Universiteit Leiden

Computer Science

Mindfulness Practices in Agile Project Organizations

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Date: 23/08/2016

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MASTER'S THESIS

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Acknowledgements

This paper is the final product of a trajectory that was inspiring, edifying and beneficial, but it can also be typified as a long and windy road as The Beatles so astutely described in one of their many hits. During this lengthy path a few persons were never far away to give advice, to be patient and to encourage. In this whole track my wife Svetlana has always been a lasting and faithful support to the somewhat crazy endeavor that I had chosen for: to go for a Master's degree besides having a fulltime job and a family which is no mean feat. In that same light I do want to thank my daughters Denise and Nicole for being patient with a dad who has not always given them the time that they wanted, which they remarkably took with more grace than I expected.

Furthermore it has been my father and mother who have been proofreading many of my papers, giving advice and encouragement throughout the years I have been busy with this track.

I also want to thank Bert Tukkers and Siemen Klaver from Flusso Ltd. who gave me both the time and the finances to make this whole endeavor possible.

For this paper many persons have played a role. More than I anticipated when I started with the thesis, which gives the paper a taste of team work, beyond the scope of my expectations. In this regard I first of all want to thank dr. Christoph Stettina who has been an inspiration and who has always been approachable and available during the whole duration of the thesis.

I also want to mention the input of dr. Claudia Buecker with her tips and tricks to give the thesis the structure that it needs and with the exercises that intended to improve the writing of a proper thesis.

The Centre of Mindfulness in Amsterdam played a key role to collect the data that was generated by the experiment that is explained in this paper. Wibo Koole, who is the director of the Centre, found his instructors willing to conduct the experiment, which meant that six of his instructors were prepared to perform exercises that were a little bit out of each and everyone's comfort zone. Most of the time that meant that these instructors had to travel 1, 2 or 3 different days to conduct exercises for 1 or 2 scrum teams. These are these instructors: Alice Read, Steven Cornelissen, Monique Verhulst, Maartje van Rossum, Simone Lips and Nienke Heijbroek. Many thanks for your hard work.

Jorrit Berends is another coach who was involved in executing the experiment but who is not connected to the Centre in Amsterdam. Jorrit performed 5 experiments on 5 different days. Many thanks Jorrit!

I also want to thank Monique Veerkamp who proofread an early version of this thesis and as mindfulness trainer and psychologist gave elaborate feedback that improved the quality of this work.

Many thanks go as well to all the companies and teams that participated in this experiment and their willingness to invest their valuable time towards this experiment.

Lastly I want to thank my sister Carla who also gave feedback from a Judeo-Christian perspective.

Contents

Abstract

This paper merges two worlds together. The world of agile development teams in project organizations seeks to build teams that are increasingly more effective and know optimal internal workings so as to deliver the right software that is highly qualitative and meet all the increasingly tougher demands. The world of mindfulness claims that it offers people the tools to have more positive emotional responses, to focus on the present and to come to better decisions. Merging these worlds in which agile development teams start using mindfulness practices just before its meetings would increase the resilience of the teams in fundamental ways so as to be able to reach a higher degree of effectiveness and optimal internal team workings.

This paper seeks to answer the question what the effect is of a short mindfulness exercise on the quality of meetings in an agile project team. This evidence is given through an experiment in which multiple development teams in multiple agile project organizations are involved. In every participating organization one team is assigned to a short guided mindfulness exercise just before several scrum related meetings, while other teams either have a guided placebo exercise or no exercise at all. After these meetings all the team members need to fill out a questionnaire guide which contain questions about the effectiveness and culture of the team meeting. The differences in team effectiveness of these teams is afterwards compared for each preparation type toward the baseline.

After the analysis of the data was performed there is statistical significant evidence that only the mindfulness exercise provides a slight increase of team workings within agile meetings in the areas of involvement in decision-making, overall effectiveness, listening skills, level of disagreement, tension level, interaction and emotional responses.

With a low investment companies could therefore increase the effectiveness of the meetings of its development teams with adding this short mindfulness exercise towards its toolbox of effectiveness.

1. Introduction

"*The market does not improve, the situation deteriorates. In September 2011 it's curtains*" (Huizinga, Siebe; Broersma, 2014). During my eleven years of working in several IT related projects for the renowned Bookstore Chain "selexyz", I have seen many projects fail and only some succeeded. I saw the organization change dramatically, but in September 2011, I saw it coming down like a giant struck by a pebble on his temple, falling with a great crash on the floor like a knock-out, causing tremors in the entire book business in The Netherlands. We had done everything to keep up with the demands of the business in order to keep our market share, but we had lost the battle. "Why did this happen?", I wondered. In the book "Book Palaces or Castle in the Air" the author states a quote which was at the heart of the selexyz strategy: "*We are the biggest and we want to be treated as such!"* (Huizinga, Siebe; Broersma, 2014). The sentence bypasses a mindful attitude towards the changing environment. "*Alea iacta est (the die is cast)"* (R. Williams, 2013), Julius Caesar uttered, as he crossed the river Rubicon, knowing it to be a defining moment in history. How can organizations and their people brace themselves against mindless behavior and recognize defining moments in their history as they present themselves? That is how I got my affinity with the subjects agility, attention to changes and resilience.

Five persons were involved in a car accident when a fellow road user ignored obvious road signs because his sat-nav told him to keep on driving (Boyle, 2015). In our present day VUCA world, a planet increasingly delineated by *"volatility, uncertainty, complexity and ambiguity*" (Horney, Pasmore, & O'Shea, 2010), to approach situations on the auto-pilot can have disastrous effects. Present-day organizations are facing the same problem as they are operating in a highly unpredictable and stressful environment to which they daily need to respond adequately. It is difficult for project organizations to adapt to changing circumstances and demands in a highly volatile world. Carefully crafted plans, that should work like business or project sat-navs, are more often than not met by a stubborn reality that does not fit the strategy any longer.

This is a problem because companies that do not possess the agility to reply to the present and its changed demands, run a great risk of becoming obsolete or at least loose some of their striking power within the market that they operate. Big corporations like "*Atari"* (Masamune, 2011), "*Kodak*" (Larish, 2012), "*DeLorean"* (Sutton, 2013), "*Polaroid"* (Bonanos, 2012), "*Pan Am"* (Harris, 2011), "*selexyz*" (Huizinga, Siebe; Broersma, 2014) and "*Compaq"* (Hoopes, 2005), once cutting edge businesses, have failed to meet these changing demands and showed no signs of agility which eventually led to their demise. Their business' GPS was focused on a fixed point which did not prevent them from crashing into new competitors, new technologies, new demands and waning public interest at the next junction. Companies that can not alter their course because they can or will not recognize the changes in the market, will fail or decline and their employees that are not equipped for this VUCA world will likely have to deal with stress levels that keep on building up in their system with a great chance of burnout and demoralization.

The solution that this paper wants to offer is to introduce mindfulness practices in order to enhance personal and organizational agility in a project organization. Mindfulness deals with a certain attitude towards reality in which the practitioner approaches the here-and-now in "*the fullest attention to*

whatever the moment presents" (K. W. Brown & Ryan, 2003) and is an attitude that has come from the Buddhist tradition in which meditation is a core principle. Mindfulness provides an organization and its employees with tools to "*increase attention*" (Follette, Palm, & Pearson, 2006) and to create useful *"habits of mind"* (*Mindfulness and Counseling Self-efficacy: The Mediating Role of Attention and Empathy*, 2007) which lead to "*stress reduction*" (Shapiro, Schwartz, & Bonner, 1998).

The reason that this is a potential solution is that mindfulness places a focus on the present that offers your business' sat-nav as it were a plug-in: not only are you provided with the usual static maps, but you learn to recognize real-life traffic and receive timely warnings to alternations on the road. It teaches you to recognize outdated organizational behavioral patterns and to take a different cause of action if the situation requires it.

2. Significance of the Study.

This study is significant because it seeks to find answers to help project organizations deal with an increasingly volatile, uncertain, complex and ambiguous environment. Organizations should receive the tools to handle this uncertainty and deal with anomalies as they present themselves. Planning is a necessity to be successful, but if a change occurs in the landscape of the organization it is essential to recognize if a response is required and if so it is paramount that the organization has the elasticity to follow suit or to even be a trendsetter. Projects often fail because they are either too complex, or the project lead time is too long for the outcome of the project still to be relevant, or the idea proved to be faulty but was not alternated because the project goals had become sacred in and of themselves without looking at the real-time world.

According to Harvard Business Review every *sixth IT project has an average budget overrun of around 200% and a timetable overrun of 70%* (Flyvbjerg, Bent; Budzier, 2011), stating that the size of IT projects is so enormous and complex these days*, that* they present*" a singular new risk*" (Flyvbjerg, Bent; Budzier, 2011). Gallup Business News has found that the economy of the *U.S.* loses around $50-$150 billion every year as a result of unsuccessful IT projects (Hardy-Vallee, 2012). These are staggering numbers which make it necessary to find a better response to the operations within project organizations. This study explains how organizations and its managers can formulate a more adequately response to difficulties and complexities when using a mindful stance which should lead to better project outcomes.

This study should also add an understanding to the body of knowledge to what extend mindfulness helps project organizations to reach their goals. It will undertake research on the effects of mindfulness within an agile project organization and will compare a group of respondents that are consciously practitioners of mindfulness to a group that does not practice this and present the observed differences on the dimensions that will be given.

3. Research Question

The purpose of this paper is to explore the effect of mindfulness practices in Agile Project Organizations. It wants to give an understanding of a tangible implementation of a mindfulness exercise within an agile setting. Hence the main question that this paper seeks to answer is:

1. *What is the effect of a short mindfulness exercise on the quality of meetings in an agile project team?*

The answer to this question should help organizations to understand whether mindfulness practices are beneficial for the optimization of results, the degree of agility, the overall well-being and the turnover rates. It should indicate if the mindfulness dimension is an essential feature of modern agile project organizations.

The literature review will give an introduction to the concept of mindfulness from the following angles:

a. What is mindfulness?
   This question should be answered to understand the context of the main question. The literature review should provide the reader with the answers to this query.
b. What are the results of the practice of mindfulness in a clinical psychological setting?
   Since mindfulness has received most attention in the clinical psychological setting, most vigorous and elaborate research has been done in this field. The answers that have been found in this context will provide useful insights for the working of mindful practices in other fields of interest. The literature review will provide the reader with an overview of the findings of several authoritative researchers in the field of clinical psychology.
c. What are the results of the usage of mindfulness in a business setting?
   This question helps to move the discussion from mindfulness in general to the application of mindfulness in a business environment. It will give an understanding of the present debate on the concept of mindful behavior in business and will be the handle toward answering the main question

4. Literature Review

The literature that will be reviewed comprises three focal points. The first deals with an introduction of the concept of mindfulness. The second handles mindfulness practices in a clinical psychological setting and the third covers mindfulness as a feature in a business setting.

4.1 Mindfulness

Mindfulness is a concept that has been practiced for several millennia and has its traceable roots in Buddhism (Shulman, 2014; J. M. G. Williams & Kabat-Zinn, 2013). Although it has its origin in an Eastern tradition (McKenzie & Hassed, 2015), many of the key concepts of mindfulness have been included in all the world religions (Gehart, 2012). The meaning of the term mindfulness has been changing over time because of the different schools of Buddhism developed the term in various regions of the globe (Burk, 2014). After the concept of Mindfulness was introduced in the area of psychology, the term Mindfulness often denotes mental and emotional facets (Burk, 2014).

Mindfulness has since the mid-1980s been used in many fields such as "*education*" (Burrows, 2011; Hyland, 2009) , "*law*" (Riskin, 2002; Rogers, 2009), "*prison programs*" (Vengapally, 2014), "*government*" (*Government Research Directory*, 2009), "*sports*" (Birrer, Röthlin, & Morgan, 2012; *Evaluating Mindfulness as a New Approach to Athletic Performance Enhancement*, 2008), "*IT*" (Rodrigues, 2002), "*ballet*" (Marich, PhD, & LPCC-S, 2015) and "*business*" (*Mindfulness in Organizations: Foundations, Research, and Applications*, 2015).

It was dr. Jon Kabat-Zinn who introduced mindfulness in the field of contemporary psychology and his definition is a description that is mostly used in the present debate (Jon Kabat-Zinn, 1982, 1991, 2005, 2007, 2009):

> *[1] Mindfulness means paying attention in a particular way;*
>
> *[2] On purpose,*
>
> *[3] In the present moment, and*
>
> *[4] Nonjudgmentally.*

Dr. Kabat-Zinn has decoupled Mindfulness from its Buddhist roots and has presented it free from its value laden context. "*[U]ntil recently,"* he states "*mindfulness meditation was most commonly taught and practiced within the context of Buddhism, its essence is and always has been universal"* (Jon Kabat-Zinn, 2013). In doing so, it has gained a greater popularity in the last years and has found many fields in which Mindfulness could be included in order to reap the fruit that the insights of mindfulness give.

The following paragraphs will explain the subdivisions that are given by Dr. Kabat-Zinn in his definition of Mindfulness.

