COMENIUS UNIVERSITY IN BRATISLAVA
FACULTY OF MATHEMATICS, PHYSICS AND INFORMATICS

AUTHOR'S EXPERTISE, CERTAINTY IN EXPRESSION, AND COMPREHENSIBILITY OF TEXT AS FACTORS IN FORMING OF EPISTEMIC TRUST

2015 **Barus Vladimír**

COMENIUS UNIVERSITY IN BRATISLAVA
FACULTY OF MATHEMATICS, PHYSICS AND INFORMATICS

AUTHOR'S EXPERTISE, CERTAINTY IN EXPRESSION, AND COMPREHENSIBILITY OF TEXT AS FACTORS IN FORMING OF EPISTEMIC TRUST

DIPLOMA THESIS

Study programme: Cognitive Science (Single degree study, master II. deg., full time form)
Field of Study: 2503 Cognitive Science
Training work place: Department of Applied Informatics
Supervisor: doc. PhDr. Ján Rybár, PhD.

Bratislava 2015 **Barus Vladimír**

Univerzita Komenského v Bratislave
Fakulta matematiky, fyziky a informatiky

ZADANIE ZÁVEREČNEJ PRÁCE

Meno a priezvisko študenta: Bc. Vladimír Barus
Študijný program: kognitívna veda (Jednoodborové štúdium, magisterský II. st., denná forma)
Študijný odbor: 9.2.11. kognitívna veda
Typ záverečnej práce: diplomová
Jazyk záverečnej práce: anglický
Sekundárny jazyk: slovenský

Názov: Author's Expertise, Certainty in Expression, and Comprehensibility of Text as Factors in Forming of Epistemic Trust
Expertíza autora, istota vo vyjadrovaní a zrozumiteľnosť textu ako faktory vo formovaní epistemickej dôvery

Cieľ: Prehľad a diskusia súčasných vedeckých poznatkov na tému epistemickej dôvery, spolu s experimentálnou časťou prezentujúcou štúdiu vplyvu troch faktorov - domnelých odborných znalostí autora na tému, istoty v autorovom vyjadrovaní a zrozumiteľnosti textu - na čitateľovu epistemickú dôveru.

Anotácia: Práca sa zaoberá fenoménom epistemickej dôvery, zhŕňa najdôležitejšie vedecké poznatky z odborov psychológie a neurovedy na tému a rozoberá jej dôležitosť pre vedu a modernú spoločnosť. V experimentálnej časti tejto práce skúmame vplyv troch faktorov (vnímané odborné znalosti autora, istotu v prejave autora a zrozumiteľnosť textu) na formovanie epistemickej dôvery u čitateľov používajúc 2x2x2 experimentálny design. Očakávame pozitívny vplyv vnímaných autorových odborných znalostí na diskutovanú tému, vysokej prejavenej istoty v autorovom vyjadrovaní a vysokej zrozumiteľnosti textu na epistemickú dôveru čitateľov.

Vedúci: doc. PhDr. Ján Rybár, PhD.
Katedra: FMFI.KAI - Katedra aplikovanej informatiky
Vedúci katedry: prof. Ing. Igor Farkaš, PhD.
Dátum zadania: 27.11.2013

Dátum schválenia: 27.11.2013 prof. RNDr. Pavol Zlatoš, PhD.
garant študijného programu

.....
študent

.....
vedúci práce

DECLARATION

I hereby declare that this thesis is my original work and it has been written by me in its entirety. I have faithfully and properly cited all sources in the thesis.

Date: 31.5.2015 Signature:

ACKNOWLEDGEMENTS

Big thank you to my colleagues for feedback, doc. PhDr. Ján Rybár for guidance and an alternative viewpoint on the topic, PhD., Mgr. Lenka Kostovičová, PhD., for invaluable feedback and literature recommendations, and Mgr. Jakub Mikuška for invaluable help with methodology, statistics, and overall going out of his way to help and being a great friend in need.

ABSTRAKT

Život v Informatickej Dobe, ktorá nasledovala Digitálnu Revolúciu, nám poskytuje aspoň toľko výziev ako výhod. Každý deň sme zaplavovaní ‘’odpadovými’’ informáciami, keďže spoločnosť produkuje viac informácií ako je nutné pre normálne fungovanie, pričom väčšina informácií je nízkej kvality (e-mail spam je typickým príkladom, s konšpiračnými teóriami a pseudovedou v tesnom závese). Jedná sa o nový druh znečistenia, nazývaný informačný smog (Bezroukov, 2015). Keď hľadáme blahobyt pre seba a ostatných používajúc vedomosti poskytnuté systémom voľne dostupných informácií, zdá sa imperatívne byť schopným adekvátne sa v ňom navigovať v zmysle vierohodnosti jeho obsahu.

Epistemická dôvera je potenciálne kvantifikovateľný postoj k informáciám, tendencia atribuovať informácie určitým stupňom pravdivostnej hodnoty na spektre od úplnej dôvery k úplnej nedôvere.

V tejto praci sme sa rozhodli preskúmať niekoľko faktorov ktoré môžu mať vplyv na proces tvorenia postojov v zmysle epistemickej dôvery voči konkrétnej informácii (text na špecifickú tému v našom prípade). Tieto sú: expertíza autora (popisy autora textu), vyjadrená istota ohľadom prezentovaných informácií, a zrozumiteľnosť. Používajúc 2x2x2 experimentálny dizajn, každý participant bol vystavený dvom úryvkom s rôznymi úrovňami fokálnych premenných (napr. ľahko pochopiteľný text napísaný expertom ktorý vyjadruje absolútnu istotu vo svojich tvrdeniach, ľahko pochopiteľný text napísaný laikom ktorý vyjadruje svoju istotu v percentách, apod.). Participanti boli náhodne pridelení k experimentálnym podmienkam a ohodnotili úryvky na základe vnímanej vierohodnosti a dôvery. Vyhodnotili sme rozsah vplyvu individuálnych faktorov na rozhodnutia participantov ohľadom dôvery voči poskytnutým textom. Jediná nezávislá premenná ktorá mala signifikantný vplyv bola vyjadrená istota.

Kľúčové slová: Epistemická dôvera. Epistemická vigilancia. Skepticizmus. Ľahkovernosť. Istota.

ABSTRACT

Living in the Information Age that followed the Digital Revolution provides us with at least as many challenges as it does with benefits. Every day we are flooded with "junk" information, as the society produces more information than necessary for normal functioning, with most information of low quality (e-mail spam is a typical example, with conspiracy theories and pseudoscience following right after). This is a new type of pollution, called *information smog* (Bezroukov, 2015). When seeking well-being for self and others using knowledge granted by a system of freely-accessible information, it seems imperative to be able to properly navigate it in terms of credibility of its contents.

Epistemic trust is a potentially quantifiable attitude towards knowledge, a tendency to attribute information with a certain degree of truth value on a spectrum from complete belief to complete disbelief.

In this thesis, we set out to investigate several factors that may bear influence on the process of attitude formation in terms of epistemic trust towards a piece of information (a text on a specific topic in our case). These are: expertise of the author (text author descriptions), expressed author's certainty regarding presented information, and comprehensibility. Using an 2x2x2 experimental framework, each participant was exposed to two excerpts with varying levels of the focal variables (e.g. an easily comprehensible text of an expert that expresses absolute certainty in his statements, an easily comprehensible text of a layman that expresses his certainty in percentages, etc.) . Participants were randomly assigned to the experimental conditions, and rated the excerpts based on their perceived credibility and trust. We evaluated the amount of influence of individual factors on the decisions of participants regarding trust towards provided texts. The only independent variable that had significant influence was *expressed certainty.*

Keywords: Epistemic trust. Epistemic vigilance. Scepticism. Credulity. Certainty.

CONTENTS

Introduction

We live in the Information Age, where knowledge is, in certain regards, the most valuable, yet at the same time the most common merchandise. Possibilities of sharing are more advanced and more affordable than ever before, leaving us free to access a stupendous amount of information in a very short time frame. We are also able to share our own thoughts and opinions, and even create online libraries of sorts, that provide information we chose for others to see. Apart from the obvious positives of these possibilities, there are dark sides as well. A person that has a splendid insight into mechanical engineering may easily have nothing relevant to say in the field of molecular biology, however, the person still has the right to express him/herself on such matters. It was demonstrated time and time again that deciding upon someone's expertise/possible contribution to an area is more challenging than previously thought. Someone with far less experience and knowledge may have unexpected and valuable insights thanks to exceptional creative or intellectual abilities, or even luck. This is, in our opinion, enough of an argument to interfere with our sharing possibilities (e.g. taking down pseudoscience websites) in the least amount possible. In our opinion, science should never resort to building its public image on silencing voices of the irrational (we are mainly referring to the situation in America, and recently Scotland, where there are attempts to sneak creationism as an alternative to the evolutionary theory into the school curriculum (Plutzer et al., 2011), where a radical intervention was undoubtedly needed). The main other variables that bear influence on this process are the quality of self-evaluation of the one providing the information (everyone should be sufficiently equipped to recognize what information to provide others with and how) and the state of mindware, mainly epistemic vigilance (the ability to recognize to what degree is a piece of information trustworthy (Sperber et al., 2010) of the receiver. We think that the latter two are connected, with rationality as described by Stanovich (Čavojová et al., 2015) being a sheltering term of sorts. Moreover, rationality and mainly epistemic vigilance are very important tools for scientists, and while the scientific method has proven very adept at using and honing them, we shouldn't stop at improving them until we are no longer susceptible to biases and errors in judgement (or never stop if it isn't

achievable). A different important point to be made is that scientific method being adept at reducing our credulity is only relatable to scientific research, even that doesn't apply to all cases - one example being Kurt Wise, a man with a Ph.D. degree in geology acquired at the Harvard University, which is a young earth creationist. ''The term "Young-Earth Creationist" (YEC) is usually reserved for the followers of Henry Morris, founder and recently-retired president of the Institute for Creation Research (ICR), and arguably the most influential creationist of the late 20th century. Few classical YECs interpret the flat-Earth and geocentric passages of the Bible literally, but they reject modern physics, chemistry, and geology concerning the age of the Earth, and they deny biological descent with modification. In their view, the Earth is from 6,000 to 10,000 years old.'' (Scott, 1999) Mr. Kurt Wise himself declared that ''Although there are scientific reasons for accepting a young earth, I am a young-age creationist because that is my understanding of the Scripture. As I shared with my professors years ago when I was in college, if all the evidence in the universe turned against creationism, I would be the first to admit it, but I would still be a creationist because that is what the Word of God seems to indicate.'' This sole example of a scientist that acquired a doctorate at one of the most prestigious universities in the world in the same field in which he openly denies the value of empirical evidence should point to the fact that scientists, although literate in the sceptical approach of the scientific method, are not exempt from falling prey to their own credulity.

These are the reasons that this thesis handles the topic of *epistemic trust* - an attitude towards information in terms of perceived truth value. We set out to discuss the current state of scientific knowledge on the topic, as well as describe observed tendencies of groups and movements whose ideologies are debatably or demonstrably dangerous to society and mainly based on credulous behavioural tendencies. The practical focus of this thesis is an experiment, meant to examine the potential influence of three variables on the trustworthiness of a text. These variables are *author's expertise on the subject, comprehensibility of text* and *certainty in expression.*

1. Theoretical framework

In this chapter, we explain the basic terminology of epistemic trust and related concepts and discuss credulous behaviour and its impact when present in groups. We also discuss research that has been done on the topic up to this point in fields of social sciences, psychology and neuroscience, as well as the lack of a unified terminology and approach to the phenomena.

