLOMOUC	Paper	Graffiti	mode = 0.37	sig = 0.0017 %
OLOMOUC	Paper	Without Stimuli	mode = 0.49	sig = 37. %
OLOMOUC	Paper	Watching Eyes	mode = 0.67	sig = 0.00010 %
OLOMOUC	Paper	Fox	mode = 0.76	sig = 2.3×10^{-11} %
OLOMOUC	Metal & Glass	Graffiti	mode = 0.49	sig = 44. %
OLOMOUC	Metal & Glass	Without Stimuli	mode = 0.6	sig = 9.0 %
OLOMOUC	Metal & Glass	Watching Eyes	mode = 0.9	sig = 2.4×10^{-9} %
OLOMOUC	Metal & Glass	Fox	mode = 0.96	sig = 0.027 %
OLOMOUC	Residual Waste	Graffiti	mode = 0.54	sig = 8.8 %
OLOMOUC	Residual Waste	Without Stimuli	mode = 0.65	sig = 0.00033 %
OLOMOUC	Residual Waste	Watching Eyes	mode = 0.74	sig = 1.0×10^{-12} %
OLOMOUC	Residual Waste	Fox	mode = 0.76	sig = 5.5×10^{-10} %

Table of results in Olomouc

Appendix 6: Detailed table of results in Ostrava

OSTRAVA	Plastic	Graffiti	mode = 0.42	sig = 7.4 %
OSTRAVA	Plastic	Without Stimuli	mode = 0.56	sig = 7.9 %
OSTRAVA	Plastic	Fox	mode = 0.82	sig = 0.000018 %
OSTRAVA	Plastic	Watching Eyes	mode = 0.85	sig = 3.4×10^{-30} %
OSTRAVA	Paper	Without Stimuli	mode = 0.31	sig = 0.00052 %
OSTRAVA	Paper	Graffiti	mode = 0.37	sig = 0.60 %
OSTRAVA	Paper	Watching Eyes	mode = 0.61	sig = 0.049 %
OSTRAVA	Paper	Fox	mode = 0.84	sig = 3.6×10^{-6} %
OSTRAVA	Metal & Glass	Graffiti	mode = 0.36	sig = 0.17 %
OSTRAVA	Metal & Glass	Without Stimuli	mode = 0.57	sig = 20. %
OSTRAVA	Metal & Glass	Watching Eyes	mode = 0.91	sig = 1.8×10^{-23} %
OSTRAVA	Metal & Glass	Fox	mode = 0.93	sig = 1.3 %
OSTRAVA	Residual Waste	Graffiti	mode = 0.39	sig = 1.1 %
OSTRAVA	Residual Waste	Without Stimuli	mode = 0.46	sig = 17. %
OSTRAVA	Residual Waste	Watching Eyes	mode = 0.63	sig = 0.0079 %
OSTRAVA	Residual Waste	Fox	mode = 0.86	sig = 2.2×10^{-11} %

Table of results in Ostrava

Appendix 7: Abstract of thesis in English

ABSTRACT OF THESIS

Title:

Don't be mean, just go green! Nonconscious influences on pro-environmental behaviour

Author: Anna Tabášková

Supervisor: Tuf Ivan Hadrián, Ph.D.

Number of pages and characters: 78, 164395

Number of appendices:8

Number of references: 156

Abstract (800–1200 characters):

The global societal and environmental that we face in the 21st century challenge the scientific publicity to find efficient solutions that require involvement from a broad spectrum of expertise. The current research combines the findings from moral and cognitive psychology, anthropology and neuropsychology to examine whether the probability of recycling behaviour could be enhanced through non-conscious stimuli. Non-conscious mental processes make you buy the Hard Rock Café T-shirt everyone is wearing, give up on that diet you swore to stick to after Christmas and also repeatedly confuse the name of your current partner with the one you used to date earlier. But is it possible they could affect your pro-environmental behaviour just the same way? Could you actually trick your mind into being a little bit greener? The evidence of the current study suggests conservation behaviour can be enhanced in the presence of eye images and nature-related cues. Contrastingly, according to our findings, people tend to act less pro-environmentally in the vicinity of signs of disorder such as Graffiti.

Key words:

reputation, morality, free will, dual-processes, priming, broken windows theory, environmental behaviour, recycling

Appendix 8: Abstrakt diplomové práce v češtině

ABSTRAKT DIPLOMOVÉ PRÁCE

Název práce:

Nebud' zlý, raději zelený! Možnosti ovlivňování pro-environmentálního chování vizuálními stimuly

Autor práce: Anna Tabášková

Vedoucí práce: Tuf Ivan Hadrián, doc. RNDr. Mgr. Ph.D

Počet stran a znaků: 78, 164395

Počet příloh: 8

Počet titulů použité literatury: 156

Abstrakt (800–1200 zn.):

Narůstající naléhavost problémů, kterým jako společnost 21. století čelíme, vyzývá nejen vědeckou veřejnost k nalezení účinných řešení. Ta však vyžadují zapojení širokého spektra odborných znalostí. Současný výzkum kombinuje poznatky z morální a kognitivní psychologie, antropologie a neuropsychologie. Prostřednictvím série terénních výzkumů práce zkoumá, zdali klasické teorie Primingu, Teorie Rozbitého okna či Efektu 'Watching Eyes' mohou být aplikovány v kontextu chování spojeného s ochranou přírody. Experimenty proběhly na dvou lokacích a napříč denní dobou, aby tak bylo docíleno co největší ekologické validity a representability. Výsledky výzkumu ukazují, že pro-environmentální chování může být pozitivním způsobem ovlivněno v přítomnosti obrázku lišky a očí, zatímco v přítomnosti grafitti se pro-environmentální tendence snižuje.

Klíčová slova:

reputace, morálka, svobodná vůle, teorie duálních procesů, priming, teorie rozbitého okna, environmentální chování, recyklace