4.1.[1] Paying attention in a particular way

On 3 Oct 2015 the U.S air force opened fire on an MSF ran hospital in Kunduz, Afghanistan, killing 42 people ("At least 848 Afghan civilian casualties in Kunduz: U.N. | Reuters," n.d.). General Campbell who was responsible for the operation declared that the incident was the result of a chain of human

errors, each one of them avoidable if people would have been more attentive. The no-strike list which contained the co-ordinates of the hospital was not consulted and the American gunship based its decision on the visual depiction of the building ("Kunduz bombing: US attacked MSF clinic 'in error' - BBC News," n.d.). The action had been performed mindlessly, killing dozens of innocent people, seriously hampering relationships and getting worldwide bad report. If the people responsible for the attack had paid more attention they would have picked up the signals that were available to them and had been able to avoid such a tragic error.

Paying attention is one of the key concepts of mindfulness or as Richard Sears says "*Attention is the vehicle on which mindfulness rides. It is the only tool we have to be present in the moment"* (Sears, 2014). Kabat-Zinn also refers to the concept as "*falling awake in the face of a not-insignificant possibility that we might drift into drowsiness and unawareness*" (Jon Kabat-Zinn, 2005).

Paying attention can be done in a kaleidoscopic set of ranges of attention. According to the Handbook of Mindfulness (*Handbook of Mindfulness: Theory, Research, and Practice*, 2015) the psychology of mindfulness has to be formulated in a setting of a variety of methods of paying attention with the following mental qualities that have pinpointed functions towards awareness of an object of consciousness:

- *attention;*
- *concentration;*
- *understanding;*
- *application of thought;*
- *examining.*

Mindfulness enhances our attention span, making it possible to notice and contextualize things and events better. Stephen McKenzie writes that not paying attention leads to a failure of recognizing the subterranean phenomena that really drive us and *"we then spend lots of time and energy trying to fool ourselves and others into believing that things are other than the way they really are"* (McKenzie & Hassed, 2015).

4.1.[2] On Purpose

The next element of the definition of Kabat-Zinn addresses the element of intention. Mindfulness is about shaking off the auto pilot. A great feature in aviation and very useful in accomplishing certain tasks, following the auto-pilot can lead to sub-optimal and sometimes even disastrous results.

Habits that are no longer useful for the present situation, should be recognized and renewed. To receive the response 'we always did things this way' is usually an indicator of mindless behavior and really leaves no room for discussion. Christine Horner states that the way of mindful behavior decreases habitual reactions that are fired without critical assessment and that the mindful person is accountable to the moment rather than rectifying unwanted reactions after the person "*had a chance to calm down and review what happened"* (Horner, 2015).

Shapiro, Carlson, Astin and Freedman categorized the aspect of "on purpose" as "intention" in their own axioms of mindfulness: "*(1) intention, (2) attention, and (3) attitude*" (Shapiro, Carlson, Astin, & Freedman, 2006)(Shapiro & Carlson, 2009), also referred to as IAA.

The concept of intention is portrayed well by Deborah Schoeber Lein and Suki Sheth (Lein & Sheth, 2011) in the following analogy:

> *"'Casting an intention' over the day is like throwing a ship's anchor into the sea. Once the anchor is lodged in the sea floor, the ship maintains its general location even if the wind and tides alter its surface position. Likewise, an intention positions your mind to hold a particular orientation during the day, as you shift between activities. Mindfulness is the line that attaches the anchor of intention with your moment-by-moment experiences during the day"*

In other words intention does not fleet to and fro but has a certain stability, stable when needed and navigable when necessary.

4.1.[3] In the present moment

Shakespeare was making a statement in the second part of Henry IV in which the Archbishop of York lamented, "*And take thou this! O thoughts of men accurst! Past, and to come, seem best; things present, worst"* (Shakespeare, Johnson, & Steevens, 1785). The fleeting thoughts of man are always busy with the past or engaged with the future, at the cost of the present.

Mindfulness puts an emphasis on living in the present moment and focusing one's attention to the things that are happening in the here and now. Thich Nhat Hanh, a Vietnamese Monk, states this part of Mindfulness astonishingly sound when he states: *"Washing the dishes is at the same time a means to an end – that is, not only do we do the dishes in order to have clean dishes, we also do the dishes to live fully in each moment while washing them"* (Hanh, n.d.).

This aspect of Mindfulness sounds as simple as breathing itself but it is a phenomenal antidote against rumination. Rumination is of course known from cud-chewing animals, and that is exactly where the comparison hits the reality of thought patterns that are repeatable and unstoppable or as Kumar says, *"[y]our rumination can become your own private reality, one that other people might not understand or know about at all"*(Kumar, 2010) .

Living in the present stops your mind from wandering around which arrests the annoyingly buzzing of past thoughts and future fears. This is accomplished by having our attentiveness in our perceptions: *"hearing, sight, taste, smell and feeling"* (Jones, 2011).

4.1.[4] Nonjudgmentally

"*Do not judge!*" (New International Version, 2011), says Jesus Christ in His well-known Sermon on the Mount. With his statement he pre-echoes an important feature of the working definition of Mindfulness stated by Kabat-Zinn. Approach your experience without judgment and without the urge to necessarily change it, but only observe (*A Practical Guide to Acceptance and Commitment Therapy*, 2013).

Nonjudgmentally addresses thoughts as merely "*passing events*" (Crane, 2013). "*In fact,"* Dean Amory says that if we would just let a thought pass without making a judgment and without resistance, it will soon wane and lapse (Amory, n.d.). If we are able to let go of judging our thoughts, we can take a more objective stance toward them and we will no longer be defined by them (Amory, n.d.). It increases our ability to recognize that this thought is in fact not us and we can admit it without losing our deeper identity, opening up to understanding the world around us. The handbook

of Mindfulness points out that without judgment we have the chance to experience the multifaceted plethora of events that surround us more deeply (*Handbook of Mindfulness: Theory, Research, and Practice*, 2015).

4.2 Mindfulness in Clinical Psychology

As already stated before, Dr. Kabat-Zinn introduced Mindfulness in the field of clinical psychology where it has since been popularized (Jon Kabat-Zinn, 1982). In this paragraph we will portray the findings that have been made in this field while using mindfulness. First we will see what mindfulness has done in enhancing psychological well-being, then we will cover some of the techniques that are used and lastly we will see what research has shown in order to prove the effects of mindfulness in the field of clinical psychology.

4.2.1 Traits of Mindfulness

Studies have shown that mindfulness has a general positive impact on one's psychological health (Jon Kabat-Zinn, 1982). Mindfulness has been correlated to a myriad of positive effects on people with psychological issues. Good results have been shown in the areas of "*self-esteem*" (J Kabat-Zinn, Lipworth, & Burney, 1985; Ward, 2015), "*overcoming fear*" (Miller, Fletcher, & Kabat-Zinn, 1995; Ward, 2013), "*self-efficacy"* (Brower & Nurius, 1993; Shapiro, 2009)(*Mindfulness and Counseling Self-efficacy: The Mediating Role of Attention and Empathy*, 2007), "*optimism"* (Epstein, 1993; Niemiec, 2013), "*gratitude"* (Fralich, 2013; Hart, 1988), "*vitality*" (*Designing Positive Psychology: Taking Stock and Moving Forward*, 2011; Hayward & Hayward, 1995), "*clarity"* (Moffitt, 2012; Thích., 1987), "*self-compassion and empathy*" (Kingsbury, 2009; *Psychoanalysis and Buddhism: An Unfolding Dialogue*, 1995).

The negative correlation of mindfulness and the following areas has also been recognized: "*rumination*" (Deyo, 2006; Kumar, 2010), "*anxiety"* (*Acceptance- and Mindfulness-Based Approaches to Anxiety: Conceptualization and Treatment*, 2007) (McKenzie & Hassed, 2015), "*delusion"* (Kozak, 2015), "*depression"* (Segal, Williams, & Teasdale, 2012) and "*stress"* (Stahl & Goldstein, 2010).

4.2.2 Mindfulness Based Interventions

Several therapies and trainings have been developed to execute mindfulness based interventions. The interventions that are mostly used are:

[1]. "*Mindfulness-Based Stress Reduction (MBSR)*" (Jon Kabat-Zinn, 1991, 2005);

[2]. "*Mindfulness Based Cognitive Therapy (MBCT)*" (Hepburn et al., 2009; Segal, Teasdale, Williams, & Gemar, 2002);

[3]. "*Dialectical Behavior Therapy (DBT)*" (Dimeff & Linehan, 2001; M. Linehan, 1993a);

[4]. "*Acceptance and Commitment Therapy (ACT)*" (Hayes, Strosahl, & Wilson, 1999; Stafford-Brown & Pakenham, 2012).

The following paragraphs will present these four interventions.

4.2.2.[1] Mindfulness-Based Stress Reduction

Dr. Kabat-Zinn introduced Mindfulness-Based Stress Reduction (MBSR). This treatment was originally designed to "*treat patients with chronic pain"* (Jon Kabat-Zinn, 2013). The program is geared towards helping people to relate to their physical and psychological condition in a more tolerant nonjudgmental manner (Keng, Smoski, & Robins, 2011). Kabat-Zinn sees mindfulness as "*a radical act of sanity"* (Jon Kabat-Zinn, 2005) and has built an intensive program of about eight weeks to weekly receive a few hours of group-based mindfulness meditation teaching and exercise (Keng et al., 2011). The program requires deliberate action and self-control (Jon Kabat-Zinn, 2013), and combines a variety of exercises like meditation, body awareness, and yoga to aid practitioners to become watchful (Pickert, 2014).

The foundation of this treatment is that persons will acquire the ability to be less combative and critical about their experiences and that they will develop new thinking and behavioral patterns (Keng et al., 2011).

The treatment knows the following components:

1. It is a program that has a group element that emphasizes on the gradual attainment of mindfulness (Grossman, Niemann, Schmidt, & Walach, 2004);
2. It covers an eight week program of about 2 or 3 hour meetings and in addition to the group program it is accompanied by individual practice (Dobie, Tucker, Ferrari, & Rogers, 2015);
3. It entails the following formal MBSR practices:
    a. "*The Body Scan*" (*Exceptional Experience and Health: Essays on Mind, Body and Human Potential*, 2012) - mindful attention while lying down (see "Appendix 1: Body Scan" for a full description of the body scan);
    b. "*Mindful Walking*" (Alidina, 2015) - mindful attention in daily life and activities (see "Appendix 2: Mindful Walking" for a full description of mindful walking);
    c. "*Mindful Sitting Meditation*" (Watson et al., 2014) - mindful attention while sitting still (see "Appendix 3: Mindful Sitting Meditation" for a full description of mindful sitting meditation);
    d. "*Mindful Stretching*" (Chaskalson, 2011) - mindful attention while stretching or doing yoga (see "Appendix 4: Mindful Stretching" for a description of Mindful stretching).
4. It entails the following informal MBSR practices:
    a. "*Awareness of pleasant and unpleasant events*" (J. Kabat-Zinn, 1996) (see "Appendix 5: Awareness of pleasant and unpleasant events" for an overview of questions that are asked during this exercise);
    b. "*Awareness of breathing*" (J. Kabat-Zinn, 1996) (see "Appendix 6: Mindful Breathing" for a description of a breathing awareness exercise);
    c. "*Deliberate awareness of routine activities and events such as: eating, weather, driving, walking, awareness of interpersonal communications*" (J. Kabat-Zinn, 1996) (see "Appendix 7: Raisin Exercise" as an example of deliberate awareness).

4.2.2.1.1 Randomized Controlled Trials MBSR

The question that is mentally posed at this point is does this approach really work or is it just another fad that will fade as soon as the next big thing appears on the scene? Research has shown that the intervention as described above has shown some promising results. This subsection will show some of the results that have been gathered throughout several studies that have been undertaken.

Eighteen known researches have been undertaken toward fathoming the consequences of MBSR on different groups of participants (Keng et al., 2011). All of these researches indicate that there is a positive correlation between MBSR and psychological well-being. The following two paragraphs will zoom in on two researches and their findings.

4.2.2.1.1.1 MBSR Findings of Shapiro, Schwarz and Bonner

Shapiro, Schwarz and Bonner for example have conducted a study among medical students, wanting to find out if the students would be more able to cope with stress after they had gone through an official MBSR program (Shapiro et al., 1998). The participants completed several measures to assess these variables:

- *Empathy (using the Empathy Construct Rating Scale);*
- *Psychological Distress (using the Hopkins Symptoms Checklist 90);*
- *Depression (using subscale 4 of the Hopkins Symptoms Checklist);*
- *State and Trait Anxiety (using the State-Trait Anxiety Inventory);*
- *Organization01uality (using the Index of Core Organization01ual Experiences)* (Shapiro et al., 1998).

The results showed that the participants had positively enhanced techniques to handle stressors. The following is the review of their findings:

> *The data indicate that participation in a mindfulness-based stress reduction intervention can effectively*
>
> *(1) reduce self-reports of overall psychological distress including depression,*
> *(2) reduce self-reported state and trait anxiety,*
> *(3) increase scores on overall empathy levels, and*
> *(4) increase scores on a measure of organization01ual experiences assessed at termination of the intervention.* (Shapiro et al., 1998).