1.1 INTRODUCTION TO TERMINOLOGY OF EPISTEMIC TRUST

Mindware - a term coined by David Perkins, a cognitive scientist from Harvard, it refers to the rules, data, procedures, strategies and other cognitive tools (expertise in probability, logic and scientific inference) that need to be retrieved from memory in order to think rationally (Stanovich, 2009)

Rationality is the ability to base one's thinking and actions on reason, where reason is the capacity for consciously making sense of things, applying logic, establishing and verifying facts, and changing or justifying practices, institutions, and beliefs based on new or existing information (Kompridis, 2010). In literature, two types of rationality are mentioned, *instrumental* and *epistemic rationality*. (Stanovich in Čavojová et al., 2015)

Instrumental Rationality - particular rational behaviour aimed at securing our goals

Epistemic rationality - how well our convictions fit the actual structure of the world, tells us what is true

When it comes to epistemic trust, epistemic vigilance, epistemic recklessness, credulity, and scepticism, we would like to integrate these terms into a single functional whole, as some have been used interchangeably in the literature so far.

Epistemic trust - usually used *positively* in terms of trustworthiness towards a piece of knowledge, meaning that it ordinarily describes the state of *belief into* something. We use it rather as an umbrella term for the whole spectrum of trusting, both negative (not trusting) and positive (trusting), as we think there is currently no better term to encompass this spectrum, and also to avoid partial overlap with *credulity.*

Epistemic vigilance - a suite of cognitive mechanisms targeted at the risk of being misinformed by others and its prevention. It is also not the opposite of trust; it is the opposite of blind trust. Factors affecting the acceptance or rejection of a piece of communicated information may have to do either with the source of the information – who to believe– or with its content – what to believe.

Epistemic recklessness - is a term not widely used, but it expresses the nature of biased and credulous thinking well. Hunt (2011) defines it as a failure to change and cultivate one's epistemic and reflective habits. He views it as a continuation of maladaptive epistemic practices, enacting of corresponding epistemic attitudes (i.e. failing to develop more adequate skills of epistemic reasoning, when one has all the cognitive, material and social resources that are prerequisite for such development) and when one's current epistemic attitudes are inadequate to the task of making full sense of important experiences or situations in one's life.

Credulity - a thinking tendency to believe claims unsupported by empirical evidence and/or reasoning.

Scepticism - a thinking tendency to disbelieve claims unsupported by empirical evidence.

Professional scepticism - a specific type of scepticism that is connected to (often required by) a particular profession for its proper execution. Professional judgment imparted by training and experience confers resistance to identity-protective cognition. (Kahan et al., 2015)

Wisdom - when it was discovered that intelligence not only fails as a positive predictor of the ability of epistemic vigilance (Stanovich et al., 2013), but is not even as powerful of a predictor of human wellbeing as previously thought (Penney et al., 2015), with discovered anxiety and underlying somatic correlations (Coplan et al., 2012). A need for a new concept arose, one that would properly separate IQ from the ability of healthy judgement. Wisdom as described by Grossman et al. involves pragmatic reasoning that helps people navigate challenges that are endemic to social life, with conflicts between groups and individuals being postulated as an example. Moreover, an important aspect of wisdom is the ability to recognize the limits of one's own knowledge, becoming aware of the varied contexts of life and how they may unfold over time, acknowledging other people's points of view and reconciling opposing viewpoints (Basseches, 1984; Grossmann, Na, Varnum, Kitayama, & Nisbett, 2013; Staudinger & Glück, 2011 in Grossman et al., 2014), additionally, participants who scored high on wise reasoning reported less negative affect in daily life, better relationship quality, greater life satisfaction, less tendency to brood, and
a more positive way of talking about social conflicts, but not more positive affect in daily life (Grossman et al., 2013).

Critical thinking - we can define thinking critically as rationally deciding what to do or what to believe (Blair, 1983; Ennis, 1981; Hitchcock, 1983 in Norris, 1985). As such, we see the distinction between epistemic vigilance and critical thinking in the level on which they are used. We see epistemic vigilance as a component, or rather a necessary prerequisite of critical thinking, although it may be freely used independently, i.e. we can use our skills of epistemic vigilance to acquire a proper representation of the world, we can subsequently choose, however, whether to use this information further in the process of critical thinking, or rather adhere to a different set of ideas.

Cognitive bias - A cognitive bias is a pattern of deviation in judgment, whereby inferences about other people and situations may be drawn in an illogical fashion (Haselton et al., 2005).

Confirmation bias or *myside bias* - a tendency, when testing an existing belief, to search for evidence which could confirm that belief, rather than for evidence which could disconfirm it. (Jones & Sugden, 2001)

We therefore see the relationship of these terms as follows:
Wisdom is a character trait which is comprised of several attitudes, tendencies and skills, with *critical thinking*, mainly its component *epistemic vigilance,* being of special significance. *Epistemic recklessness* is a specific type of thinking/behaviour characterised by failure to properly navigate information in terms of their truth value. *Mindware* is a set of cognitive tools serving our rational thinking. *Epistemic trust* is a spectrum-like situational attitude towards a piece of information, which can lean towards the *trusting* or *not trusting* end of the spectrum, whereas *scepticism* and *credulity* are thinking tendencies which dictate our thought patterns and sometimes behaviour in situations when there is need for determining our position on the epistemic trust spectrum when faced with an information.

1.2 CREDULITY IN MASS OPINION

The purpose of this subchapter is to a) familiarise the reader with information that provide a foundation for our choice of variables in our experiment, and b) document observable impact of influential movements that base their agenda on empirically unsupported claims in our society.

The image of an archetypal conspiracy theorist has evolved from a drugged lunatic in a tinfoil hat into a respected member of our society for several reasons.
First, as already mentioned, information are more accessible than ever before - this means a larger volume to filter through, and also more false positives in deciding their truth value, as well as the fact that real conspiracies happened, some were predicted and documented - which is a nurturing soil for further conspiracy speculations. Second, the anonymous environment of the internet hides the identity of the author, which, when using correct wording, can easily swindle readers into believing they are reading a text of someone with expertise in the field.

As our interest of study lies partially with contemporary social groups and movements that take advantage of people's credulity, we set out to identify variables taking part in the trust-forming process when reading a text by observing the nature and mechanisms of these groups firsthand. Our main sources were social media and sites dedicated either to promotion of ideas of these movements themselves, or those who attempt to suppress their influence (led by scientific researchers, philosophers and sceptics). Influence of these groups has surprisingly often resulted into events that had an observable impact on public opinions, legislation, and even health of others.

Anti-GMO - the abbreviation ''GMO'' stands for ''Genetically Modified Organisms'', and is used to label organisms that have been modified using techniques of genetic engineering. As genetic modification is a complex topic with a high level of expertise needed to be navigated properly, a lot of individuals and interest groups are spreading false information and/or fear mongering messages aimed at inducing negative opinions regarding GMO. Primary tool of spreading their agenda seems to be Facebook, where, for example, a group bearing the name ''Anti GMO Foods and Fluoride Water'' (available online as of 29.5.2015 at https://www.facebook.com/antigmofoods) has over 87 000 followers. The main point of these movements is not simply expressing uncertainty regarding GMO's, they are often promoting alternative natural medicine, ''organic'' food, and spreading pseudoscience. The ''Anti-GMO'' thinking movement also resulted in destruction of a testing field of *golden rice* crops in Philippines. Golden rice is a genetically engineered rice variety with beta-carotene content, a project that started in 1993 and was presented in the year 2000 in the Science magazine. It's practical purpose was to provide third world countries with an easily-accessible crop that serves as a source of vitamin A. According to an article in the World Health Organization bulletin (Humphrey et al., 1992); 'Improved vitamin A nutriture would be expected to prevent approximately 1-2 million deaths annually among children aged 1-4 years. An additional 0.25-0.5 million deaths may be averted if improved vitamin A nutriture can be achieved during the latter half of infancy. Improved vitamin A nutriture alone could prevent 1.3-2.5 million of the nearly 8 million late infancy and preschool age child deaths that occur each year in the

highest-risk developing countries.' The aforementioned incident occurred in the year 2013, when a group of 400 protesters attacked and uprooted a testing field of the golden rice crop in Philippines (McGrath, 2013). The research itself was not put to a halt, as it was only one of multiple trials and only one of multiple testing fields.

Anti-vaccine - or anti-vax for short. A movement arguing against vaccination for various reasons. Opposition and controversies accompanied inoculation since the introduction of the smallpox vaccine in 1798, but in this case, we are referring to the anti-vaccination movement that gained momentum mainly since the publication of a study by Andrew Wakefield that proposed a link between the MMR vaccine and autism (Thomas, 2010). The study has since been criticized and refuted by academic bodies, which had little effect on the forming anti-vax movement. The fact that the MMR vaccine is usually administered after a child's first birthday, according to the recommendation of Committee on Infectious Diseases of the American Academy of Pediatrics, whereas the symptoms of autistic spectrum disorders are, by definition, observable before a child reaches the second year of age, often accompanied by a sudden developmental regression (Stefanatos, 2008), has contributed to the *post hoc, ergo propter hoc* fallacy, misleading a large number of parents into associating these two events. As Thomas (2010) writes; ''Before the publication of Wakefield's findings, the MMR inoculation rate in the UK was 92%—nearly the herd immunity requirement of 95%. Following the publication, the inoculation rate dropped to below 80%. In 1998, the year of publication, there were 56 measles cases in the UK. By 2008, there were 1348 cases and 2 confirmed deaths.'' A number of sites appeared, dedicated to parents sharing their experiences of discovering symptoms of autism and developmental regression after having their child vaccinated, strengthening their suspicions.

A British online journal dailymail.co.uk published a story about Michelle Moore, a woman that took an anti-malaria medication (Lariam), that was considered safe at the time. As a result, she faced several health complications, which resulted in her distrusting the medical establishment, ending with her delaying vaccinations for her children. She claimed that she is not opposed to medicine, but fears for the well-being of her children. We cite this case as a specific example demonstrative of an attempt to be sceptical towards information, but failing to do so because of

insufficient proficiency in epistemic vigilance (i.e. taking the risk of not vaccinating her child, although the probability of damage caused by vaccination is stupendously lower than the risk of damage caused by deficiency of immunization against a deadly disease).

Homeopathy users/promoters - homeopathy is a therapeutic method using preparations of substances whose effects when administered to healthy subjects correspond to the manifestations of the disorder in the individual patient (Ernst, 2002). This method has been developed by Hahnemann in the 18th century, and hasn't been proven to be more efficient than a placebo (Ernst, 2002).
As stated in the record of a public hearing in the Federal Register of the United States; In 2007, the National Health Interview Survey, conducted by the Centers for Disease Control and Prevention's National Center for Health Statistics, estimated that adults spent about $2.9 billion on the purchase of homeopathic medicine. Homeopathy users usually turn to it because of bad past experiences with conventional medicine (Avina et al., 1978).

Conspiracy theorists - conspiracy theory is characterised as an explanation of important events that hypothesizes the intentional deception and manipulation of those involved in, affected by, or witnessing these events (Basham, 2011). Conspiracy theories tend to undermine official accounts via pointing out incongruities, and subsequently work these into a new, own framework where they become congruent. Basham (2011) argues that conspiracy theories are not as irrational as one may think, because after looking back at history, stating that there is currently no conspiracy anywhere, involving an elaborate cover-up or disinformation is just as unreasonable as total scepticism about public institutions. A study using surveys sampled between 2006 and 2011 found that half of the American public consistently endorses at least one conspiracy theory, and also that many of them are differentiated along ideological dimensions. The likelihood of supporting them is strongly predicted by willingness to believe in other unseen, intentional forces (Oliver & Wood, 2014).

Creationists - usually also religious fundamentalists, argue that the theory of evolution is not true, and that Earth as well as all life on it has been created by a higher power. Can be split into *young-Earth creationists* (presume the Earth is only about 10 000 years old) and *old-Earth creationists* (usually agree with the theory of evolution and the scientifically deduced age of Earth). Results of a National Survey of High School Biology in America (Berkman and Plutzer, 2013) found that 33% of biology teachers consider themselves advocates of creationism, 28% advocates of evolution, and 60% don't consider themselves advocates of either. The creationist movement has a particular strength in the U.S., where multiple states faced attempts for creationism to be taught as an alternative to evolution.

Health and fitness pseudoscience - more of a societal problem than a particular defined group of individuals, many people find themselves victims of so-called *diet fads*. Roberts (2001) explains the theory behind them; usually aiming for a great loss of weight in a short amount of time, fad diets are often explained using scientific terminology, simplifying or expanding upon biochemical/physiological facts that provide evidence to support claims of said diet. Validity of these facts is often questionable, either because it stands on a single study, theory, testimonials or short term results. Usually restricting from eating a category or several categories of foods, they make use of two elements; ritual and sacrifice. This would mean that you have to eat a particular meal/food or a set of them each day/several hours (that would represent the ritual element) but at the same time never touch a particular food or food category (sacrifice). Considering dangers of an inappropriate diet or eating disorders, this may, in some cases, have even fatal consequences. The problem with orienting oneself in dietology advice is in the overall inconclusiveness of dietology research. If we consider individual physiological differences, specific chemical and molecular interactions of the substances we consume, and even differences in activities performed, the number of variables that need to be controlled is very high. The credulity of the public and even major mainstream media in this regard was well demonstrated by John Bohannon, Ph.D., a doctor of molecular biology and a science journalist. In 2015, he and his team published a study named ''Chocolate with high Cocoa content as a weight-loss accelerator''. The study concluded that consumption of dark chocolate leads to a 10% increase in weight-loss. It made news in over 20

countries and was discussed on television news shows, although it was fraudulent by design. Even though the outcomes and all the information regarding its methods were true, the wanted result was achieved by observing a large amount of variables in a very small sample of participants (15 of them, to be precise) and adequate statistical procedures (Bohannon,2015). The fact that the general public and journalists alike have no formal training in scientific research and therefore have little understanding of it can easily result in similar situations in the future.

In this subchapter, we investigated several movements that are, to a degree, credulous by their very nature. Some of these groups are only unsuccessful attempts at scepticism, while others directly promote non-empirical thinking and dogmatism, diverting the intellectual and creative energy of masses, in some cases causing direct material or physical harm. There are many observable and many already studied factors that seem to influence followers of these movements, but as we think and observe that most of their influence is via internet in written form, we decided to focus on expertise, which has already been studied in research on risk (Eiser et al., 2009), comprehensibility of text, researched in connection with business research (Praxmarer-Carus, 2013), both being postulated as factors in influencing trust, and certainty in expression.

1.3 CURRENT STATE OF RESEARCH

This subchapter discusses current scientific knowledge on the topic, evolution of cognitive bias and the concept of situation-dependent epistemic rationality.

1.3.1 There might not be any General Epistemic Rationality

The very basis of science is reliance on measurable, empirical evidence, and its evaluation using reason. In spite of this fact, there is a considerable amount of scientists that not only come up with, but vigorously defend homeopathy, refutation of vaccines, the chemtrail conspiracy theory, and creationism, to name a few. Mr. Kurt Wise, mentioned earlier, wrote a whole book titled ‘’In Six Days: Why Fifty

Scientists Choose to Believe in Creation''. Being familiar with, or even proficient in, the scientific method obviously doesn't grant one an immunity from being mislead, although a positive relationship with science may at least help to some extent in this regard (Barus, 2014).

Moreover, we suspect that confirmation bias (Wason, 1960) might have evolved as a part of the same suite of cognitive mechanisms that protect us from being misled, although in environments with a lot less information available, and primarily, a much bigger part of the data available in the past was tested first-hand. I.e. having a successful survival strategy in an environment where, for example, predation is a real threat, would prove enough of a reason to adhere to a conservative way of thinking and not change it. Findings pointing to conservative opinions also fulfilling a protection-from-misinformation function (Čavojová et al., 2015) offer some support to this opinion. Cases when people have the intent of being properly vigilant towards knowledge, but fail to do so because of a lack of insight into the scientific method are not uncommon. Good examples being the anti-vax, anti-climate-change and anti-GMO movements, all of which are discussed later on, as well as a general tendency to listen to pseudoscience. In their cases, behaviour and/or thinking patterns of a significant portion of their respective followers cannot be attributed solely to confirmation bias, because the information they hold true now weren't their first opinions. The change of mind was motivated by something else - whether it was an emotional factor, a particular personality trait or the environment is hard to tell, but when speaking about why they *retain* these opinions, we do have some idea. Confirmation bias would be the first bet, with Steele's self-affirmation theory following right after (Nyhan, 2015).

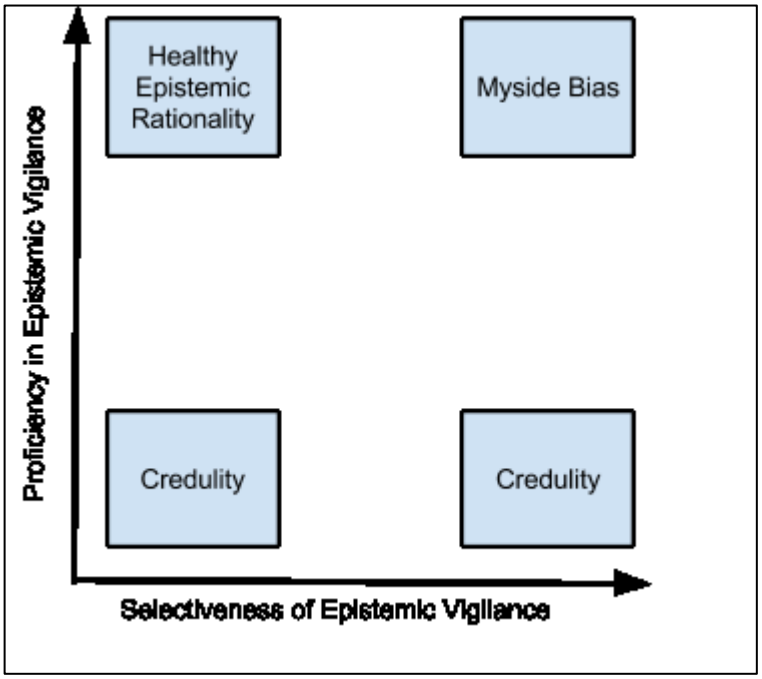
According to Ross and Nisbett, 1991; Gilbert and Malone, 1995 in Sperber et al., 2010, considerable amount of social psychology literature suggests that it is the situation, to a significant extent, not one's character, that determines people's behaviour. They further suggest that believing in someone's 'general trustworthiness' may be a case of the 'fundamental attribution error', referring to a tendency in predicting and/or explaining someone's behaviour, while underestimating situational factors in favour of psychological dispositions (Ross, 1977 in Sperber et al., 2010).

All of this points to a possibility of no general epistemic rationality, rather that it comes into play only in people that have proper cognitive equipment for this task -

a healthy mindware, and only in situations which enable them to put it into practice (an affirming environment seems to be one such situational prerequisite).

Our views on how to advance research in this field further are as follows: further study on various factors that influence our epistemic trust, as well as on those that improve our epistemic vigilance are needed. Subsequently, using the knowledge obtained through the previous step, training in epistemic vigilance becomes increasingly effective, however, as we mentioned, it is not only about the ability to see an information through a lens of scepticism, it is also about the motivation to do so. The following image portrays this effect.

Figure 1., Selectiveness of Epistemic Vigilance



The image itself has two axes, one represents the dimension of one's proficiency in epistemic vigilance (how well will I perform in distinguishing empirically unsupported information) the other it's selectiveness (how often will I make an exception in using this skill). If one is found in the upper left quadrant of the spectrum, being highly proficient as well as almost non-selective (certain level of selectiveness must be kept to avoid time- and energy-ineffective behaviour) in his epistemic vigilance skills, we may talk about healthy epistemic rationality - a well-functioning ability to have a representation of the world as it is. When one is proficient in epistemic vigilance, but highly selective in using it, myside bias will

most likely influence his mental representation of the world. Having low skills of epistemic vigilance results in a very high risk of credulous thinking patterns independently from the selectiveness of their application (as the person doesn't have much to apply). Therefore, anyone aiming at improving their skills of epistemic vigilance should also aim at being able to reduce the selectiveness of its use, as we hypothesise that if someone is trained in both conditions, he might be able to reduce if not eliminate the situational influence on his epistemic trust.

1.3.2 Evolution of cognitive bias and its usefulness

The study of cognitive bias is currently almost a sub-field of its own, being an attractive topic for several decades. The influence that it bears on our everyday lives as well as societal problems is hardly disputable, and its demonstrativeness makes it likeable even for the laic audience. As with many topics, though, there is another side to this coin. It seems that the common approach to this phenomenon is to view it as a defective element that is negatively influencing an otherwise perfect system of human rationality. If we are to understand and study it properly, an objective stance that acknowledges it's rightful state as an *indivisible and highly functional part of the whole* might be more suitable (i.e. it's not a bug, it's a feature). As written by Cosmides & Tooby, 1994, in Haselton et al. ,p.725;

'' 'Rational' decision-making methods....logic, mathematics, probability theory… are computationally weak: incapable of solving the natural adaptive problems our ancestors had to solve reliably in order to reproduce...This poor performance on most natural problems is the primary reason why problem-solving specializations were favoured by natural selection over general-purpose problem-solvers. Despite widespread claims to the contrary, the human mind is not worse than rational...but may often be better than rational.''

This points to the fact that the real world is immensely complex, and while evolution is very demanding when it comes to performance of organisms that are to survive, it is even more unforgiving in terms of effectiveness. Reasoning is a recently evolved filtering mechanism. By allowing us to understand and evaluate arguments, reasoning makes it possible to communicate beliefs that would otherwise have very little chance of being accepted by receivers: it increases the

amount of information efficiently transmitted. (Mercier, 2013) Cognitive bias has probably evolved simultaneously, if not sooner, than our ability to reason - however, this doesn't justify viewing it as a redundancy in the contemporary society, on the contrary - just as we shouldn't be throwing our legs away because of the existence of superhuman-strength prosthetics, we should not shun the most time-effective method of assessing info about the world nature came up with, just because we are capable of other, lengthier, but more precise ways to acquire data of this sort.

In line with this view (Haselton et al., 2005) is the notion that we are, by design, limited in our cognitive abilities, while real world situations are characteristic by a time constraint. Evolutionary perspective dictates that to be successful under these conditions, rules of thumb and shortcuts that are prone to breakdown in systematic ways are needed. It was also demonstrated (Goldstein & Gigerenzer, 1999, in Haselton et. al, 2005) that simple decision-making rules may, in certain situations, outperform complex algorithms; an example of this being the *recognition heuristic.* E.g. when students were asked which city has a larger population, San Diego or San Antonio, German students made the right guess (San Diego). In contrast to this, American students tended to choose the wrong pick. German students simply pick the city that is known to them, relying on the inference that it means it's more popular, therefore larger/ has more inhabitants. For American students, however, both cities are equally known, so they have to rely on other, often wrong, cues.