Shapiro et al., therefore could conclude from objective research that short-term effects of MBSR were measurable and undeniable.

4.2.2.1.1.2 MBSR Findings of Carlson, Ursuliak, Goodey, Angen and Speca

MBSR was designed to help patients with chronic pain. The research that Carlson, Ursuliak, Goody, Angen and Speca have conducted is more closely allied with the original purpose of MBSR, namely to observe the effects of MBSR on intolerable mood instabilities and indications of stress for cancer outpatients (Carlson, Ursuliak, Goodey, Angen, & Speca, 2001).

Patients were asked to fill out the Profile of Mood States and the Symptoms of Stress Inventory both before and after the MBSR intervention. According to Carlson et al. (Carlson et al., 2001) patients in the treatment group had:

- *Lower scores on Total Mood Disturbance;*
- *Subscales of Depression,*
- *Subscales of Anxiety;*
- *Subscales of Anger;*
- *Subscales of Confusion;*
- *More Vigor;*
- *Fewer overall Symptoms of Stress;*
- *Fewer Cardiopulmonary and Gastroin- testinal symptoms;*
- *Less Emotional Irritability;*
- *Less Depression;*
- *Less Cognitive Disorganization;*
- *Fewer Habitual Patterns of stress.*

The decrease in overall Temperament Disturbance was 65%, with a 31% reduction in Symptoms of Stress (Carlson et al., 2001).

These and other results indicate that the MBSR program has a considerable positive effect on the well-being of the participants and has found a rightfully deserved place in Western Psychology.

4.2.2.[2] Mindfulness-Based Cognitive Therapy

Having seen the effects of MBSR, we will go on and bring our attention to other Mindfulness based programs. Mindfulness Based Cognitive Therapy (MBCT) is an intervention developed by Zindel Segal, Mark Williams and John Teasdale (Barnhofer, Crane, Didonna, & Didonna, 2009). Just as MBSR, on which it was partially based, it comprises an eight week intervention program and is especially geared towards people with the looming tendency to relapse into depression. "*Depression casts a long shadow*" (Segal et al., 2012) , as the developers of the program hold, and a person is refrained from clarity of thought when confronted with a turmoil of mood which leaves the person paralyzed in mental pain and agony (Segal et al., 2012).

The aim of MBCT is to target liability procedures that have been associated with the conservation of depressive occurrences (Keng et al., 2011). The program is focused on persons that have relapsed in depression before and specifically for those "*with Major Depressive Disorder*" (Piet & Hougaard, 2011).

MBCT defines the focal point of its program as becoming sensitive to all incoming incentives and accepting them without having the urge to respond to them (Hofmann, Sawyer, & Fang, 2010). In this way it interrupts ingrained reflexes and shifts the focus from the need to react to simple acceptance and observance (Felder, Dimidjian, & Segal, 2012) in order "*to respond in intentional and skillful ways to these patterns"* (*Acceptance and Mindfulness in Cognitive Behavior Therapy: Understanding and Applying the New Therapies*, 2011) so as to sever the psychological response mechanism from its accompanying negative thoughts (Barnhofer et al., 2009).

MBCT was thus based on the practices of MBSR. All the mindful elements in MBSR can therefore be found in the practices of MBCT. Another angle to approach MBCT however is from a cognitive-behavioral side in which is the notion that the manner we comprehend affairs *"largely determines how we feel about them and, in turn, how we behave*" (Mukherjee, Sheehan, Puzniak, Schlamm, &

Ghannoum, 2011). The differences between MBSR, MBCT and regular meditation are shown in table 1: "*Characteristics of the Practices of Meditation, MBSR and MBCT*" (Xie, Zhou, Gong, Iennaco, & Ding, 2014)

Characteristics	Meditation	MBSR	MBCT
Sitting meditation	Yes	Yes	Yes
Group therapy format	It occurs in a group format but not considered "group therapy"	Yes	Yes
Body scan	No	Yes	Yes
Hatha yoga [(Mindful stretching)]	No	Yes	Yes
Cognitive therapy	No	No	Yes
Duration of intervention	Unlimited	Limited, often provided as an 8-session intervention.	Limited, often provided as an 8-session intervention.

Table 1: "*Characteristics of the Practices of Meditation, MBSR and MBCT*" (Xie et al., 2014)

This implies that all the mindful exercises described in appendix 1, 2, 3, 4, 5, 6 and 7 also apply to MBCT. In addition to the MBSR exercises, the following exercises have also been developed as part of the MBCT program:

- "*The three-minute breathing space*" (Segal, PhD, Williams, & Teasdale, 2002) (see "Appendix 8: Three-minute breathing space" for a description of the three-minute breathing space exercise);
- "*The physical barometer*" (Kenny & Williams, 2007) (see "Appendix 9: The physical barometer" for a description of the physical barometer exercise).

4.2.2.2.1 Randomized Controlled Trials MBCT

Having seen some of the research results of MBSR, this subsection will show some findings that have been acquired as a result of an MBCT program. Fourteen presently known studies have been executed to prove or disprove the correlation between MBCT and psychological well-being (Keng et al., 2011), especially in the area of relapse prevention in the area of depression. All fourteen have shown a partial or full negative association between MBCT and a set-back into depression. The next two paragraphs will show the results of two of these studies.

4.2.2.2.1.1 MBCT Findings of Bondolfi et al.

Bondolfi et al., researched a group of "*[s]ixty unmedicated patients in remission from recurrent depression (>= 3 episodes) were randomly assigned to MBCT + TAU [(Treatment As Usual)] or TAU. Relapse rate and time to relapse were measured over a 60 week observation period"* (Bondolfi et al., 2010).

The results were partially positive and showed a negative correlation between MBCT and the time to relapse into recurring depression. Bondolfi et al. display their results as follows: "*Over a 14-month prospective follow-up period, time to relapse was significantly longer with MBCT + TAU than TAU alone (median 204 and 69 days, respectively), although both groups relapsed at similar rates*" (Bondolfi et al., 2010). It is thus noted that this treatment is not a waterproof method in which the therapy results in a complete abandoning of relapse, but there is a promising indicator that the interlude between the periods of depression is substantially longer when MBCT is added to the usual treatment.

4.2.2.2.1.2 MBCT Findings of Hepburn et al.

Hepburn et al. commenced a study in which they research a group of 68 persons "*in remission from depression and with a history of suicidal ideation"* (Keng et al., 2011). The participants "*were allocated to an MBCT group or a treatment-as-usual waitlist control. Measures of thought suppression and depression were taken pre- and post-treatment*" (Hepburn et al., 2009).

The study did not find a correlation between MBCT and thought repression but "*MBCT group's depressive symptoms declined from the mild clinical range to normal levels*" (Hepburn et al., 2009) . The conclusions of Hepburn et al. are: "*Preliminary evidence suggests that MBCT for suicidality may reduce TS and residual depression in the short-term. If replicated, it would suggest MBCT as a useful approach for tackling this maladaptive cognitive strategy in high-risk populations*" (Hepburn et al., 2009).

4.2.2.[3] Dialectical Behavior Therapy

Dialectical Behavior Therapy (DBT) was developed by Marsha Linehan in the late eighties of the previous century. "*DBT was first developed as a treatment for chronic suicidal and other self-injurious behaviors, which are often present in patients with severe borderline personality disorder (BPD)*" (Keng et al., 2011). The program gears towards "*emotion regulation skills, interpersonal effectiveness skills, distress tolerance skills, and DBT 'core' mindfulness skills are taught in a structured format"* (M. Linehan, 1993a).

"*DBT is based on a combined capability deficit and motivational model of BPD which states that (1) people with BPD lack important interpersonal, self-regulation (including emotional regulation) and distress tolerance skills, and (2) personal and environmental factors often both block and/or inhibit the use of behavioral skills that clients do have, and reinforce dysfunctional behaviors*" (Dimeff & Linehan, 2001).

The therapy elements that are used to address the issues that the patients experience are cognitive therapy, exposure therapy and coping skills. During the cognitive therapy "*the therapist helps you to monitor, evaluate, and change thinking patterns that contribute to anxiety problems"* (Chapman, Gratz, & Tull, 2011). During the exposure therapy "*the therapist helps you to face situations, objects and events that you are afraid of and would normally avoid"* (Chapman et al., 2011). The coping skills know both "what" and "how" core mindfulness skills. The "what" skills can be categorized in three groups:

- Observe (see "Appendix 10: Observe" for full description);
- Describe (see "Appendix 11: Describe" for full description);
- Participate (see "Appendix 12: Participate" for full description).

The "how" skills are sub-divided in the following clusters:

- Nonjudgmentally (see "Appendix 13: Non-judgmentally" for description);
- One-mindfully (see "Appendix 14: One-mindfully" for description);
- Effectively (see "Appendix 15: Effectively" for description).

These coping skills are carefully developed "*for use in tolerating feelings you've typically tried to avoid*" (Astrachan-Fletcher & Maslar, 2009).

"*Specific exercises that are used to foster mindfulness [in DBT] include visualizing thoughts, feelings and sensations as if they were clouds passing by in the sky, observing breath […], and bringing mindful awareness into daily activities*" (Keng et al., 2011).

4.2.2.4.1 Randomized Controlled Trials DBT

There are thirteen known randomized controlled trials undertaken to prove the effect on DBT on psychological health. This research was especially executed with groups that are vulnerable and known for its suicidal tendencies as well as for groups consisting of persons with Borderline Personality Disorder. All of these researches showed a negative correlation between DBT and "*suicidal ideation, depression, hopelessness and dissociation and anger expression*" (Keng et al., 2011). The following two paragraphs will briefly show the results of two of these researches.

4.2.2.4.1.1 DBT Findings Linehan et al.

Linehan et al. have done a study among 101 patients that were diagnosed with BPD with the objective to "*evaluate the hypothesis that unique aspects of DBT are more efficacious compared with treatment offered by non–behavioral psychotherapy experts*" (M. M. Linehan et al., 2006). The patients were subdivided in two groups. One group (52) underwent one year of DBT treatment, the control group (49) went through a year of community treatment by experts. Both groups had a post treatment of an additional year of follow-up.

The measures that were used were among other things "*trimester assessments of suicidal behaviors, emergency services use, and general psychological functioning*" (M. M. Linehan et al., 2006). The outcomes were promising and are formulated like this: "*[s]ubjects receiving DBT were half as likely to make a suicide attempt [...], required less hospitalization for suicide ideation [...], and had lower medical risk [...] across all suicide attempts and self-injurious acts combined*" (M. M. Linehan et al., 2006).

The conclusions that these authors give are somewhat carefully stated without too much conclusiveness but with a slight hint of hope for the patients: "*[d]ialectical behavior therapy appears to be uniquely effective in reducing suicide attempts*" (M. M. Linehan et al., 2006).

4.2.2.4.1.2 DBT Findings Verheul et al.

Another research that was done concerning the relationship between DBT and a positive outcome for well-being among patients with BPD is done by Verheul et al (Verheul et al., 2003). Fifty-eight female patients with BPD were randomly selected. Twenty-seven of these were submitted to a twelve month DBT program, while the control group (31) were receiving treatment as usual.

The results were that "*[d]ialectical behavior therapy resulted in better retention rates and greater reductions of self-mutilating and self-damaging impulsive behaviors compared with usual treatment"* (Verheul et al., 2003).

The conclusions that were drawn by the authors are a bit more firmly stated than the conclusions of Linehan et al. in the previous paragraph: "*[d]ialectical behavior therapy is superior to usual treatment in reducing high-risk behaviors in patients with BPD"* (Verheul et al., 2003).

4.2.2.[4] Acceptance and Commitment Therapy

The last Mindfulness based intervention that we will discuss in this paper is Acceptance and Commitment Therapy (ACT). ACT "*is based on the view that language is at the core of many psychological disorders specifically, and human suffering in general*" (*A Practical Guide to Acceptance and Commitment Therapy*, 2013). ACT counteracts "*attempts to control or avoid negative thoughts and emotions, which often paradoxically increase the frequency, intensity, or salience of these internal events, and result in further distress*" (Keng et al., 2011). ACT was developed "*in the late 1980's by Steven Hayes, Kelly Wilson and Kirk Strosahl*" (Murdock & Hall, 2012). The objective of ACT is not to shun difficult feelings but "*to be present with what life gives us at any given point in time and to [move] toward valued behavior*" (Hayes, Strosahl, & Wilson, 2011). Acceptance and commitment therapy inspires *"individuals to accept the experience of emotional pain as something that is part of human life*" (Pearson, Heffner, & Follette, 2010).

There are six essential treatment methods that are emphasized in ACT*: "acceptance, defusion, contact with the present moment, self as context, values, and committed action*" (Hayes, Luoma, Bond, Masuda, & Lillis, 2006). According to Robb, these processes can be summarized as follows (Robb, 2007):

- *"Acceptance [(see "*Appendix 16: Is Emotion Control Working?" and "Appendix 17: Discovering the Power of Giving up Emotional Control" for description)]*: Allowing thoughts to come and go without struggling with them;*
- Cognitive defusion [(see "Appendix 18: Defusion" for description)]: Learning methods to reduce the tendency to reify thoughts, images, emotions, and memories;
- *Contact with the present moment [(see "*Appendix 8: Three-minute breathing space" for description)]*: Awareness of the here and now, experienced with openness, interest, and receptiveness;*
- *Observing the self [(see "Appendix 19: Observing Self" for description)]: Accessing a transcendent sense of self, a continuity of consciousness which is unchanging;*
- *Values [(see "*Appendix 20: The Bull's Eye" for description)]*: Discovering what is most important to one's true self;*
- *Committed action [(see "*Appendix 21: The Willingness and Action Plan" for description)]*: Setting goals according to values and carrying them out responsibly"*.