Jussim (2015) writes on the real state of bias and self-fulfilling prophecy, reaching three conclusions: ''1. Although errors, biases, and self-fulfilling prophecies in person perception, are real, reliable, and occasionally quite powerful, on average, they tend to be weak, fragile and fleeting; 2. Perceptions of individuals and groups tend to be at least moderately, and often highly accurate; and 3. Conclusions based on the research on error, bias, and self-fulfilling prophecies routinely greatly overstates their power and pervasiveness, and consistently ignores evidence of accuracy, agreement, and rationality in social perception.''

He argues that even though we often point to people getting something wrong, we are, at the same time, overlooking the fact that they got most things right. And again, it is not because we used some complex algorithm which was overridden and damaged by some sort of cognitive bias, it was *thanks* to the bias. This is, of

course , mostly dependent on the situation, but unbiased examination would be oftentimes much more time consuming and taxing energy-wise. Moreover, many of our biases actually do have a strategic meaning other than making as real approximations of reality as possible. For example viewing own offspring as more able than they truly are is beneficial in terms of investing energy that may help preserve offspring's life or positively impact his/her development. If we are to study these phenomena, it may prove more beneficial not to measure human performance in representing reality compared to its objective state, but compared to a norm - a statistical representation of how well an average person approximates the real world.

Boyer (2011) presents a non-epistemic perspective of misleading, he describes it as *strategic.* He proposes that fitness of one's communication must not necessarily stem from the value of presented facts, but also from coalitional events. According to his view, thanks to presenting others with information of questionable truth value or being willing to accept such notions yourself, possibilities for coalitional alignment between individuals arise.

Mercier (2013) offers an alternative view on the topic; he postulates that our filtering mechanisms might have evolved in layers, allowing communicated information to be increasingly influential - with subliminal communication being the oldest type, where very little information actually gets through, followed by non-ostensive communication that yields more influence, and ostensive communication with a recently evolved filtering mechanism - reason, that allows us to understand and evaluate (and possibly accept) facts or views that we normally wouldn't be able to, thus increasing the amount of information efficiently transmitted.

1.3.3 Epistemic trust and workings of the brain

It seems obvious that since the functioning of our mind is closely tied to (if not a product of) the functioning of our brains, epistemic trust will be no exception. If we are to influence our abilities of avoiding misinformation, neuroscience is a reliable source of information that can either supplement psychological theories with an additional level of verification, or provide insights of its own. E.g.; psychological studies tend to support Spinoza's conjecture - that we a priori accept new

information as true, and only subsequently doubt their truth value/ reject them. Behavioural data from a study by Harris et al. (2008) seem to give further credibility to the hypothesis; in an fMRI study of reactions to stimuli which were either believable, unbelievable or undecidable, reactions to believable stimuli were observably faster than those to false or undecidable stimuli. We think of this as an interesting example of how neuroscientific studies may provide relevant data to support or falsify a hypothesis, but as we mentioned, neuroscience can provide insights into the topic from its own and specific perspective - in 2004, Westen et al. published an fMRI study on emotional constraints in political judgment. Participants were categorised based on their political candidate preference, and subsequently exposed to information threatening either to their own candidate, the opposing one, or neutral control targets. The results showed a specific, motivated (or emotional, if you will) type of reasoning, through activations of regions that were not associated with cold reasoning and conscious emotion regulation, suggesting that motivated reasoning is qualitatively different from cold reasoning (where there are no emotional investments in the conclusions reached).

If we want to discuss epistemic trust on a neural level, it proves relatively easy to narrow the particular area of the brain down to the prefrontal cortex, since it governs our executive functions - our cognition: processes that give emergence to the ability of reasoning and emotion control, which are of utmost importance in prevention of bias and credulous thinking patterns. The region of probably the highest level of importance in this regard is the ventromedial prefrontal cortex. Closely associated with risk behaviour, decision-making and control of amygdala activity (Motzkin et al., 2015), it's neuroscientific study led to the development of the *False Tagging Theory*. It is a neurobiological model of the belief and doubt process, proposing that the prefrontal cortex is critical for normative doubt regarding properly comprehended cognitive representations (Asp et al., 2012):

‘’...a neuroanatomically based theoretical model of belief and doubt processes. In brief, the FTT asserts that (1) the process of belief occurs in two stages, mental representation and assessment (Gilbert, 1991); (2) all ideas that are represented are initially believed, but a secondary psychological analysis (assessment) can produce disbelief (or doubt) (Gilbert, 1991; Gilbert et al., 1993); (3) the mental representation of the idea, which is initially believed or regarded as true, must be “tagged” to indicate false value, producing doubt (Gilbert, 1991); (4) the prefrontal

cortex is necessary for the “false tag” in the assessment component of belief; and (5) “false tags” are affective in nature, akin to the central tenets of Damasio’s (1994) “somatic marker hypothesis.’’

Asp, Ramachandran and Tranel examined patients with prefrontal cortex damage, hypothesizing that patients with damaged prefrontal cortex would suffer from doubt deficits, ultimately resulting in higher authoritarianism and religious fundamentalism. They positively differed from the normative values as well as the control group, suggesting support for the False Tagging Theory, further pointing to the ventromedial prefrontal cortex as being critical for psychological doubt and resistance to authoritarian persuasion. Asp and his colleagues (2012) also put the theory to a test by examining credulity and purchase intention for consumer products featured in misleading advertisements of subjects with focal damage to the ventromedial prefrontal cortex. These were more credulous to misleading ads and even showed the highest intention to purchase the products mentioned in the misleading advertisements in comparison to both healthy patients, and patients with damage outside of the ventromedial prefrontal cortex.

One last example we’d like to mention would be a study that showed amygdala as crucial in developing and expressing interpersonal trust (Koscik & Tranel, 2010). Participants took part in *Trust Game*, an economic task that presumably requires developing and/or expressing interpersonal trust. Those with a unilateral damage to the amygdala not only expressed more benevolent behaviour than healthy adults and the neurologically lesioned control group (with damage to ventromedial prefrontal or insular cortices), but also tended to increase trust in response to betrayals. As interpersonal trust plays an important role when handling new information as well, we suggest that the ventromedial prefrontal cortex, critical for the regulation of amygdala activity, seems a strong candidate for the most influential element of the neural system responsible for the epistemic belief and doubt process.

1.3.4 Correcting our epistemic recklessness

In this subchapter we plan on discussing scientific findings most directly relevant for developing systematic methods of epistemic vigilance training and reducing epistemic recklessness, both having widespread application both in personal development and communication of science. When handling this topic, it might prove useful to distinguish whether we want to examine the common, spontaneous workings of humans in this regard, or conscious, *desired* (by the subject) epistemic analysis.

As mentioned before, we may divide factors influencing our proficiency in epistemic analysis into *internal* and *external*. Internal factors may include our previous knowledge, affective states, and motivation, while external influence might be caused by consciousness-altering substances, social pressure, time constraints etc.

For example, a study has shown that people who have had a coffee are more alert and change their mind more in response to good arguments (Martin, Laing, Martin, & Mitchell, 2005, in Mercier, 2013). Also, Haselton et al. (2005) argues that a variety of sources demonstrate the fact that people solve problems differently when under time pressure, or when their motivations to be accurate are reduced.

In line with previous research - that being presented with contradictory evidence can even strengthen these prior beliefs (Batson, 1975; Burris, Harmon-Jones, & Tarpley, 1997; Lord, Ross, & Lepper, 1979; Tormala & Petty, 2002, in Mercier, 2013), Nyhan et al. (2013) executed a study regarding effectiveness of messages in vaccine promotion, in which they found that these messages do not always work as intended, depending on pre-existing parental attitudes against vaccines. Parents were measured for their attitudes towards vaccination, and subsequently randomly assigned one of four interventions; (1) information explaining the lack of evidence that MMR causes autism from the Center for Disease Control and Prevention; (2) textual information about the dangers of the diseases prevented by MMR from the Vaccine Information Statement; (3) images of children who have diseases prevented by the MMR vaccine; (4) a dramatic narrative about an infant who almost died of measles from a Center for Disease Control and Prevention fact sheet; or to a control group.' None of these had positive effect, rather, parents with extremely negative attitudes towards vaccinations before the intervention

expressed increased belief in the vaccines/autism link after it. It is possible that the same mechanism was identified in a study by Lewandowsky et al., (2003), in which the ability to update one's view was influenced by citizenship of a particular country (Americans that were not sensitive to corrections and refractions of information related to the Iraq War), and another one by Ecker et al. (2013), where participants were measured on pre-existing attitudes (racial prejudice), and subsequently provided with information that they were supposed to memorise. Later on (day afterwards), some of these information were or were not retracted. The participants were then supposed to recall the information, but bear the mentioned corrections in mind. Their racial prejudice was able to successfully predict their ability in doing so - the participants mostly remembered the information that fit their worldview, independently of the information's truthfulness.

An important insight on how to manage external factors was provided by Nyhan & Reifler (2015) - they hypothesized that people might not be willing to change their views because it threatens their worldview or self-concept (Sherman & Cohen, 2006), a theory originally proposed by Steele (1998, in Nyhan & Reifler, 2015). They found out that letting participants execute a short exercise aimed at self-affirmation, would leave their misperceptions greatly diminished - even amongst those that are most likely to hold them. This supports the claim that maladaptive state of one's epistemic rationality is not simply a result of a lack of information - strong affective factors are present as well. It may be also thanks to this fact that actual displays (e.g. instead of talking about how friendly of a community we are, let a subject experience it firsthand), gaining people's trust little by little, reaching people through their friends and families, etc. are more effective than directly influencing people's trust (Mercier, 2013).

Haselton et al. (2005) state that cognitive biases usually arise for three reasons. Heuristics may arise through discovering useful shortcuts that work in most circumstances using selection, though these may fall short of some normative standards. Error management biases can arise if biased solutions to adaptive problems resulted in lower error cost than unbiased ones. Artifacts can arise if mind is not designed for the task at hand. This would only account for the cognitive outlook, however.

It seems that for epistemic vigilance to work properly, we first need to circumvent other systems that prevent us from making full use of it. We therefore argue that

when attempting to be consciously sceptical, epistemic vigilance is only a subsystem of a more broad *conscious epistemic analysis* skill. This would mean that conscious epistemic analysis would comprise epistemic vigilance as well as other skills that act in conjunction to ensure properly functioning epistemic rationality in three steps:

1. realising own cognitive biases, emotional state and relations to the topic, motivation, pre-existing beliefs, and attempt to consciously reduce their effect by depersonalization and self-affirmation
2. applying own skills of epistemic vigilance, acquiring epistemic insight and determining truth values as objective as possible/appropriate
3. subsequently attempting to approximate the probability of having achieved an accurate representation of reality, and acting upon it with this approximation in mind

2. Experimental framework

In this chapter, we explain our experimental design, and describe our sample and data processing.

2.1 CHARACTERISING THE SUBJECT OF STUDY

Our aim was to investigate influence of author's expertise status, comprehensibility of text and certainty in expression on epistemic trust of readers. As a significant part of deceiving (pseudoscience, conspiracy theories, fearmongering) and most of scientific information are communicated via written form (internet), which is also the easiest to study - possibly providing insights that lets science know how to communicate and so that we may learn what further influences our epistemic trust. A lot of research on epistemic trust and affiliated phenomena focuses on credulity of receivers. We think that whatever data are acquired in this field, they can be used also for improvement of communication of science to the public. These two possible implications are the main motivation behind this experiment.

2.2 METHOD

Using *Qualtrics* online survey software, we constructed a questionnaire completely in Slovak language, as that was the target demographic, that consisted of basic demographic data gathering, and text trustworthiness evaluation. Demographics comprised *sex, age, achieved level of education,* and religion. A question on whether the participant completed a Master's degree in dietology or biology was also present, as a mean of excluding participants for which could both presented excerpts seem as equally comprehensible. In the text trustworthiness evaluation part, two texts were presented as two separate questionnaire items, along with author descriptions and instructions to read the excerpt and rate it on a scale from zero to one hundred, hundred representing absolute belief and zero representing absolute disbelief.

Excerpts themselves were chosen and translated from the result section of a dietology study ‘The efficacy of probiotics for monosodium glutamate-induced obesity: dietology concerns and opportunities for prevention’ by Savcheniuk et al. (2014).

As the *first independent variable* one of the excerpts was reworded to have a simpler sentence construction and to contain as few foreign or expert terms as possible: to ensure a very high level of comprehensibility. The second text was translated as it was, with only minor changes - increasing the number of foreign/technical terms: to be borderline incomprehensible for a non-expert reader. Comprehensibility was subsequently tested on a single volunteer with great success (excerpts described as completely incomprehensible, with only a few concepts understood, and scholarly but comprehensible, respectively). These basic versions of excerpts were controlled to have the same number of words (126 words each).

The *second independent variable* was certainty in expression. To represent it, we chose eight phrases that would add an expression of certainty to statements in the excerpts and incorporated them in several sentences. Three of them were always in the second, third and last sentence of each excerpt, with the fourth pair placed independently of each other in the text. As the texts were in Slovak language, English translations of these statements would be: *‘’unambiguously’’*, *‘’it is certain, that..’’*, *‘’we can state with absolute certainty that...’’* and *‘’hundred per cent’’* for expressions of absolute certainty, and *‘’probably’’*, *‘’it is possible, that...’’*, *‘’we can state with some probability, that...’’*, and *‘’almost certainly’’* for the doubting expressions respectively.

The *third independent variable* was author’s expertise. Both excerpts were provided with a made-up author reference with a brief description (both described as of American origin) - either ‘’*Carl Davis - doctorate degree in dietology, twelve years of practice in the field*’’ - as the expert, or ‘’*Thomas Brown - engineering doctorate in applied mathematics, engages in dietology on a long-term basis on his own initiative.*’’

Each of these variables could thus be present in the text in one of two states; expression can be either *doubting* or *undoubting,* text can be either *comprehensible* or *incomprehensible,* and authors can be either *expert* or *layman.* We use this kind of wording to describe each state of each variable to be able to form comprehensible abbreviations (i.e. ‘’UIE’’ would be an excerpt that is Undoubting, Incomprehensible, and has an Expert author). We want to see how each state of each independent variable fares in comparison to its opposite state, but also to avoid the influence of the other two independent variables.
To achieve this, we chose a 2x2x2 experimental framework, where texts were presented in pairs. By combining both states of all three independent variables, we acquired eight unique excerpt setups. These were subsequently put in pairs so that no independent variable in a pair is in the same state twice. I.e. whenever one of the excerpts was undoubting, the other must have been doubting, whenever one was comprehensible, the other must have been incomprehensible, whenever one had an expert author, the other had to have a layman.
This way, four pairs of excerpts were determined:
UCE - DIL
UCL - DIE
UIL - DCE
UIE - DCL

Using *Qualtrics*, we set up a randomizer that randomly showed a single pair to each participant. Randomization was controlled so as to assign approximately the same number of participants to each of the pairs. As the excerpts were displayed above each other, another randomizer was put in place to choose their ordering within a pair at random.

2.2.1 Hypotheses

In line with previous research (Eiser et al., 2009, Praxmarer-Carus, 2013), we hypothesized that if incomprehensibility acts damagingly on interpersonal trust, it should have similar influence within a body of text, and similarly so with absence of expertise. Hypothesis of positive influence of certainty of expression was

postulated based on our own observations of communication within credulous groups.

2.2.2 Sample

Our sample was *n=169,* after removing 43 inadequate answers (35 didn't finish the questionnaire, 6 were removed because of expertise in the excerpt's field, two specified invalid values for age), ages 18-65, with a mean of 31.27 and a standard deviation of 10.977 with 42.6% (72) being male, 56.8% (96) being female, and 0,6% (1) specified their gender as ''other''. 69.2% of participants expressed themselves as being without religious belief, 26% as Christian, 8% as ''other''. 37 participants were exposed to the UCE-DIL condition, 43 to UCL – DIE condition, 48 to UIL-DCE, and 41 to UIE – DCL.

Table 1. Sample Education

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Highschool without graduation	1	.6	.6	.6
	Highschool with graduation	64	37.9	37.9	38.5
	Bachelor or equivalent	31	18.3	18.3	56.8
	Master or equivalent	67	39.6	39.6	96.4
	Doctoral or equivalent	6	3.6	3.6	100.0
	Total	169	100.0	100.0	

2.2.3 Statistical analysis

For the purpose of our statistical analysis, we treated each case of participants' viewing of our excerpts as two standalone trials and subsequently reduced weights for each trial to bring the size of the sample back to its original value. Our results were reached using a linear regression model, also comparing the influence of demographic data on the dependent variable (none of which would prove significant). Below is a table showing correlations between analysed variables:

Table 2,
Correlations

Correlations Among Analyzed Variables							
Variable	(2)	(3)	(4)	(5)	(6)	(7)	(8)
(1) Female							
(2) Age	-.149						
(3) Education	-.007	.139					
(4) Not Religious	-.148	-.180*	-.013				
(5) Certain	.000	.000	.000	.000			
(6) Comprehensive	.000	.000	.000	.000	-.053		
(7) Expert	.000	.000	.000	.000	-.077	.006	
(8) Trust	-.019	-.069	.041	.100	-.203**	-.085	-.132
Note: * $p < .05$, ** $p < .01$							

3. Results and discussion

The unstandardized coefficient for the constant (dependent variable – epistemic trust) was 50.565, which is around half the maximum value achievable (100). Out of our three independent variables, *comprehensibility* reached a significance of 0.070 with *B* being -5.732, *expertise* reached a significance of 0.005 with *B* being -8.879, and *certainty* reached a significance lower than 0.001 with *b* being -13.172, the strongest predictor out of all influencing factors. The *R square* for our three independent variables was 0.088.

Table 3, Results

Multiple Linear Regression Analysis					
Predictor	*b*	95% CI		β	*p*
Intercept	50.565	14.913	86.216		.006
Female	-0.907	-9.970	8.156	-.015	.844
Age	-0.173	-0.598	0.252	-.063	.423
Education	1.582	-3.071	6.236	.051	.503
Not Religious	5.660	-4.316	15.637	.087	.264
Effects of experimental conditions compared to their counterparts					
Certain	-13.172	-22.120	-4.224	-.220	.004
Comprehensible	-5.732	-14.653	3.190	-.096	.206
Expert	-8.879	-17.814	0.057	-.148	.051
Note: Dependent variable = expressed trust in the text excerpt, $n = 169$, $R^2 = .088$, $F(7,161) = 2.214$, $p = .036$					

Our hypotheses were thus falsified, with comprehensibility not bearing an influence on trust at all, with presence of expert author description actually *decreasing* epistemic trust of the readers, and *certainty* bearing the same effect.

There were several challenges connected with this type of research, one of which obviously being a very large number of variables influencing a person's trust at any given time. Considering that previous research done on two of these variables was done in different contexts (in research on risk as well as in business research), it seems that the nature of the text and the task may retain a large portion of the influence. Whereas expertise in the field was seen as trust-evoking (Eiser et al., 2009) in the past, in our experiment, it seemed rather detrimental in

this regard. This might have had something to do with either Slovak population not having experience with the ‘’engineering doctorate’’ title (not seeing that it is equivalent to a standard doctorate, with difference being only in the field of study, they may have thought that it represents a higher level of education), or with the description of the *layman* author pointing to the fact that he studies the topic of his own interest.

The other factor that might have influenced our results is the sample itself, with 18.3% with a Bachelor’s degree, 39.6 % having completed a Master’s degree, and further 3.6% having achieved a Doctoral degree, our sample is comprised from 61.5% having completed tertiary education, which might have had a specific influence on the perception of comprehensibility of text.

What catches us completely by surprise is the specific influence of *certainty* expressed in the text. Two possible outcomes were awaited – either that our hypothesis would prove itself right by people trusting an undoubting text, or that there would be no connection at all. Furthermore, we provided our e-mail address at the end of the questionnaire as means of contact if any of the participants would be interested in details regarding the research or giving us feedback on the questionnaire. Several of them contacted us, expressing strong distrust towards the *incomprehensible* excerpt, and also mentioning probiotics (that were discussed in the *comprehensible* text, in comparison to effects of leptin, which was discussed in the *incomprehensible* text) as a topic that is more known to them and is also perceived as more likeable. These might have been only outliers to the trend, however. If further research is be done on the effect of certainty in expression on forming of epistemic trust in the future, it would be interesting to provide participants with additional questions regarding the perceived motivations behind their rating, as strong intraindividual tendencies might be covered by massive interindividual differences.

The point we consider as probably the strongest positive of this experimental design is the provided possibility to examine variables potentially influencing epistemic trust not in a sterile, controlled manner, where each of them is isolated as much as possible, but in an interaction, which is, in our opinion, much closer to real world conditions. Learning to orient in designs where mutual dependence and interaction of multiple variables is studied seems to be crucial to further

advancement of the field, even at the cost of lower scores of significance or weaker effects.

These are the points we think would deserve to be brought to attention for further consideration when discussing this topic:

- when articulating one's expert opinion on this topic, proper use of terms is more than needed, because as it only fairly recently started to attract attention in terms of scientific research, and new concepts arise, unintentional overlap is very likely if one is not cautious.
- social groups and movements that exhibit credulous thinking patterns are capable of inflicting serious harm upon society, and need to be handled with proper care – if science is to employ its own influence, revisions of the scientific publication system that allowed the ''Chocolate Weight Loss'' fraudulent study to become so viral are needed.
- communication is at least a two-man activity, and it might prove useful for scientists to adopt a stance, where it is not only upon the public to learn how to understand science, but also for science to express itself in an understandable way.
- even though we may observe behavioural trends towards stronger scepticism or credulity within individuals, situational and external factors still bear a strong influence.
- literature shows that mechanisms responsible for credulous thinking patterns are features, not bugs, and their suppression might be advantageous only to a certain extent – we cannot become entirely sceptical. In order to improve so that we are not to be as easily misled, we propose a humble approach of constantly reminding oneself of our own fallibility, and not think about truth value in binaries, but in percentages.
- epistemic vigilance is only a sub-skill that falls short if not complemented by sound self-perception.
- low expressed certainty in an otherwise hardly comprehensible text might influence us to trust it more, as the person that expresses him/herself cautiously but is proven wrong is better off from a social perspective (worthier of trust because of lesser investment) than the person that was absolutely certain but errs in spite of that.