The therapy itself is organized around the following constituents: *"creative hopelessness, control as the problem, mindfulness and acceptance, values clarification and barriers to values and committed action*" (Pearson et al., 2010).

The salient phrase that is often used to come to the essence of the treatment is that acceptance and commitment theory means "*moving from FEAR to ACT*" (*A Practical Guide to Acceptance and Commitment Therapy*, 2013) in which both FEAR (**F**usion, **E**valuation, **A**voidance and **R**eason giving) and ACT (**A**ccept, **C**hoose and **T**ake action) are acronyms of the state in which the person finds itself.

4.2.2.4.1 Randomized Controlled Trials ACT

Eleven presently known studies have been conducted "*to evaluate the efficacy of ACT in treating a range of mental health outcomes, including those associated with depression, anxiety, impulse control disorders, schizophrenia, substance abuse and addiction, and workplace stress*" (Keng et al., 2011). All of these studies have shown a positive correlation between the treatment and the well-being of the patient. The following two paragraphs will zoom in on two of these researches.

4.2.2.4.1.1 ACT Findings Gaudiano and Herbert

Gaudiano and Herbert randomly assigned "*[p]sychiatric inpatients with psychotic symptoms […] to enhanced treatment as usual (ETAU) or ETAU plus individual sessions of ACT*" (Gaudiano & Herbert, 2006).

On several of the measured entities the ACT group showed superiority in outcomes when compared to the control group: "[t]he ACT group showed superiority to ETAU on measures related to affective severity, global improvement, distress associated with hallucinations, and social functioning" (Gaudiano & Herbert, 2006). What we observed in an earlier paragraph also proves to be true when an ACT program is executed: "*No significant differences between groups were observed […] to the frequency or severity of psychotic symptoms*" (Gaudiano & Herbert, 2006).

4.2.2.4.1.2 ACT Findings Woods, Wetterneck, Flessner

Woods, Wetterneck and Flessner commenced a study among patients with trichotillomania (hair pulling disorder). The group consisted of 25 patients of which 12 underwent an ACT treatment and 13 were put on a waiting list.

The results were promising and "*demonstrated a significant reduction in hair pulling severity, impairment ratings, and hairs pulled, along with significant reductions in experiential avoidance and both anxiety and depressive symptoms in the ACT/HRT group compared to the waitlist control*" (Woods, Wetterneck, & Flessner, 2006).

4.2.2.5 Summary of Findings of Mindfulness in a Clinical Psychological Setting

The findings of all these treatments look promising and all four intervention types show a positive correlation between the intervention and psychological well-being. The "*evidence*" (*School Mental Health*, 2015) that is gathered from the field of clinical psychology is robust enough "*to take mindfulness seriously*" (*School Mental Health*, 2015).

Participants of the interventions

- showed "lower scores on […]*subscales of Depression, Anxiety, Anger, and Confusion and more Vigor than control subjects"* (Carlson et al., 2001);
- had reduced "*self-reports of overall psychological distress including depression"* (Shapiro et al., 1998);
- *proved that "relapse [into depression] was significantly longer"* (Bondolfi et al., 2010);
- *"had lower medical risk"* (M. M. Linehan et al., 2006);

- had reduced *"high-risk behaviors"* (Verheul et al., 2003);
- had better scores on "*social functioning*" (Gaudiano & Herbert, 2006);
- showed *"significant reductions in experiential avoidance and […] anxiety*" (Woods et al., 2006).

The results have caused a move from psychology to other fields of study (Birrer et al., 2012; Burrows, 2011; Hyland, 2009; Marich et al., 2015; Rodrigues, 2002; Vengapally, 2014) . The following section will describe the effects that mindfulness has had within the area of business.

4.3 Mindfulness in a Business Setting

The concept of mindfulness, which has proven itself to be valuable in a clinical psychological setting (Hayes et al., 2011; Jon Kabat-Zinn, 2013; M. Linehan, 1993a; Segal et al., 2012; Shapiro et al., 2006), has also found its way into the world of business (Välikangas & Romme, 2013; Weick & Sutcliffe, 2001). Time and again businesses fail because they could not respond adequately to unexpected changes in their environment (Bromley, 2002). This lack of agility could be counteracted with the promises that mindfulness offers.

The Department of Command, Leadership and Management of the United States War College coined the phrase "*VUCA World*" (Gerras, 2010) to capture the present-day world. VUCA stands for "*an environment marked by volatility, uncertainty, complexity, and ambiguity*" (Gerras, 2010). Nineteenth Century German military strategist Helmuth von Moltke the Elder already understood this when he said "*No Battle Plan Survives Contact With the Enemy*" ("No Battle Plan Survives Contact With the Enemy," 2010).

It is essential to know the general direction that a business wants to take and to commence the tasks that accompany this chosen direction vividly, as president Eisenhower already understood (Nichols, 2012), but if the climate changes so that the general direction is no longer valid, it should be recognized in time in order to take the necessary counter measures. Companies need "*resilience […] to adapt to unexpected change, and can also enlarge the ability to proactively make collective decisions that optimize future options*" (Newman & Dale, 2005). This timely recognition scheme is often not in place in organizations and when changes in opinion or market working are discovered it is often "*too late to react*" (Gerlach-Kristen, 2005; Mishkin, 2001). Mindful organizations have a way of "*recognizing changes*" (Dess & Lumpkin, 2005) at an early stage and have the "*courage*" (Floyd, Xu, Atkins, & Caldwell, 2013) and the "*resilience*" (Gittell, 2006; Keye & Pidgeon, 2013) to formulate a response to these changes.

The main mechanisms of mindfulness that are enhancing business results can best be understood by figure 1 (figure 1: Mechanisms of Mindfulness) as described by Hafenbrack et al. (Hafenbrack, Kinias, & Barsade, 2014). Mindfulness practices predict an augmentation of a positive emotional state of being, since mindfulness "*increases the willingness to tolerate uncomfortable emotions and sensations*" (Arch & Craske, 2006; Eifert & Heffner, 2003) which indirectly increases the quality of decision making (Loewenstein & Lerner, 2003). Figure 1 furthermore shows that there is a significant direct correlation between the mindfulness state and decision making (Hafenbrack et al., 2014). Lastly the figure shows a predictability between the mindfulness trait and the focus on the present (K. W. Brown & Ryan, 2003; Hafenbrack et al., 2014; Jon Kabat-Zinn, 1991) which again indirectly increases the value of decision making.

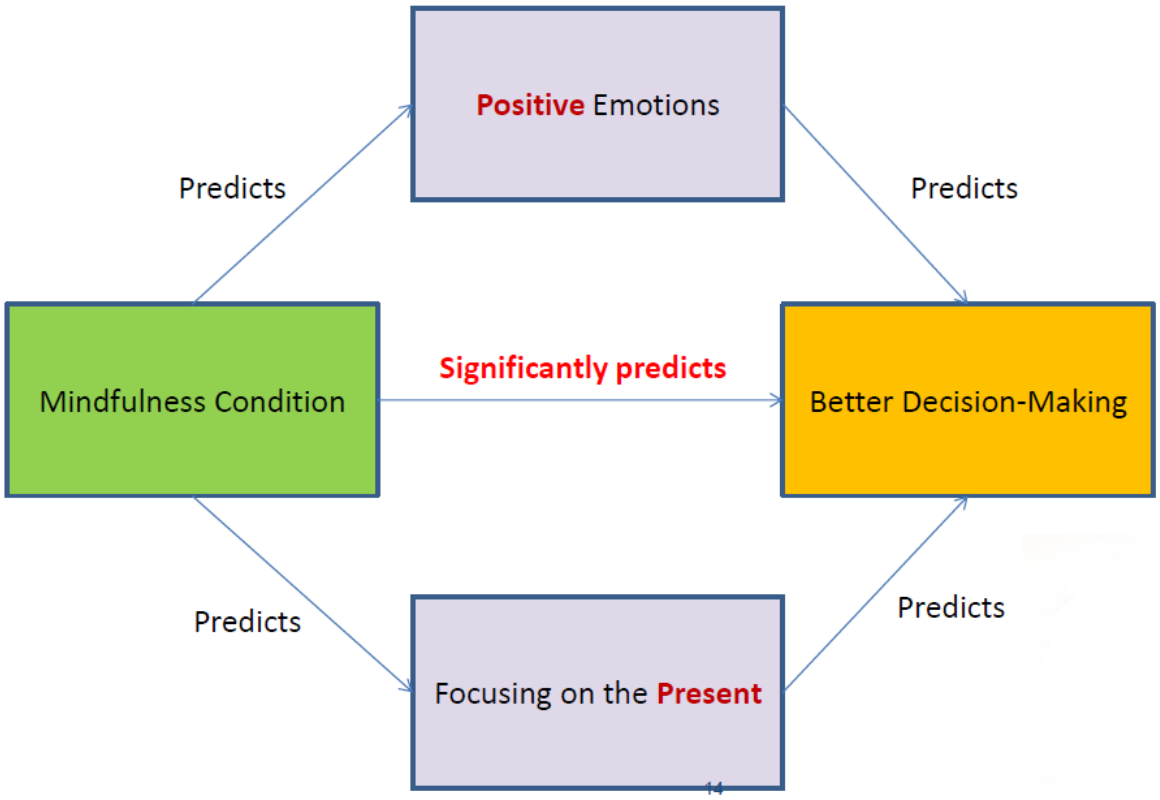


Figure 1: Mechanisms of Mindfulness (Hafenbrack et al., 2014)

Weick et al. proposes the following five key constructs that measure organizational mindfulness (Weick & Sutcliffe, 2001):

1. *Preoccupation with failure;*
2. *Reluctance to simplify interpretations;*
3. *Sensitivity to operations;*
4. *Commitment to resilience;*
5. *Deference to expertise*.

These concepts have been the basis for many academic studies concerning organizational mindfulness (Matook & Kautz, 2008; Mcavoy, Nagle, & Sammon, 2013; Nagle, McAvoy, & Sammon, 2011; Vogus & Sutcliffe, 2012).

Matook and Kautz give the characteristics of these constructs in table 2 (Table 2: Aspects of Collective Mindfulness).

Aspect	Characteristic
1) Preoccupation with failure	Utilization of errors and failures as a way of improvement
2) Reluctance to simplify	Organizational aspiration to perceive problems from different points of view
3) Attention to operations	Individuals' capability to have an integrated overall picture of the operations in an organization or project
4) Commitment to resilience	Ability to cope with problems and dangers as they occur
5) Migration of decisions to expertise	Migrating the problems to the experts, who are most capable of solving them, regardless of hierarchical levels

Table 2: Aspects of Collective Mindfulness (Matook & Kautz, 2008)

The constructs of collective mindfulness that Weick puts forward, give practical handles to operate in the here and the now and quickly respond to slight changes in the environment, it is "*associated with cultures and structures that promote open discussion and it increases organizations' ability to perform in dynamic, unstable environments*" (Matook & Kautz, 2008). "*In general, [collective] mindfulness involves the ability to detect important aspects of the context and take timely, appropriate action*" (Butler & Gray, 2006).

In addition to the constructs of collective mindfulness that Weick proposes (Weick & Sutcliffe, 2001), several scholars and lecturers have suggested other notions with which collective mindfulness can be identified.

[1]. "*Resilience"* (Jha et al., 2015; Välikangas & Romme, 2013)*;*

[2]. *"Presence of mind"* (Hassed, De Lisle, Sullivan, & Pier, 2009; Jon Kabat-Zinn, 2007; Malhotra, Lee, & Uslay, 2012);

[3]. "*Unconditional responsibility"* (Beauchamp, 2004; Gordon, 2014; Kofman, 2008b);

[4]. "*[Investigative] openness"* (Portocarrero, Umbelino, & Wiercinski, 2012; Yanchuk, 2014)

[5]. "[*Experimental], [innovative], and [connecting] action"* (Bartel & Garud, 2009; Gupta, 2013; Koole, 2013)

The subsequent paragraphs will deal with each of these features.

4.3.[1] Resilience

"*It is really wonderful how much resilience there is in human nature,"* Bram Stoker utters in his classic Dracula, "*let any obstructing cause, no matter what, be removed in any way, even by death, and we fly back to first principles of hope and enjoyment"* (Stoker, 2013). Human beings have often needed their basic ingrained faculty of resilience to be able to give a new shape to their alternating and unpredictable environment. This is true on a personal level, but also applies to the world of business.

The Oxford Advanced Learner's Dictionary equals "resilience" to "*The capacity to recover quickly from difficulties*" (*Oxford Advanced Learner's Dictionary, 8th Edition: Paperback*, 2010). Mindfulness presents the practitioner with instruments to handle difficulties more effectively and to "*develop a greater space for a conscious response"* (Koole, 2013), which enhances the elasticity and toughness of a mindfulness agent. The psychologists Ramsey and Biezner see resilience as "*the hardiness needed to change unfortunate situations into advantageous ones*" (Whitehead, D., & Eaton, 2015).

Resilience goes hand in hand with the concept of grit which "*refers to the perseverance and passion for long-term goals*" (Duckworth, Peterson, Matthews, & Kelly, 2007), that is "*characterized as working persistently towards challenges, maintained effort and interest over years despite negative feedback, adversity, plateaus in progress, or failure*" (Duckworth et al., 2007).

On an organizational level resilience "*increases an organization's ability to achieve its objectives in the face of uncertainty and adversity as well as during nonroutine times*" (Leflar & Siegel, 2013).

"*Mindful engagement throughout the organization*", Välikangas and Romme hold, is a "*key condition[…] for resilience"* (Välikangas & Romme, 2013). "*Mindful […] workers continuously develop, refine and update a shared understanding of the situation they face, the problems defining it, and what capabilities exist to ensure or improve […] the safety, well-being, or satisfaction of clients*" (Gittell, 2006; Välikangas & Romme, 2013; Weick & Sutcliffe, 2006).

Organizations like Vroom and Dreesman who have been key players for decades or more have shown remarkable few signs of resilience in the last years. It seems that the expiry date of these old main players has past and that they do not have the elasticity to compete with the new players on the market who have understood the signs of the times better and who have actually helped to define these signs. Vroom and Dreesman and the like have had no resilience to follow suit and have not been able to shed the old paradigm.

Jha et al. conducted research among several military units where they studied "*the impact of mindfulness training (MT) on attentional performance lapses associated with task-unrelated thought (i.e., mind wandering) [and …] investigated if MT may mitigate these deleterious effects and promote cognitive resilience in military cohorts enduring a high-demand interval of predeployment training*" (Jha et al., 2015). The results were promising and showed "*that MT focused on in-class training exercises more so than on in-class didactic instruction may promote cognitive resilience by protecting attentional capacities put at risk by high-demand intervals*" (Jha et al., 2015).

4.3.[2] Presence of Mind

Another aspect of mindfulness in a business setting is a fearless presence of mind which means "*being present without any reservation with what there is, addressing the facts, including ones that are painful, awkward or have been avoided in the past*" (Koole, 2013). That means there are no taboos, no hidden agendas and everything is discussable as it is.

A good example of someone with a fearless presence of mind was David, the Israelite king of the Old Testament. David who is known for his mindful attitude, approached an overwhelmingly disheartening scene when the entire people of Israel lay paralyzed before the scolding of a gigantic and daunting opponent. With a fearless presence of mind David approached their vicious opponent without armor and neutralized the giant and champion fighter Goliath with one professionally astutely placed sling shot (New International Version, 2011). The result of that one act was that the whole people of Israel gained the courage to stand up against the people of Philistia and uprooted them. One act of fearlessness saved the day.

One of the mindfulness practices that helps to create a fearless presence of mind is the practice of pausing. The acronym STOP indicates what this practice entails:

- "***S**top;*
- ***T**ake a breath;*
- ***O**bserve, acknowledge, and allow what's here;*
- ***P**roceed and be present*" (V. Brown & Olson, 2014).

Pausing gives "*the mental energy and space for your mind to find a solution*" (Lein & Sheth, 2011) and makes us "*fearless: We do not hide from anything but instead look directly at our experience*" (Hayward & Hayward, 1995).

4.3.[3] Unconditional Responsibility

Mindful personal and organizational leadership also means taking responsibility for the state of affairs at hand, "*however difficult*" (Koole, 2013). This means no finger pointing to other persons, teams and/or organizations when a problematic situation presents itself. So often teams do not take this responsibility when they are underperforming. It is either the manager, another colleague, another organization or just a set of circumstances that have caused this floundering, thereby too quickly adopting the role of the victim. Mindfulness gives you an attitude in which "*you choose to be a player and not a victim*" (Kofman, 2008a).

It is the "degree of unconditional responsibility for the welfare of another person that is the marker of a communal relationship" (*Encyclopedia of Social Psychology*, 2007) Baumeister holds. He continues his monologue with "*each person in the relationship feels the same degree of communal*

responsibility for the other" (*Encyclopedia of Social Psychology*, 2007). Responsibility has therefore the ability to feed on the mutual responsibility that is present in the community or in the team. Since the leader is the mirror of the team, he or she has the greatest potential to instill the highest degree of responsibility within a team.

Victor Frankl, a survivor of the concentration camps in World War II, portrayed this unconditional responsibility potently. When he had every reason to ascribe the role of the victim, he changed his mind-set by alternating his standard life inquiry from "*What do I want to happen?*" to "*What does this situation ask of me?*" (Frankl, 2013). This change of inquiry demanded a change of worldview, the latter question being a question that shows that you often cannot influence your situation, but you can always determine your response to it. This change of attitude denotes his unconditional responsibility for his own action toward a situation.

4.3.[4] Investigative Openness

Investigative Openness or enquiring openness is another element that is part of the suite of mindfulness within organizations. This entails that the mindful practitioner relentlessly investigates "*experiences and patterns in the culture*" (Koole, 2013), while "*disengaging individuals from unhealthy thoughts, habits and unhealthy behavior patterns*" (K. W. Brown & Ryan, 2003). This should have an cathartic effect on an organization because "*becoming more mindful of one's thoughts and emotional response patterns can be a source for altering them and can therefore be important to supporting positive organizational change*" (Manuti & palma, 2014).

Mindfulness then supports the ability to discover ingrained habits, it involves "*taking a stance of creative problem-solving and openness towards novelty [… and] entails open assimilative 'wakefulness' to cognitive tasks such as the creation of new categories*" (Niemiec, 2013). The mindful practitioner therefore does not need to choose between existing categories, but can create new ones when the situation demands it.

Henry Ford for example thought in terms of new categories as his famous quote shows: "*If I had asked people what they wanted, they would have said faster horses*" (Bergenholtz, Nielsen, & Tarp, 2009). Ford would never have been able to build the famous T-Ford, if he would not have had an investigative openness with which he looked at his environment which resulted in new categories and paradigms.

4.3.[5] Experimental, Innovative and Connecting Action

And lastly the mindful consultant has an increased ability for "*experimental, innovative and connecting action, with which they direct the attention of the organization […] onto that which is unfolding before them*" (Koole, 2013). The mindful practitioner can formulate proper action that leads an organization from the old paradigm to the new reality. This change is not without danger since new paradigms are "*often associated with skepticism, mistrust and disbelief: the new paradigms are unsettling, as they perturb the longstanding mindset that has already developed familiarity, comfort and accessibility of truth"* (*The Wiley Blackwell Handbook of Mindfulness*, 2014).

The mindful leader therefore needs to be alert to take this into account when he or she initiates the action and gradually moves the organization towards a more open mindset in order to remain relevant for the present. Scharmer presents this action like this: "*after deeply immersing yourself in the contexts and places of most potential, the next movement focuses on accessing a deeper source*

of knowing: connecting to the future that wants to emerge through you" (Scharmer, 2009). Scharmer continues to speak about experimental action as prototyping strategic microcosms. "*A strategic microcosm, "* he says, "*is a small version of the future that you want to create that include all core elements of your vision. It requires you to have the confidence to move into action before you have figured out the entire plan forward*" (Scharmer, 2009). A mindful practitioner can trust that he or she has "*the capacity to improvise and to connect to the right places and communities*" (Scharmer, 2009)

Altogether the palette of tools that is available to a mindful practitioner has a quite extended nature and will serve him or her to be equipped to use the right response at the right time in order to move the organization to a new level of service that is demanded for this present time.

4.3.6 Randomized Controlled Trials in a Business Setting

Several randomized controlled trials have been undertaken to prove the effectiveness of mindfulness in a business setting. The following randomized controlled trials are some of the trials that have been recognized by dr. Jutta Tobias (Choi & Tobias, 2015; Nandram & Borden, 2011), lecturer at Cranfield school of management:

1. Debiasing the Mind Through Meditation: Mindfulness and the Sunk-Cost Bias (Hafenbrack et al., 2014);
2. Leading Mindfully: Two Studies of the Influence of Supervisor Trait Mindfulness on Employee Well-Being and Performance (Reb, Narayanan, & Chaturvedi, 2014);
3. Task complexity matters: The influence of trait mindfulness on task and safety performance of nuclear power plant operators (Zhang, Ding, Li, & Wu, 2013);

The following paragraphs will give the research results of these studies.

4.3.6.[1] RCT: Debiasing the Mind Through Meditation: Mindfulness and the Sunk-Cost Bias

In this randomized controlled trial Hafenbrack and Barsade focused on the effect of mindfulness on "*the sunk-cost bias*" (Hafenbrack et al., 2014). The scholars conducted four studies to prove a negative correlation between mindfulness and the "*tendency to allow unrecoverable prior costs to influence current decisions*" (Hafenbrack et al., 2014). Four studies were conducted.

Study 1 (see: "table 3: RCT: Debiasing the Mind Through Meditation: Mindfulness and the Sunk-Cost Bias") was crafted to demonstrate a correlation between "*trait mindfulness and resistance to the sunk-cost bias*" (Hafenbrack et al., 2014). In the study 178 adults participated. This study had the participants fill out the Mindfulness Attention Awareness Scale (K. W. Brown & Ryan, 2003). The participants also filled out the Resisting Sunk Costs subsection of the Adult Decision-Making Competence Inventory (Bruine de Bruin, Parker, & Fischhoff, 2007), which gives an indication of how the participants would respond to sunk-cost scenario's. The study showed that there was a positive correlation between mindfulness and "*resisting the sunk-cost bias (r=.205, p = .003)*" (Hafenbrack et al., 2014).

Study 2a (see: "table 3: RCT: Debiasing the Mind Through Meditation: Mindfulness and the Sunk-Cost Bias") was designed to test the causal effect between state mindfulness and the sunk-cost bias through "*an experimental manipulation of mindfulness meditation*" (Hafenbrack et al., 2014). In the study, 57 undergraduate students participated. The participants were "*randomly assigned to one of two experimental conditions: mindfulness meditation or a mind-wandering control condition*"

(Hafenbrack et al., 2014). These instructions were designed by a professional mindfulness-meditation instructor and lasted for 15 minutes. The directives of the mindfulness meditation were based on the focused breathing induction as described by Arch and Craske (Arch & Craske, 2006)(see "Appendix 22: focused breathing induction" for a description) which were a slight adaptation of the sitting meditation that was developed by Kabat-Zinn (see "Appendix 3: Mindful Sitting Meditation" for a full description). After the experiment the participants performed a decision making task , "*the outcome of which indicated whether participants had resisted the sunk-cost bias"* (Hafenbrack et al., 2014). The outcome of the study was that the participants that had just had a mindfulness meditation manipulation resisted the sunk-bias more effectively (78%) than the control group (44%).

Study 2b (see: "table 3: RCT: Debiasing the Mind Through Meditation: Mindfulness and the Sunk-Cost Bias") was introduced to provide a follow-up and was intended to " *replicate study 2a with a different decision task"* (Hafenbrack et al., 2014). This time 109 undergraduate students partook. The same intervention was used as was the case in study 2a. Again the outcome showed that the mindfulness-meditation group showed a considerable higher resistance towards sunk-cost bias (53%) compared with the control group (29%). This outcome acknowledged the results of study 2a.

Study 3 (see: "table 3: RCT: Debiasing the Mind Through Meditation: Mindfulness and the Sunk-Cost Bias") "*replicated the experimental finding that mindfulness meditation significantly increases resistance to the sunk-cost bias*" (Hafenbrack et al., 2014) and included 156 participants.

Study	N	Method	Outcome
Study 1	178	1. Fill out MAAS 2. Fill out Resisting Sunk Costs subsection of Adult Decision-Making Competence Inventory	Mindfulness ↑ => Resisting the sunk-cost bias↑
Study 2a	57	Group 1: Mindfulness Meditation • 15 minutes focused breathing Group 2: mind-wandering control condition • 15 minutes think of "whatever came to mind" => Both groups: • Perform decision making task which indicated whether participants had resisted the sunk-cost bias	Mindfulness ↑ => Resisting the sunk-cost bias↑
Study 2b	109	Group 1: Mindfulness Meditation • 15 minutes focused breathing	Mindfulness ↑ => Resisting the sunk-cost bias↑

Study	N	Method	Outcome
		Group 2: mind-wandering control condition • 15 minutes think of "whatever came to mind" => Both groups: Perform decision making task which indicated whether participants had resisted the sunk-cost bias	
Study 3	156	Group 1: Mindfulness Meditation • 15 minutes focused breathing Group 2: mind-wandering control condition • 15 minutes think of "whatever came to mind" => Both groups: 1. Fill out Resisting Sunk Costs subsection of Adult Decision-Making Competence Inventory 2. Fill out a three-item survey measuring the degree to which their thoughts were focused on the future or past 3. Fill out the Positive and Negative Affect Schedule	Mindfulness ↑ => 1. Resisting the sunk-cost bias↑ 2. Awareness of present moment ↑ 3. Negative affect ↓

Table 3: RCT: Debiasing the Mind Through Meditation: Mindfulness and the Sunk-Cost Bias

4.3.6.[2] RCT: Leading Mindfully: Two Studies of the Influence of Supervisor Trait Mindfulness on Employee Well-Being and Performance

Reb et al. examined the effect of "leader's mindfulness on employee well-being and performance" (Reb et al., 2014). To prove this hypothesis two different randomized control trials were designed, each of these we will discuss in de paragraphs below.