Conclusion

This thesis was an attempt to connect some loose threads in the study of epistemic rationality, trust, vigilance and scepticism. We think that groups and movements building their agenda on embracing credulous behaviour and thinking patterns need to be examined from a scientific, not political, perspective, because large portions of their member base stem from the ranks of people with intentions that were originally good, yet immense creative and intellectual power is lost to them, apart from the obvious material damage and toll on health of many. When it came to the refutation of the MMR vaccine, thanks to the scientific expertise of specialists working in the medicinal field, outbreaks ended ‘’only’’ with several tens of dead, but the consequences could’ve been much more dire than that. These sudden outbreaks managed to sway the more rational parents towards the safer option, but concerns arise when we imagine a situation without the luxury of having good knowledge regarding the illness and enough time to act. If there ever is a situation where a prompt, but rational response from everyone in our society is needed, we might not be ready. This is one of the reasons why we think that scientific research on this topic might prove crucial in the upcoming decades. Also, if we focus too much on intrapersonal factors of epistemic vigilance and conscious epistemic analysis, and too little on situational and external factors, we might miss crucial data. Even though the cognitive systems we are equipped with provide us with the potential to be fooled, they are extremely energy and time efficient, and we wouldn’t get too far without them. Approaching them in this way in terms of scientific study grants us a very fresh outlook – how can we make *more* use of them, instead of trying to get rid of them? Even the neuroscientific view on the topic suggests that misfiring of these systems is strongly associated with malfunction of areas linked to emotion regulation. As mentioned, in a study by Nyhan & Reifler (2015), participants that went through a self-affirmation procedure actually reduced their adherence to their misbeliefs even when no new information were presented. We therefore believe that reducing our epistemic recklessness is an important task that requires a lot of out-of-the box thinking to end up successful. In the end, what difference is there between chaos and incomprehensibly complex rules?

References

Antonenko Young, O., Willer, R., & Keltner, D. (2013). “Thou shalt not kill”: Religious fundamentalism, conservatism, and rule-based moral processing. *Psychology of Religion and Spirituality*, 5(2), 110–115. doi:10.1037/a0032262

Asp, E., Manzel, K., Koestner, B., Cole, C. a., Denburg, N. L., & Tranel, D. (2012). A neuropsychological test of belief and doubt: Damage to ventromedial prefrontal cortex increases credulity for misleading advertising. *Frontiers in Neuroscience*, 6(JULY), 1–9. doi:10.3389/fnins.2012.00100

Avina, L. R., Schneiderman, L. J., (1978). Why patients choose homeopathy. *Medical Care*, (April), 366–369.

Barberia, I., Blanco, F., Cubillas, C. P., & Matute, H. (2013). Implementation and Assessment of an Intervention to Debias Adolescents against Causal Illusions. *PLoS ONE*, 8(8). doi:10.1371/journal.pone.0071303

Barus, V. (2015) .Proposal for a tool to measure the scepticism-credulity spectrum. *unpublished*

Bechara, a, Damasio, H., Damasio, a R., & Lee, G. P. (1999). Different contributions of the human amygdala and ventromedial prefrontal cortex to decision-making. *The Journal of Neuroscience : The Official Journal of the Society for Neuroscience*, 19(13), 5473–5481. doi:0270-6474/99/19135473-09$05.00/0

Bechara, a, Tranel, D., & Damasio, H. (2000). Characterization of the decision-making deficit of patients with ventromedial prefrontal cortex lesions. *Brain : A Journal of Neurology*, 123 (Pt 11), 2189–2202. doi:10.1093/brain/123.11.2189

Berkman, M. B., & Plutzer, E. (2011). Science education. Defeating creationism in the courtroom, but not in the classroom. *Science* (New York, N.Y.), 331(6016), 404–405. doi:10.1126/science.1198902

Bessi, A., Coletto, M., & Davidescu, G. (2014). Science vs Conspiracy: collective narratives in the age of (mis) information. *arXiv Preprint arXiv*: …, 1–14. doi:10.1371/journal.pone.0118093

Bezroukov, N., Information Overload - How Digital Devices Deprive Brain of Needed Downtime, available online as of 15.5.2015 at <http://www.softpanorama.org/Social/overload.shtml>

Blogowska, J., & Saroglou, V. (2011). Religious Fundamentalism and Limited Prosociality as a Function of the Target. *Journal for the Scientific Study of Religion*, 50(1), 44–60. doi:10.1111/j.1468-5906.2010.01551.x

Čavojová, V., Mikušková, E. B., & Majerník, M. (2011). Kontaminovaný mindware : typy , otázky a výzvy. Ústav experimentálnej psychológie SAV, *unpublished*
Basham, L. (2001). Living with the Conspiracy. *The Philosophical Forum*, 32(3), 265–280. doi:10.1111/0031-806X.00065

Coplan, J. D., Hodulik, S., Mathew, S. J., Mao, X., Hof, P. R., Gorman, J. M., & Shungu, D. C. (2012). The relationship between intelligence and anxiety: An association with subcortical white matter metabolism. *Frontiers in Evolutionary Neuroscience*, 3(FEB), 1–7. doi:10.3389/fnevo.2011.00008

Cruz, P. C., (2012) Epistemic Vigilance, Cautious Optimism and Sophisticated Understanding. *Research in language*.,Volume 10, Issue 4, Pages 365–386, ISSN (Online) 2083-4616, ISSN (Print) 1731-7533, DOI: 10.2478/v10015-011-0040-y, January 2013

D'Adamo, P. J. (1998). Eat Right 4 Your Type. *Clinical Nutrition Insight*, *25*(6), 5

Ecker, U. K. H., Lewandowsky, S., Fenton, O., & Martin, K. (2014). Do people keep believing because they want to? Preexisting attitudes and the continued influence of misinformation. *Memory & Cognition*, 42(2), 292–304. doi:10.3758/s13421-013-0358-x

Ecker, U. K. H., Lewandowsky, S., Swire, B., & Chang, D. (2011). Correcting false information in memory: manipulating the strength of misinformation encoding and its retraction. *Psychonomic Bulletin & Review*, 18(3), 570–578. doi:10.3758/s13423-011-0065-1

Eiser, J. R., Stafford, T., Henneberry, J., & Catney, P. (2009). "Trust me, I'm a scientist (not a developer)": Perceived expertise and motives as predictors of trust in assessment of risk from contaminated land. *Risk Analysis*, 29(2), 288–297. doi:10.1111/j.1539-6924.2008.01131.x

Ernst, E. (2002). Systematic review of systematic reviews of acupuncture. *Clinical Medicine* (London, England), 6(5), 508–509.

Furr, R. M. (2011). Scale Construction and Psychometrics for Social and Personality Psychology. *Sage*, 153. Retrieved from http://books.google.com/books?id=BTp166kSQywC&pgis=1

Grossmann, I., Karasawa, M., Izumi, S., Na, J., Varnum, M. E. W., Kitayama, S., & Nisbett, R. E. (2012). Aging and Wisdom: Culture Matters. *Psychological Science*, 23(10), 1059–1066. doi:10.1177/0956797612446025

Grossmann, I., Na, J., Varnum, M. E., Kitayama, S., & Nisbett, R. E. (2013). A route to well-being: Intelligence versus wise reasoning. *Journal of Experimental Psychology: General*, *142*(3), 944.

Grossmann, I., & Kross, E. (2014). Exploring Solomon's Paradox: Self-Distancing Eliminates the Self-Other Asymmetry in Wise Reasoning About Close Relationships in Younger and Older Adults. *Psychological Science*, 1–10. doi:10.1177/0956797614535400

Harris, S., Sheth, S. a., & Cohen, M. S. (2008). Functional neuroimaging of belief, disbelief, and uncertainty. *Annals of Neurology*, 63(2), 141–147. doi:10.1002/ana.21301

Hart, P. S., & Nisbet, E. C. (2012). Boomerang Effects in Science Communication: How Motivated Reasoning and Identity Cues Amplify Opinion Polarization About Climate Mitigation Policies. *Communication Research*, 39(6), 701–723. doi:10.1177/0093650211416646

Haselton, M. G., Nettle, D., & Andrews, P. W. (2005). The evolution of cognitive bias. *The handbook of evolutionary psychology*, 724-746

Hatton, K. (2013). Scepticism and Credulity in Childhood. Doctoral thesis, *Goldsmiths*, University of London

Humphrey, J. H., West, K. P., & Sommer, a. (1992). Vitamin A deficiency and attributable mortality among under-5-year-olds. *Bulletin of the World Health Organization*, 70(2), 225–232.

Hunt, T., (2011)., The social harm of epistemic recklessness, *Theory of Knowledge final paper*, May 12th

Irlenbusch, B., & Ter Meer, J. (2013). Fooling the Nice Guys: Explaining receiver credulity in a public good game with lying and punishment. *Journal of Economic Behavior and Organization*, 93, 321–327. doi:10.1016/j.jebo.2013.03.023

Jensen, E. (2010). Between credulity and scepticism : envisaging the fourth estate in 21st-century science journalism. *Media, Culture & Society*, 32(4), 615–630. doi:10.1177/0163443710367695

Jones, M., & Sugden, R. (2001). Positive confirmation bias in the acquisition of information. *Theory and Decision*, 50(1), 59–99. doi:10.1023/A:1005296023424

Jussim, L. (2012). Social Perception and Social Reality: Why Accuracy Dominates Bias and Self-Fulfilling Prophecy, *preprint,* 486. doi:10.1093/acprof

Kahan, Dan M. and Hoffman, David A. and Evans, Danieli and Devins, Neal and Lucci, Eugene A. and Cheng, Katherine,(2015). 'Ideology' or 'Situation Sense'? An Experimental Investigation of Motivated Reasoning and Professional Judgment. (April 6, 2015). *University of Pennsylvania Law Review*, Vol. 164, Forthcoming. Available at SSRN: http://ssrn.com/abstract=2590054

Kata, A. (2012). Anti-vaccine activists, Web 2.0, and the postmodern paradigm - An overview of tactics and tropes used online by the anti-vaccination movement. *Vaccine*, 30(25), 3778–3789. doi:10.1016/j.vaccine.2011.11.112

Kompridis, N. (2000). So we need something else for reason to mean. *International journal of philosophical studies*, *8*(3), 271-295.

Koscik, T. R., & Tranel, D. (2011). The human amygdala is necessary for developing and expressing normal interpersonal trust. *Neuropsychologia*, 49(4), 602–611. doi:10.1016/j.neuropsychologia.2010.09.023

Kross, E., & Grossmann, I. (2012). Boosting wisdom: Distance from the self enhances wise reasoning, attitudes, and behavior. *Journal of Experimental Psychology*: General, 141(1), 43–48. doi:10.1037/a0024158

Kux, L., (2015). Homeopathic Product Regulation: Evaluating the Food and Drug Administration's Regulatory Framework After a Quarter-Century; *Public Hearing* available online at:https://www.federalregister.gov/articles/2015/03/27/2015-07018/homeopathic-product-regulation-evaluating-the-food-and-drug-administrations-regulatory-framework

Leclerc, C. M., & Kensinger, E. a. (2008). Effects of Age on Detection of Emotion information. *Psychology and Aging*, 23(1), 209–215. Retrieved from http://psycnet.apa.org/journals/pag/23/1/209/

Leiserowitz, A. a, Maibach, E., & Roser-Renouf, C. (2010). Climate change in the American mind: Americans' global warming beliefs and attitudes in January 2010.

On Climate Change., (June), 1–10. Retrieved from http://e360.yale.edu/images/digest/AmericansGlobalWarmingBeliefs2010.pdf

Lewandowsky, S., Stritzke, W. G. K., Oberauer, K., & Morales, M. (2005). Memory for Fact, Fiction, and Misinformation. *Psychological Science*, 16(3), 190–195. doi:10.1111/j.0956-7976.2005.00802.x

Marris, C., & Marris, C. (2001). Public views on GMOs: deconstructing the myths. *Molecular Biology*, 2(7), 545–548. doi:10.1093/embo-reports/kve142

Matute, H., Yarritu, I., & Vadillo, M. a. (2011). Illusions of causality at the heart of pseudoscience. *British Journal of Psychology* (London, England : 1953), 102(3), 392–405. doi:10.1348/000712610X532210

Mellinger, Ch., (2014). Moderators of the Relationship Between Masculinity and Sexual Prejudice in Men: Friendship, Gender Self-Esteem, Same-Sex Attraction, and Religious Fundamentalism, *Arch Sex Behav,* 43:519-530, DOI 10,1007/s10508-013-0220-z

Miller, J. F., & Powers, M. J. (n.d.). Development of an instrument to measure hope. *Nursing Research*.

Mercier, H. (2011). Our pigheaded core: How we became smarter to be influenced by other people., Draft, *to be published in Signaling, Commitment, and Emotion*

Mosqueda, L. (2010). Journal of Elder Abuse & Neglect. Introduction. *Journal of Elder Abuse & Neglect*, 22(3-4), 219–220. doi:10.1080/08946566.2010.489884

Motzkin, J. C., Philippi, C. L., Wolf, R. C., Baskaya, M. K., & Koenigs, M. (2014). Ventromedial Prefrontal Cortex Is Critical for the Regulation of Amygdala Activity in Humans. *Biological Psychiatry*, 77(3), 276–284. doi:10.1016/j.biopsych.2014.02.014

Musgrave, A. (1993). Common Sense, Science and Scepticism., *Cambridge University Press,* 310., ISBN 0-521-43625-7

Norris, S. P. (1985). Synthesis of Research on Critical Thinking. *Educational Leadership*. Retrieved from http://www.ilearnincambodia.org/ct/synthCT.pdf

Nyhan, B., Reifler, J., Richey, S., & Freed, G. L. (2014). Effective Messages in Vaccine Promotion: A Randomized Trial. *Pediatrics*, 133(4), e835–e842. doi:10.1542/peds.2013-2365

Nyhan, B., & Reifler, J. (2015). The role of information deficits and identity threat in the prevalence of misperceptions, 50.

Obermiller, C., Spangenberg, E., & MacLachlan, D. L. (2005). Ad Skepticism: The Consequences of Disbelief. *Journal of Advertising*, 34(3), 7–17. doi:10.1080/00913367.2005.10639199

Oliver, J. E., & Wood, T. J. (2014). Conspiracy theories and the paranoid style(s) of mass opinion. *American Journal of Political Science*, 58(4), 952–966. doi:10.1111/ajps.12084

Penney, A. M., Miedema, V. C., & Mazmanian, D. (2015). Intelligence and emotional disorders : Is the worrying and ruminating mind a more intelligent mind ? *Personality and Individual Differences*, 74, 90–93. doi:10.1016/j.paid.2014.10.005

Pinsker, D. M., Stone, V., Pachana, N., & Greenspan, S. (2006). Social Vulnerability Scale for older adults: Validation study*. *Clinical Psychologist*, 10(3), 109–119. doi:10.1080/13284200600939918

Potrykus, I. (2001). Golden Rice and Beyond International Society for Plant Molecular Biology 2000 Kumho Science International Award. *Society*, 125(March), 1157–1161.

Praxmarer-Carus, S. (2013). Why the proposal of a complex contract may harm or foster a partner's trust. *Journal of Business Research*, 67(7), 1421–1429. doi:10.1016/j.jbusres.2013.07.025

Ramsey, M. A. (2010). Sophisticated credulity: Are old beliefs disguised by new terminology and selective learning? *Dissertation*, University of New Hampshire

Roberts, D. C. (2001). Quick weight loss: sorting fad from fact. *Medical journal of Australia*, *175*(11/12), 637-640.

Robinson, W., Anti-vaccine moms hit back saying they are being unfairly 'ostracized and vilified' for 'a medical choice' amid measles outbreak. *Associated Press,* available online at: http://www.dailymail.co.uk/news/article-2964037/Anti-vaccine-mothers-discuss-thinking-amid-backlash.html

Savcheniuk, O. a, Virchenko, O. V, Falalyeyeva, T. M., Beregova, T. V, Babenko, L. P., Lazarenko, L. M., … Spivak, M. Y. (2014). The efficacy of probiotics for monosodium glutamate-induced obesity: dietology concerns and opportunities for prevention. The EPMA Journal, 5(1), 2. doi:10.1186/1878-5085-5-2

Scott, E., (2001). The Creation/Evolution Continuum, *Oregonians for Rationality,* available online at: http://www.o4sr.org/publications/pf_v5n4/cre-evo.htm

Sherman, D. K., & Cohen, G. L. (2006). The Psychology of Self-defense: Self-Affirmation Theory. *Advances in Experimental Social Psychology*, 38(06), 183–242. doi:10.1016/S0065-2601(06)38004-5

Shupe, A. (2009). Religious Fundamentalism . *The Oxford Handbook of the Sociology of Religion*. doi:10.1080/14690760903454341

Sperber, D., Clément, F., Heintz, C., Mascaro, O., Mercier, H., Origgi, G., & Wilson, D. (2010). Epistemic vigilance. *Mind and Language*, 25(4), 359–393. doi:10.1111/j.1468-0017.2010.01394.x

Stanovich, K. E. (1986). Matthew effects in reading: Some consequences of individual differences in the acquisition of literacy. Reading research quarterly, 360-407.

Stanovich, K. E. (2009). Rational and Irrational Thought: The Thinking That IQ Tests Miss. *Scientific American Mind*, 20(6), 34–39. doi:10.1038/scientificamericanmind1109-34

Stanovich, K. E., & West, R. F. (1998). Individual differences in rational thought. *Journal of Experimental Psychology: General*, 127(2), 161–188. doi:10.1037/0096-3445.127.2.161

Stanovich, K. E., & West, R. F. (2000). Individual differences in reasoning: implications for the rationality debate? *The Behavioral and Brain Sciences*, 23(5), 645–665; discussion 665–726. doi:10.1017/S0140525X00003435

Stanovich, K. E., & West, R. F. (2014). What intelligence tests miss. *Psychologist*, 27(2), 80–83.

Stanovich, K. E., West, R. F., & Toplak, M. E. (2013). Myside Bias, Rational Thinking, and Intelligence. *Current Directions in Psychological Science*, 22(4), 259–264. doi:10.1177/0963721413480174

Stefanatos, G. a. (2008). Regression in autistic spectrum disorders. *Neuropsychology Review*, 18(4), 305–319. doi:10.1007/s11065-008-9073-y

Swami, V., & Furnham, A. (2011). Preliminary examination of the psychometric properties of the Psychiatric Scepticism Scale. *Scandinavian Journal of Psychology*, 52(4), 399–403. doi:10.1111/j.1467-9450.2011.00881.x

Thomas, J., (2010). Paranoia strikes deep: MMR Vaccine and Autism., March 5th, available online at: http://www.searchmedica.com/resource.html?rurl=http%3A%2F%2Fwww.psychiatr

ictimes.com%2Fdisplay%2Farticle%2F10168%2F1531916&ts=29052015&parentreferrer=http://en.wikipedia.org/wiki/MMR_vaccine

Tol, R. S. J. (2014). Quantifying the consensus on anthropogenic global warming in the literature: Rejoinder. *Energy Policy*, 73, 709. doi:10.1016/j.enpol.2014.06.003
Users, N. F. O. R. I. I. a S. a. (n.d.). Working Paper. Analysis, (63).

Wang, J., García-Bailo, B., Nielsen, D. E., & El-Sohemy, A. (2014). ABO genotype, “blood-type” diet and cardiometabolic risk factors. *PloS One*, 9(1), e84749. doi:10.1371/journal.pone.0084749

Wason, P. C. (1960). On the failure to eliminate hypotheses in a conceptual task. *Quarterly Journal of Experimental Psychology*, 12(3), 129–140. doi:10.1080/17470216008416717

Westen, D., Blagov, P. S., Harenski, K., Kilts, C., & Hamann, S. (2006). Neural bases of motivated reasoning: an FMRI study of emotional constraints on partisan political judgment in the 2004 U.S. Presidential election. *Journal of Cognitive Neuroscience*, 18(11), 1947–1958. doi:10.1162/jocn.2006.18.11.1947

White, E., (2002). The Value of Conspiracy Theory. *American Literary History* Volume 14, Number 1, Spring 2002, pp. 1-31

Wilholt, T. (2013). Epistemic trust in science. *British Journal for the Philosophy of Science*, 64(2), 233–253. doi:10.1093/bjps/axs007

Worthington, A., (2004). Chemtrails: Aerosol and Electromagnetic Weapons in the Age of Nuclear War, *Global Research,* www.globalresearch.ca, June 1, 2004

Yamagishi, T. (1999). Trust , gullibility , and social intelligence * Toshio Yamagishi and Masako Kikuchi Motoko Kosugi. *Asian Journal of Social Psychology*, 2(1), 145–161. doi:10.1111/1467-839X.00030

Appendix

The following appendix contains all eight versions of excerpts with descriptions (here displayed in *italic)* that were used for the purpose of our experiment (participants did not see the descriptions). As mentioned, the study itself was conducted in Slovak language. Excerpts themselves were presented in pairs: A-B, C-D, E-F, G-H
Author descriptions were displayed in **bold**.

Annex A
Undoubting Comprehensible Expert

Autor: Carl Davis - doktorát z dietológie, dvanásť rokov praxe v odbore

U zvierat, ktorým bola injekciou podaná probiotická zmes nastal nárast telesnej dĺžky o 6.1% v porovnaní s placebom. To, že došlo k redukcii obezity jednoznačne dokazuje výrazné zníženie pravdepodobnosti srdcovej príhody a množstvo tuku obaľujúceho vnútorné orgány. Je isté, že požitie probiotík tiež zvýšilo úroveň proteínu ktorý pôsobí ako ochranný faktor proti zmenám spôsobeným obezitou a obnovil sa aj metabolizmus tukov. Podobné výsledky nájdeme aj v iných štúdiách a s absolútnou určitosťou môžeme tvrdiť, že ukazujú efektivitu probiotík v prevencii obezity. Pravidelné podávanie probiotík viedlo k obnoveniu tukového metabolizmu u zvierat. Probiotické kmene ovplyvnili koncentráciu cholesterolu, ktorý bol obnovený na normálnu úroveň. Zavedenie probiotík tiež viedlo k normálnej hormonálnej aktivite v tukovom tkanive. Prerušované podávanie probiotík počas dvoch týždňov teda viedlo k spoľahlivým výsledkom, ktoré ukazujú efektivitu probiotickej terapie pri prevencii obezity, konzistentne s ostatnými štúdiami.