Study 1 (see "Table 4: RCT: Leading Mindfully: Two Studies of the Influence of Supervisor Trait Mindfulness on Employee Well-Being and Performance ") investigated 96 supervisors and their subordinates. The participants had two moments in time with two weeks apart when data was collected. The supervisors had to fill out the Mindfulness Attention Awareness Scale (K. W. Brown & Ryan, 2003). The subordinates had to submit themselves to the Maslach Burnout Inventory (Maslach,

Jackson, & Leiter, 1997) through which employee emotional exhaustion was measured and had to fill out the work-life balance sheet developed by Greenhaus, Collins and Shaw (Greenhaus, Collins, & Shaw, 2003). Furthermore the supervisor had to fill out an overall job performance scale for his or her subordinates which was created by Motowidlo and Scotter (Motowidlo & Van Scotter, 1994) and had to indicate the aspect of deviance observed in the employee by filling out the supervisor's ratings that were established by Bennett and Robinson (Bennett & Robinson, 2000). The inter correlations of all study variables showed that "*leader mindfulness was significantly related to both employee well-being and performance measures in the expected directions*" (Reb et al., 2014). Reb et al. showed that the higher the degree of mindfulness of the supervisor is (Reb et al., 2014):

- the lower the emotional exhaustion rate of the employee, $r=-.40$, $p < .01$;
- the higher the work-balance of the employee, $r=.28$, $p < .05$;
- the more favorable the overall work performance, $r=.32$, $p < .01$;
- the lower the deviance rating that the employee received, $r=-.57$, $p < .01$.

Study 2 (see "Table 4: RCT: Leading Mindfully: Two Studies of the Influence of Supervisor Trait Mindfulness on Employee Well-Being and Performance ") provided "*a conceptual replication of the findings of Study 1*" (Reb et al., 2014). There were 79 supervisors and their subordinates that took part in this study. The supervisors again had to fill out the Mindfulness Attention Aware Scale (K. W. Brown & Ryan, 2003). Job satisfaction was measured with the Michigan Organizational Assessment Questionnaire (Vancouver & Schmitt, N. W., 1991). Employee psychological need satisfaction was measured by the 21-item need satisfaction scale instigated by Deci et al. (Deci et al., 2001). Performance measure were once more performed by the overall job performance scale (Motowidlo & Van Scotter, 1994). Finally organizational citizenship behavior was measured using Moorman and Blakely's 17 item scale (Moorman & Blakely, 1995) to fortify the findings of the overall job performance scale (Motowidlo & Van Scotter, 1994). As in study 1, there were two separate moments were the data was collected with two weeks apart. Again the results were as expected and showed a significant correlation between leadership mindfulness and employee well-being and performance. Study 2 of Reb et al. (Reb et al., 2014) showed that the higher the supervisor's mindfulness:

- the higher the employees' psychological need satisfaction, $r=.36$, $p < .01$;
- the higher the job satisfaction of the employee, $r=.27$, $p < .05$;
- the more favorable overall job performance ratings, $r=.27$, $p < .05$;
- the higher the in-role performance, $r=.43$, $p < .01$;
- the higher the engagement with organizational citizenship behaviors, $r=.38$, $p < .01$.

Study	N	Method	Outcome
Study 1	96	Group Supervisors 1. Fill out MAAS 2. Fill out an overall job performance scale 3. Fill out the supervisor's ratings that were established by Bennett and Robinson	Mindfulness ↑ => 1. Emotional exhaustion ↓ 2. Work-balance ↑ 3. Overall work performance ↑

Study	N	Method	Outcome
		Group Subordinates 1. Fill out Maslach Burnout Inventory 2. fill out the work-life balance sheet Both groups had to fill out these scales twice with two weeks apart	4. Deviance rating ↓
Study 2	79	Group Supervisors 1. Fill out MAAS 2. Fill out an overall job performance scale 3. Fill out Moorman and Blakely's 17 item scale (for citizenship behavior) Group Subordinates 1. Fill out Michigan Organizational Assessment Questionnaire 2. Fill out need satisfaction scale Both groups had to fill out these scales twice with two weeks apart	Mindfulness ↑ => 1. Psychological need satisfaction ↑ 2. Job satisfaction ↑ 3. Overall job performance ↑ 4. In-role performance ↑ 5. Engagement with organizational citizenship behaviors ↑

Table 4: RCT: Leading Mindfully: Two Studies of the Influence of Supervisor Trait Mindfulness on Employee Well-Being and Performance

4.3.6.[3] RCT: Task complexity matters: The influence of trait mindfulness on task and safety performance of nuclear power plant operators

Zhang et al. conducted a field study in a nuclear power plant context where "*the task complexity between control room operators (CROs) and field operators (FOs)*" (Zhang et al., 2013) was measured.

Two studies were designed to prove the correlation between mindfulness and safety performance.

Study 1 (see "Table 5: RCT: Task complexity matters: The influence of trait mindfulness on task and safety performance of nuclear power plant operators ") was commenced in order to prove that the Freiburg Mindfulness Inventory (FMI) had a "*structural validity*" (Zhang et al., 2013) to be the basis for the second study. In total 294 persons participated. The participants had to fill out the following self-analysis reports:

- The FMI (Walach, Buchheld, Buttenmüller, Kleinknecht, & Schmidt, 2006);
- The Cognitive Failure Questionnaire (CFQ)
- The Self-rating Depression Scale (SDS)

The conclusion of study 1 is that the required minimum "*structural and criterion related validity*" (Zhang et al., 2013) to serve as the instrument of study 2.

In study 2 (see "Table 5: RCT: Task complexity matters: The influence of trait mindfulness on task and safety performance of nuclear power plant operators") a total of 63 CROs and 73 FOs at two newly operating reactors run by one nuclear energy corporation participated. All participants completed questionnaires during their regular training sessions. Afterwards, their supervisors were separately contacted in person and asked to rate the performance of their subordinates. The following questionnaires needed to filled out by all participants:

- The FMI (Walach et al., 2006);
- The NEO Five Factor Inventory (in order to measure the amount of neuroticism, agreeableness and conscientiousness) (Costa, & McCrae, 1992).

The supervisors in addition needed to fill out the subsequent surveys:

- The General Task Performance Scale (L. J. Williams & Anderson, 1991);
- Safety Compliance and Participation Scales (Jiang, Yu, Li, & Li, 2010).

The conclusion of study 2 is that the higher the presence factor (which is one of the determinants of mindfulness), the higher the task performance and the task safety for high-complexity task holders. For low-complexity task holders this effect has not been statistically confirmed.

Study	N	Method	Outcome
Study 1	294	1. Fill out the Freiburg Mindfulness Inventory (FMI) 2. Fill out the Cognitive Failure Questionnaire (CFQ) 3. Fill out the Self-rating Depression Scale (SDS)	FMI has acceptable structure and serves as instrument of study 2
Study 2	136	All 1. Fill out the FMI 2. Fill out the NEO Five Factor Inventory Group Supervisors (CRO's) 3. Fill out the General Task Performance Scale 4. Fill out the Safety Compliance and Participation Scales	Mindfulness ↑ => Presence factor ↑ => If high complexity task: 1. Task performance ↑ 2. Safety performance ↑ 3. Agreeableness ↑

Table 5: RCT: Task complexity matters: The influence of trait mindfulness on task and safety performance of nuclear power plant operators

4.4 Ethical Implications of Mindfulness in a Western Setting

After covering the introduction of Mindfulness in western psychology and having seen what the results of mindfulness are in a business setting, we want to cover the ethical implications of mindfulness in a Western setting. The secularization of Mindfulness in which it is severed from its Buddhist roots has been the cause of some discussion concerning its ethical implications (Goto-Jones, 2013). Different media report nothing but good things about Mindfulness, but almost forcefully add that you don't need to worry about the fact that you need to be a Buddhist in order to practice Mindfulness (Jon Kabat-Zinn, 2005). Every study that has been portrayed above gives a beneficial outcome for mindfulness on some psychological trait. The secularity of Mindfulness is seen to be essential for its widespread acceptance in a culture with predominantly Christian roots (Goto-Jones, 2013). Its beneficial use seems almost limitless and its media coverage nearly seems to give it the status of the new miracle drug. The following paragraphs give an introduction to some of the concerns that have been raised as a result of the Western use of the Eastern concept of Mindfulness.

4.4.1 McMindfulness

Some authors have referred to this modern version of Mindfulness as McMindfulness (MacCoon, Rosenkranz, & Davidson, 2007; Purser & Loy, 2013; Rubin, 2015). Modern culture is spellbound by quick fixes and Mindfulness is no exception to that rule(Neale, 2011). In the term McMindfulness a concern is raised that the modern variant of Mindfulness is offered in a very commercial package in which Mindfulness training is being pushed by "*savvy consultants*" (Purser & Loy, 2013). Rather than to give mindfulness practitioners the tools to recognize and to deal with the origins of social injustice, McMindfulness gives self-help techniques "*that can actually reinforce those roots*" (Purser & Loy, 2013). The enhancement of concentration and the reduction of stress should not be an end in itself but have to be imbedded in ethical behavior that supersedes these qualities (Purser & Loy, 2013). The McMindfulness approach tells the practitioner to accept the circumstances as they are, no matter how immoral they are, and to give handles to be able to operate more efficiently in a toxic environment, shifting the problem completely to the individual and letting the toxic organization off the hook (Purser & Loy, 2013).

4.4.2 Social Control

Is mindfulness the new opiate for the people (Dawson & Turnbull, 2006; Goto-Jones, 2013)? This is a question that has lead Dr. Goto-Jones to compare mindfulness practitioners with mindless zombies (Goto-Jones, 2013). Instead of changing and challenging evil structures the mindfulness practitioner learns how to live in such constructions and to accept them. In this view amoral mindfulness becomes a construct that is a vehicle for social control: accept the evils around you with optimized inner peace. The most prevalent research questions that are asked concerning mindfulness is "*whether or not mindfulness works*" (Goto-Jones, 2013) (in that regard this paper is following suit) thereby bypassing pressing issues like cultural, social or political matters and thus leaving them unchallenged and unchanged.

Dane and Brummel demonstrated that there is a negative correlation between mindfulness and turnover intention (Dane & Brummel, 2013). Could this also be explained through the suggested relationship between mindfulness and social control? The wrongs in an organization are accepted, unchallenged and unchanged, but the people are equipped to endure the evil that is presented to them in the alienating capitalist environment (Goto-Jones, 2013).

5. Methodology

One of the main questions that is posed in the research question section is: *what is the effect of a short mindfulness exercise on the quality of meetings in an agile project team?*

The methodology that will be used in order to answer that question and to fathom if mindful practices have a positive effect on agile project organizations is stated in table 6 (Table 6: Methodologies used to find the effects of mindfulness on agile project organizations).

Nr	Methodology	Description
1	Experiment	The experiment should give an understanding if there is a correlation between trait mindfulness and the effectiveness of the daily stand-up meeting and the retrospective in an agile project organization.

Table 6: Methodologies used to find the effects of mindfulness on agile project organizations

5.1 Experiment

The method that is chosen to prove the correlation between mindfulness and the effectiveness of a meeting in an agile context is the experiment. The main goal of an experiment is "*to establish a causal connection between the independent and dependent variables"* (Kirk, 1982). The following paragraphs will give the reason why this method is chosen, as well as the general approach of experiments in general. Subsequently it will give with the protocol of the specific experiment of this particular study and will end with a quick reference card of the chosen protocol.

5.1.1 Why the Experimental Method for this Particular Study

Sir Ronald Fischer, who is "*rightly regarded as the founder of the modern methods of design and analysis of experiments*" (Yates, 1964) said that experiments are "*only experience carefully planned in advance, and designed to form a secure basis of new knowledge*" (Fisher, 1935).

This study wants to determine whether there is a positive correlation between trait mindfulness and the effectiveness of a meeting in an agile project organization. The literature study suggests that such a relationship exists and has found many positive effects on a person's well-being and an organization's effectiveness. The experiment should solidify this suggestion by collecting first hand data from "*carefully planned experience*" (Fisher, 1935) to prove or disprove the theoretical framework. An experiment is a very good instrument to "*support or disprove*" (Griffith, 1992) existing theories or new hypotheses, which is exactly the rationale of this paper.

The experiment that will be conducted is the randomized controlled trial. The randomized controlled trial (RCT) "*is accepted by medicine as objective scientific methodology that, when ideally performed, produces knowledge untainted by bias*" (Kaptchuk, 2001), it is considered to be " *the gold standard*" (Meldrum, 2000) in psychological and medical research.

5.1.2 General Approach of the Experimental Method

According to Kirk (Kirk, 1982), experiments are characterized by the:

1. "*manipulation of one or more independent variables;*
2. *use of controls such as randomly assigning participants or experimental units to one or more independent variables;*
3. *careful observation or measurement of one or more dependent variables*".

An experiment generally uses controls to "*minimize the effect of variables other than the treatment variable*" (Lewis-Beck, Bryman, & Liao, 2003).

In experiments "*experimental units [...] are randomly assigned to a treatment or control condition where one or more outcomes are assessed*" (Holland, 1986). This randomness is important because it "*distinguishes a rigorous, "true" experiment from an observational study or "quasi-experiment*" (Creswell, 2005), because "*it minimizes allocation bias*" (Moher et al., 2010).

Lachin shows that a true randomization procedure wants to achieve the following goals (Lachin, 1988):

1. "*It will maximize statistical power;*
2. *It will minimize selection bias;*
3. *It will minimize allocation bias"*.

Another aspect of experiments is that they have to be repeated in order to limit the measurement uncertainty in order to "*establish[…] reliability*" (*Research Methods in Psychology*, 2006). If the same experiment leads to the same results every time it is executed, "*the experiment is said to be reliable*" (*Research Methods in Psychology*, 2006).

The experiment not only needs to be reliable, it also has to be valid. The results of the experiment need to be critically assessed and the likelihood of having arrived at "*the correct conclusions about the role of the independent variable*" (Levine & Parkinson, 2014) says something about the validity of the experiment. "*The minimum requirement for […] a fair test is that […] there be no competing explanations for any observed differences*" (Levine & Parkinson, 2014).

The building blocks of the design of an experiment are according to Kirk (Kirk, 1982) summarized as follows:

1. *"Formulation of hypothesis;*
2. *Determination of treatment levels;*
3. *Specification of experimental units;*
4. *Specification of the randomization procedure;*
5. *Determination of statistical analysis"*.

5.1.3 Protocol of this Experiment

The experiment that will be conducted wants to prove the correlation between mindfulness and the effect on the effectiveness of meetings in an agile setting.

The experiment was conducted among software development teams in three different organizations that are presently working with agile processes. This demands that these teams are working with

short cyclical iterations in which working software is completed after each sprint. In each of these three organizations, three development teams that have the same setup will be allocated to partake. The teams have been chosen in consultation with an HR manager that is familiar with the teams and knows the make-up of the teams.

All the teams have been submitted to a test in which the effectiveness of both three daily stand-ups and three retrospectives that are held at the end of each sprint are measured. The effectiveness of the meetings will be measured per type of meeting. The following meetings will use the subsequent charts:

1. The Stand-up meeting uses Appendix 23 (Questionnaire Guide for Stand-up Meetings) which consists out of:
    - the general *Team Effectiveness Chart* (see "Appendix 23 A: Team Effectiveness Chart" for full description)
    - as well as the *Perceptive Agile Measurement (PAM) Scales* chart for the Stand-up meeting as tested by Chaehan So and Wolfgang Scholl (So & Scholl, n.d.) (see "Appendix 23 B: Perceptive Agile Measurement (PAM) Scales. Scale: Stand-up Meetings").
2. The Retrospective meeting uses Appendix 24 (Questionnaire Guide for Retrospectives) which consists out of:
    - the general *Team Effectiveness Chart* (see "Appendix 24 A: Team Effectiveness Chart" for full description)
    - as well as the *Perceptive Agile Measurement (PAM) Scales* chart for the Retrospective meeting as tested by Chaehan So and Wolfgang Scholl (So & Scholl, n.d.) (see "Appendix 24 B: Perceptive Agile Measurement (PAM) Scales. Scale: Retrospectives").

The preparation that is required of the teams will depend on the role the team has been given and is shown below:

- One team per organization will prepare the meeting with the three-minute breathing space exercise as is described in Appendix 8 (Appendix 8: Three-minute breathing space (Koole, 2013; Segal, Teasdale, et al., 2002; M. Williams & Penman, 2011)).
- Another team will be exposed to a three minute music video of composer Igor Stravinsky before the meeting starts ("Igor Stravinsky - Tango (audio + sheet music) - YouTube," n.d.)(URL to the video: https://www.youtube.com/watch?v=VcXTFRXenwI).
- The third team in that organization will not be exposed to any exercise before its meetings.

The three-minute breathing space exercise will be conducted by a trained mindfulness coach who will be present at the meeting site. This exercise will be alike the online three minute breathing space video which is given by Jon Kabat-Zinn ("The Breathing Space by Jon Kabat-Zinn: A 3 Minute Exercise - YouTube," n.d.) (URL: https://www.youtube.com/watch?v=iZIjDtHUsR0).

This preparation, if any, will be conducted five minutes before the meeting starts. If the preparation has been completed the team members will start their meeting.

After each meeting all team members will have to fill out the Team Effectiveness Chart and the Perceptive Agile Measurement Scales for the type of meeting that it applies to, providing grades for all the metrics that are described in the tests. The different interventions should prove that the "*nature of the intervention or condition (the independent variable or i.v.) causes an effect […] (the dependent variable or d.v.)*" (Boniface, 1994) towards the effectiveness of the team meeting.

The mindfulness exercise as well as the Stravinsky placebo exercise were both guided by certified mindfulness instructors to give the best results. The instructors were present five minutes before the meeting started and conducted the exercise type that was assigned to the team. After the exercise had taken place the team would start with its meeting. Shortly thereafter the team would fill out the forms. The act as usual team was not guided at all but needed to fill out the forms on exactly the same moments as the other teams to follow their heartbeat.

The form had two sections. One section was meant for the standup meeting and the other for the retrospective. Each of these sections was subdivided in again two subsections. One was a general section that was the same for both the standup as well as for the retrospective and dealt with questions about effectiveness and culture. The other was specifically designed for the type of meeting that was taken place and dealt with specific questions that the type of meeting needed to accomplish.

All statistical analysis has been done with Tinn-R 2.3.7.1 together with R 2.12.2. Both are open source applications for statistical computing. The R code that is used can be found in Appendix 25 (Appendix 25: R Code for Statistical Analysis). The tables in paragraph 8.3 have been generated by Qlikview software (version 11.00.11154.0 IR).

5.1.4 Quick Reference Card for the Experiment

Table 7 (Table 7: Quick Reference Card for the Experiment) shows the steps that are to be taken for the experiment:

Nr	When	Duration	Phase	Active Group	Placebo Group	Treatment as Usual (Natural History) Group	Iterations
1	Just before meeting	5 min.	Preparation	Execute the three minute breathing space	Listen to Tango of Igor Stravinsky	None	The experiment will be repeated
2	During meeting	15 min – 60 min	Execution	Attend and participate in meeting			• 3 times for Stand-up meetings
3	Right after meeting	5 min.	Feed-back	Give feedback on the meeting you just had. Do this by filling out the following:			

					AND
				• [Fill out the Questionnaire Guide for Stand-up Meetings (for Stand-up meetings) OR • Fill Out the Questionnaire Guide for Retrospectives (for Retrospective meetings)]	• 3 times for Retrospectives meetings
4	Right after giving feed-back	1 min.	Collecting feed-back	Hand over the form to your contact person. The contact person will hand over all feed-back forms to the researcher after all the feed-back has been given.	

Table 7: Quick Reference Card for the Experiment

5.1.5 Questionnaire Guide Questions

The questions that need to be answered each of the team members after the meeting has been conducted can be sub-divided in three parts. There is a general section that needs to be answered after both meeting types are executed (see Appendix 23 and 24). The other two parts are related to their meeting types: both a standup section (see Appendix 23) and a retrospective section (see Appendix 24). All questions need to be answered with a 1 to 7 scale in which 1 means 'never' and 7 indicates 'always'. The questions are asked in such a way that the higher the score the better for the team. The following paragraphs will state these questions.

5.1.5.1 Questionnaire Guide Questions - General Section

The following statements are answered in the general sections of both meeting types (see Appendix 23 and 24). Each question is preceded with a question code, that will be referred to in the rest of the text. The purpose of each question will be given directly below the stated question.

- G01. Everyone is involved in the decision-making process.
  - measuring the engagement of team members in the group
- G02. The team vision was well defined.
  - measuring the actual results of the meeting against the overall goals of the team
- G03. The meeting atmosphere was constructive, calm and open.
  - measuring the 'temperature' of the ambiance of the team meeting
- G04. The meeting was effective.
  - measuring the manner in which team members came to desired results
- G05. All meeting participants listened well to each other.
  - measuring the quality of attentiveness
- G06. The meeting objectives were met.
  - measuring the actual results of the meeting against the desired results
- G07. The meeting was honest.

  - measuring the transparency of the meeting
- G08. The level of disagreement during the meeting was acceptable.
  - measuring the effectiveness of conflict handling
- G09. The tension during the meeting was tolerable.
  - measuring the effectiveness of dealing with stress levels
- G10. The interaction in the meeting was good.
  - measuring the quality of communication
- G11. The emotional responses within the meeting were healthy.
  - measuring the quality of reactions within the group

5.1.5.2 Questionnaire Guide Questions – Stand-Up Meetings Section

The following statements only needed to be answered after a stand-up meeting had been conducted (see Appendix 23). These questions have been taken from Chaehan So and Wolfgang Scholl (So & Scholl, n.d.) who measured these questions on their internal consistency. Again the questions were provided with a question code that is further referred to in the text below. These are the statements, followed by the explanation of the concerning question:

- S01. Stand up meetings were extremely short (max. 15 minutes).
  - measuring the ability of the team to keep the meeting as concise as possible as formally described for a stand-up meeting
- S02. Stand up meetings were to the point, focusing only on what had been done and needed to be done on that day.
  - measuring the ability of the team to stay focused without digression to non-relevant issues
- S03. All relevant technical issues or organizational impediments came up in the stand-up meetings.
  - measuring the awareness of the team to signal significant obstructions that the team encounters to prevent them from doing their work effectively
- S04. Stand up meetings provided the quickest way to notify other team members about problems.
  - measuring to what degree the intended purpose of the stand-up meeting to the notify team members promptly and adequately was met
- S05. When people reported problems in the stand-up meetings, team members offered to help instantly.
  - measuring the degree of co-ownership of team members

5.1.5.3 Questionnaire Guide Questions – Retrospectives Section

The last set of statements is found in the retrospective section of the questionnaire guide for retrospectives (see Appendix 24). These are the questions that need to be answered after a guided retrospective has taken place. The questions are again taken from So & Scholl (So & Scholl, n.d.) who researched them for their internal consistency. Also these questions have been given a code that links them to the results below. The statements, with their explanations, are:

- R01. How often did you apply retrospectives?
  - measuring the continuous will to periodically self-reflect as a team
- R02. All team members actively participated in gathering lessons learned in the retrospectives.

  - measuring the will to actively learn from the reflection period
- R03. The retrospectives helped us become aware of what we did well in the past iteration/s.
  - measuring the ability to recognize the internal workings of the team over the reflection period
- R04. The retrospectives helped us become aware of what we should improve in the upcoming iteration/s.
  - measuring the ability to define measurable actions that lead to improvement of the effectiveness of the team
- R05. In the retrospectives (or shortly afterwards), we systematically assigned all important points for improvement to responsible individuals.
  - measuring the degree to which the measurable actions have been assigned to the proper team member(s)/stakeholder(s) in order to give the action the highest likelihood to succeed
- R06. Our team followed up intensively on the progress of each improvement point elaborated in a retrospective.
  - measuring the degree of commitment to defined measurable actions in previous retrospectives

5.1.6 Open Questionnaire Questions

After the whole experiment had been conducted the team members received an open questionnaire guide which they had to fill in online through eSurv.org. These question can be found in Appendix 26 (Appendix 26 – Open Questionnaire Questions). The link to the survey can be found here: http://esurv.org/online-survey.php?surveyID=LBJNHI_52664437. The participants could tell in their own words how they had experienced the exercises and if they would apply similar exercises for future use.

6. Main Results and Findings

This section presents the results of the experiment. The experiment has been conducted in three different renowned companies in The Netherlands. Two of these companies provided three teams to participate in the experiment and one company provided two teams. All three companies appointed one team to be the mindfulness team and another team to act as usual. The two companies that provided three teams had the third team participate in a placebo exercise by listening to music of Stravinsky just before the start of the meeting. All in all there were therefore eight teams that were involved in the experiment.

Every team consisted of approximately eight members. Each team had seven measuring moments, consisting of one baseline to measure the effectiveness and culture of the team before any intervention was provided and six guided measuring moments. The measuring took place right after the meeting had taken place in which every team member had to fill out a questionnaire that indicated the effectiveness and culture of the team during the meeting. Two agile type of meetings were measured. One was the standup meeting and the other the retrospective. Each of these meetings was measured three times.

Table 8 (Table 8: Team metrics) shows the teams and the amount of members in the team. It also shows how many forms each team has filled out as well as the variance of the marks towards the answers that the team provided for the questions.