Na škále od 0 do 100, nakoľko by ste ohodnotili dôveryhodnosť prečitaného textu? (pričom 0 - vôbec nedôverujem, 100 - úplne dôverujem)

Annex B

Doubting Incomprehensible Layman

Autor: Thomas Brown - inžiniersky doktorát z aplikovanej matematiky, výživou sa dlhodobo zaoberá z vlastnej iniciatívy

Fyziologická funkcia leptínu spočíva v prevencii obezity pri excesívnom prísune potravy. Je možné, že redukovaná sekrécia leptínu počas hladovania je signálom spôsobujúcim zvýšenie absorpcie energie. Pri excesívnej konzumpcii potravy pravepodobne nastane zvýšena aktivácia termogenéznej energie za účelom formovania hnedého tuku indukovaním expresie génov zodpovedných za syntézu mitochondriálnych proteínov typu 1, 2 a 3; nastane závažná oxidatívna fosforylácia, regulujúc intenzitu termogenézy v tele. Analýza koncetrácie leptínu v adipóznom tkanive u zvierat, ktorým bol podaný neonatálny monosodium glutamát, ukázala nárast tohto indikátora o 74,7% v porovnaní s neovplyvnenými zvieratami. S určitou pravdepodobnosťou môžeme tvrdiť, že pri obezite je efekt leptínu na periférne tkanivá zachovaný, takže môžeme očakávať prítomnosť selektívnej leptínovej resistencie. Diskutovateľne bolo ukázané, že podanie MSG zapríčiňuje lézie v oblúkoch a ventromediálnych jadrách hypotalamu, zapríčiňujúc insenzitivitu na leptín a inzulín, ústiac do rozvíjajúcej sa hyperleptinémie a hyperinsulinémie.

Na škále od 0 do 100, nakoľko by ste ohodnotili dôveryhodnosť prečitaného textu? (pričom 0 - vôbec nedôverujem, 100 - úplne dôverujem)

Annex C

Undoubting Comprehensible Layman

Autor: Thomas Brown - inžiniersky doktorát z aplikovanej matematiky, výživou sa dlhodobo zaoberá z vlastnej iniciatívy

U zvierat, ktorým bola injekciou podaná probiotická zmes nastal nárast telesnej dĺžky o 6.1% v porovnaní s placebom. To, že došlo k redukcii obezity jednoznačne dokazuje výrazné zníženie pravdepodobnosti srdcovej príhody a množstvo tuku obaľujúceho vnútorné orgány. Je isté, že požitie probiotík tiež zvýšilo úroveň proteínu ktorý pôsobí ako ochranný faktor proti zmenám spôsobeným obezitou a obnovil sa aj metabolizmus tukov. Podobné výsledky nájdeme aj v iných štúdiách a s absolútnou určitosťou môžeme tvrdiť, že ukazujú efektivitu probiotík v prevencii obezity. Pravidelné podávanie probiotík viedlo k obnoveniu tukového metabolizmu u zvierat. Probiotické kmene ovplyvnili koncentráciu cholesterolu, ktorý bol obnovený na normálnu úroveň. Zavedenie probiotík tiež viedlo k normálnej hormonálnej aktivite v tukovom tkanive. Prerušované podávanie probiotík počas dvoch týždňov teda viedlo k spoľahlivým výsledkom, ktoré ukazujú efektivitu probiotickej terapie pri prevencii obezity, konzistentne s ostatnými štúdiami.

Na škále od 0 do 100, nakoľko by ste ohodnotili dôveryhodnosť prečitaného textu? (pričom 0 - vôbec nedôverujem, 100 - úplne dôverujem)

Annex D

Doubting Incomprehensible Expert

Autor: Carl Davis - doktorát z dietológie, dvanásť rokov praxe v odbore

Fyziologická funkcia leptínu spočíva v prevencii obezity pri excesívnom prísune potravy. Je možné, že redukovaná sekrécia leptínu počas hladovania je signálom spôsobujúcim zvýšenie absorpcie energie. Pri excesívnej konzumpcii potravy pravepodobne nastane zvýšena aktivácia termogenéznej energie za účelom formovania hnedého tuku indukovaním expresie génov zodpovedných za syntézu mitochondriálnych proteínov typu 1, 2 a 3; nastane závažná oxidatívna fosforylácia, regulujúc intenzitu termogenézy v tele. Analýza koncetrácie leptínu v adipóznom tkanive u zvierat, ktorým bol podaný neonatálny monosodium glutamát, ukázala nárast tohto indikátora o 74,7% v porovnaní s neovplyvnenými zvieratami. S určitou pravdepodobnosťou môžeme tvrdiť, že pri obezite je efekt leptínu na periférne tkanivá zachovaný, takže môžeme očakávať prítomnosť selektívnej leptínovej resistencie. Diskutovateľne bolo ukázané, že podanie MSG zapríčiňuje lézie v oblúkoch a ventromediálnych jadrách hypotalamu, zapríčiňujúc insenzitivitu na leptín a inzulín, ústiac do rozvíjajúcej sa hyperleptinémie a hyperinsulinémie.

Na škále od 0 do 100, nakoľko by ste ohodnotili dôveryhodnosť prečitaného textu? (pričom 0 - vôbec nedôverujem, 100 - úplne dôverujem)

Annex E

Undoubting Incomprehensible Layman

Autor: Thomas Brown - inžiniersky doktorát z aplikovanej matematiky, výživou sa dlhodobo zaoberá z vlastnej iniciatívy

Fyziologická funkcia leptínu spočíva v prevencii obezity pri excesívnom prísune potravy. Je isté, že redukovaná sekrécia leptínu počas hladovania je signálom spôsobujúcim zvýšenie absorpcie energie. Pri excesívnej konzumpcii potravy jednoznačne nastane zvýšená aktivácia termogenéznej energie za účelom formovania hnedého tuku indukovaním expresie génov zodpovedných za syntézu mitochondriálnych proteínov typu 1, 2 a 3; nastane závažná oxidatívna fosforylácia, regulujúc intenzitu termogenézy v tele. Analýza koncetrácie leptínu v adipóznom tkanive u zvierat, ktorým bol podaný neonatálny monosodium glutamát, ukázala nárast tohto indikátora o 74,7% v porovnaní s neovplyvnenými zvieratami. S absolútnou určitosťou môžeme tvrdiť, že pri obezite je efekt leptínu na periférne tkanivá zachovaný, takže môžeme očakávať prítomnosť selektívnej leptínovej resistencie. Spoľahlivo bolo ukázané, že podanie MSG zapríčiňuje lézie v oblúkoch a ventromediálnych jadrách hypotalamu, zapríčiňujúc insenzitivitu na leptín a inzulín, ústiac do rozvíjajúcej sa hyperleptinémie a hyperinsulinémie.

Na škále od 0 do 100, nakoľko by ste ohodnotili dôveryhodnosť prečitaného textu? (pričom 0 - vôbec nedôverujem, 100 - úplne dôverujem)

Annex F

Doubting Comprehensible Expert

Autor: Carl Davis - doktorát z dietológie, dvanásť rokov praxe v odbore

U zvierat, ktorým bola injekciou podaná probiotická zmes nastal nárast telesnej dĺžky o 6.1% v porovnaní s placebom. To, že došlo k redukcii obezity pravepodobne dokazuje výrazné zníženie pravdepodobnosti srdcovej príhody a množstvo tuku obaľujúceho vnútorné orgány. Je možné, že požitie probiotík tiež zvýšilo úroveň proteínu ktorý pôsobí ako ochranný faktor proti zmenám spôsobeným obezitou a obnovil sa aj metabolizmus tukov. Podobné výsledky nájdeme aj v iných štúdiách a s určitou pravdepodobnosťou môžeme tvrdiť, že ukazujú efektivitu probiotík v prevencii obezity. Pravidelné podávanie probiotík viedlo k obnoveniu tukového metabolizmu u zvierat. Probiotické kmene ovplyvnili koncentráciu cholesterolu, ktorý bol obnovený na normálnu úroveň. Zavedenie probiotík tiež viedlo k normálnej hormonálnej aktivite v tukovom tkanive. Prerušované podávanie probiotík počas dvoch týždňov teda viedlo k diskutovateľným výsledkom, ktoré ukazujú efektivitu probiotickej terapie pri prevencii obezity, konzistentne s ostatnými štúdiami.

Na škále od 0 do 100, nakoľko by ste ohodnotili dôveryhodnosť prečitaného textu? (pričom 0 - vôbec nedôverujem, 100 - úplne dôverujem)

Annex G

Undoubting Incomprehensible Expert

Autor: Carl Davis - doktorát z dietológie, dvanásť rokov praxe v odbore

Fyziologická funkcia leptínu spočíva v prevencii obezity pri excesívnom prísune potravy. Je isté, že redukovaná sekrécia leptínu počas hladovania je signálom spôsobujúcim zvýšenie absorpcie energie. Pri excesívnej konzumpcii potravy jednoznačne nastane zvýšená aktivácia termogenéznej energie za účelom formovania hnedého tuku indukovaním expresie génov zodpovedných za syntézu mitochondriálnych proteínov typu 1, 2 a 3; nastane závažná oxidatívna fosforylácia, regulujúc intenzitu termogenézy v tele. Analýza koncetrácie leptínu v adipóznom tkanive u zvierat, ktorým bol podaný neonatálny monosodium glutamát, ukázala nárast tohto indikátora o 74,7% v porovnaní s neovplyvnenými zvieratami. S absolútnou určitosťou môžeme tvrdiť, že pri obezite je efekt leptínu na periférne tkanivá zachovaný, takže môžeme očakávať prítomnosť selektívnej leptínovej resistencie. Spoľahlivo bolo ukázané, že podanie MSG zapríčiňuje lézie v oblúkoch a ventromediálnych jadrách hypotalamu, zapríčiňujúc insenzitivitu na leptín a inzulín, ústiac do rozvíjajúcej sa hyperleptinémie a hyperinsulinémie.

Na škále od 0 do 100, nakoľko by ste ohodnotili dôveryhodnosť prečitaného textu? (pričom 0 - vôbec nedôverujem, 100 - úplne dôverujem)

Annex H

Doubting Comprehensible Layman

Autor: Thomas Brown - inžiniersky doktorát z aplikovanej matematiky, výživou sa dlhodobo zaoberá z vlastnej iniciatívy

U zvierat, ktorým bola injekciou podaná probiotická zmes nastal nárast telesnej dĺžky o 6.1% v porovnaní s placebom. To, že došlo k redukcii obezity pravepodobne dokazuje výrazné zníženie pravdepodobnosti srdcovej príhody a množstvo tuku obaľujúceho vnútorné orgány. Je možné, že požitie probiotík tiež zvýšilo úroveň proteínu ktorý pôsobí ako ochranný faktor proti zmenám spôsobeným obezitou a obnovil sa aj metabolizmus tukov. Podobné výsledky nájdeme aj v iných štúdiách a s určitou pravdepodobnosťou môžeme tvrdiť, že ukazujú efektivitu probiotík v prevencii obezity. Pravidelné podávanie probiotík viedlo k obnoveniu tukového metabolizmu u zvierat. Probiotické kmene ovplyvnili koncentráciu cholesterolu, ktorý bol obnovený na normálnu úroveň. Zavedenie probiotík tiež viedlo k normálnej hormonálnej aktivite v tukovom tkanive. Prerušované podávanie probiotík počas dvoch týždňov teda viedlo k diskutovateľným výsledkom, ktoré ukazujú efektivitu probiotickej terapie pri prevencii obezity, konzistentne s ostatnými štúdiami.

Na škále od 0 do 100, nakoľko by ste ohodnotili dôveryhodnosť prečitaného textu? (pričom 0 - vôbec nedôverujem, 100 - úplne dôverujem)