The Teams

Organization:	**Organization 1**			**organization 2**			**organization 3**		**Totals**
Team:	**Team 1**	**Team 2**	**Team 3**	**Team 4**	**Team 5**	**Team 6**	**Team 7**	**Team 8**	
Preparation Type	Blauw actasusual	Pintreg stravinsky	Rood mindful	Mobile actasusual	Backoffice mindful	Quarant stravinsky	Blitzkikkers mindful	Kaeru actasusual	
# Members	7	8	5	10	8	10	5	8	61
# Filled out forms	7	15	42	27	39	41	24	14	209
# Times collected	1	5	6	5	7	7	5	2	38
Average score on all questions	5.54	5.75	6.21	5.48	5.59	5.82	5.77	5.04	
Variance (σ^2) within answers	0.65	0.99	0.58	1.13	1.41	1.48	1.04	1.34	
Cronbach's α Standup	0.13	0.56	0.51	0.68	0.64	0.72	0.85	0.72	
Cronbach's α Retro	N.A.	0.88	0.90	0.81	-0.26	0.95	-0.04	N.A.	

Table 8: Team metrics

The scores of each question had a standardized range from 1 to 7 in which 1 meant never and 7 meant always. The questions were formulated in such a way that the number 7 was always better for the team than number 1. The higher the score the more effective the team.
The variance indicates the level of agreement in a dataset. The lower the variance the higher the level of agreement is. The maximum variance on a Likert scale from 1 to 7 is:

$$\text{Variance} = \sigma^2 = \frac{\sum(X-\mu)^2}{N} = \frac{\sum X^2}{N} - \mu^2 \qquad [1]$$

$$\text{MAX}(\sigma^2\{1,7\}) = \frac{1^2+7^2}{2} - \left(\frac{1+7}{2}\right)^2 = 25 - 16 = 9 \qquad [2]$$

The variance of all teams is fairly small, indicating the degree of uniformity is fairly high between the team members. The variety of the scores of the answers of the team varies from 0.58 to 1.48 which lies in a range of 6,44% to 16,44% when compared to the maximum variance of 9.

In the following paragraphs we will highlight a few of these questions and the paragraphs will resemble the sections that were presented in the questionnaire forms, but we will first start with the overview of the results.

6.1 Overview of Results

The results of the experiment show a slight, but statistical significant increase of the effectiveness of team meetings after a three minute mindfulness exercise on the following team dynamics:

- G01 - Everyone is involved in the decision-making process.
- G04 - The meeting was effective.
- G05 - All meeting participants listened well to each other.
- G08 - The level of disagreement during the meeting was acceptable.
- G09 - The tension during the meeting was tolerable.
- G10 - The interaction in the meeting was good.
- G11 - The emotional responses within the meeting were healthy.

As stated, only these questions scored slightly but statistically significantly better than the baseline and only for the treatment group. None of the other groups had a significant noticeable changes during the entirety of the experiment.

Figure 17 (Figure 17: significant increases in means for mindfulness exercise) shows the differences in means in percentages for all the questions with a significant increase in effectiveness in comparison with the baseline.

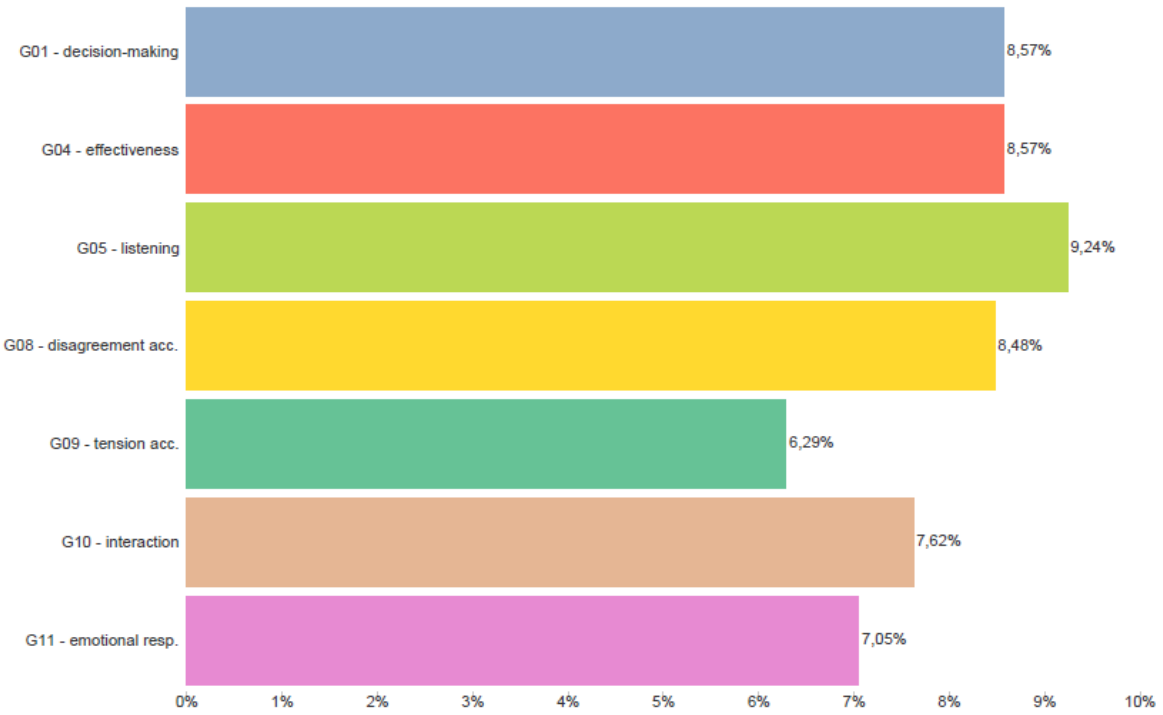


Figure 17: significant increases in means for mindfulness exercise

Other findings in the general questions sections were not statistically significant. The remaining questions do show an improvement in scores when the baseline is compared to the exercise measurements, but they are non-significant findings. The questions concerned are:

- G02 - The team vision was well defined.
- G03 - The meeting atmosphere was constructive, calm and open.
- G06 - The meeting objectives were met.
- G07 - The meeting was honest.

The increase in results can be found in figure 18 (Figure 18: non-significant increases in means for mindfulness exercise).

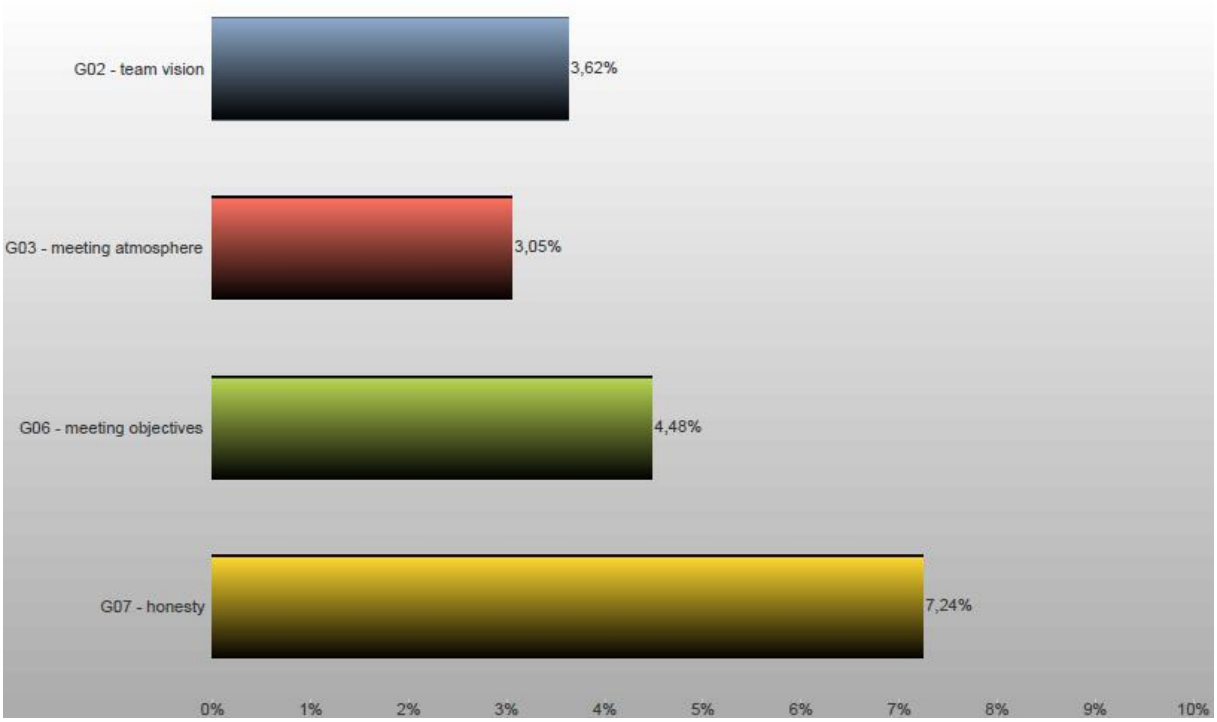


Figure 18: non-significant increases in means for mindfulness exercise

The experiment thus showed an optimization in involvement and decision-making, in overall effectiveness, in listening skills of the participants, in acceptable tension levels of the meeting, in mutual general interaction and in the emotional stability of the team.

6.2 General Section of Questionnaire

This general section has been designed to focus on the general workings of the meetings and has been the same for both types of meetings. The questions dealt with matters of interaction, honesty, effectiveness, emotional responses and objectives. These are the questions that were answered in the general section of the questionnaire guide (see Appendix 23 and 24):

- G01. Everyone is involved in the decision-making process.
- G02. The team vision was well defined.
- G03. The meeting atmosphere was constructive, calm and open.
- G04. The meeting was effective.
- G05. All meeting participants listened well to each other.
- G06. The meeting objectives were met.
- G07. The meeting was honest.
- G08. The level of disagreement during the meeting was acceptable.
- G09. The tension during the meeting was tolerable.
- G10. The interaction in the meeting was good.
- G11. The emotional responses within the meeting were healthy.

Table 9 shows an overview of the differences in means focusing on the teams that were confronted with a mindfulness exercise and compares the intervention with the baseline that was taken. The questions in table 9 and in the whole results section have been coded. The questions that represent

these codes can be found in appendix 23 and 24, which are the questionnaire guides that have been used by the participants, although the participants received a version in which the codes were not included. In these appendices the codes precede the actual questions.

question	difference_of_means_mindful	t_value_mindful	p_value_mindful
G 1	0.6140351	2.280507	0.0282530407
G 2	0.1719298	0.602015	0.5503640150
G 3	0.1964912	1.103091	0.2759009630
G 4	0.6000000	3.046700	0.0039304641
G 5	0.6789474	3.630576	0.0007795889
G 6	0.3175439	1.448088	0.1542950444
G 7	0.5052632	2.236144	0.0310912569
G 8	0.5385965	2.446636	0.0191785548
G 9	0.3976190	2.213997	0.0318456782
G 10	0.5929825	2.976673	0.0046759927
G 11	0.4666667	2.528096	0.0150742026

Table 9: difference in means mindfulness baseline compared to intervention

Table 9 is the output after a t.test has been performed on the questions concerned. The t-value and the p-value are given here as well. When a p-value is smaller than 0.05 the finding is statistically significant, meaning that the observed difference cannot be explained by mere chance but will be the result of the intervention. The following questions have a statistically significant character: G01, G04, G05, G08, G09, G10 and G11. The t.value should be higher than 1 in order to determine that there is a bigger signal in the data than there is clutter, meaning that the data involved seems statistically sound. All the questions that have a statistic significance, do have a t-value that is bigger than 1 and have an acceptable noise.

Table 10 (Table 10: difference in means stravinsky baseline compared to intervention) shows the differences mentioned above for the Stravinsky placebo exercise.

question	difference_of_means_stravinsky	t_value_stravinsky	p_value_stravinsky
G 1	0.29411765	0.9578263	0.3458015
G 2	-0.41176471	-1.0130044	0.3190937
G 3	0.41176471	1.3440430	0.1891763
G 4	0.05882353	0.1424941	0.8876255
G 5	0.00000000	0.0000000	1.0000000
G 6	0.29411765	0.8290267	0.4147841
G 7	0.00000000	0.0000000	1.0000000
G 8	0.00000000	0.0000000	1.0000000
G 9	-0.11764706	-0.3577709	0.7230171
G 10	0.05882353	0.1750752	0.8621836
G 11	0.05882353	0.1596174	0.8742222

Table 10: difference in means stravinsky baseline compared to intervention

Noticeable in table 10 is that there is no single p-value that is lower than 0.05, making no significant statements. Since the Stravinsky exercise was a placebo exercise, this finding is not unexpected.

Table 11 (Table 11: difference in means act as usual baseline compared to intervention) shows the differences measured for the act as usual group. This group has had no intervention whatsoever.

question	difference_of_means_actasusual	t_value_actasusual	p_value_actasusual
G 1	0.05952381	0.23220259	0.818650238
G 2	0.21428571	0.67094465	0.515942438
G 3	-0.14285714	-0.35470477	0.730638885
G 4	0.05952381	0.15890508	0.876737766
G 5	0.27380952	0.58595477	0.575174152
G 6	0.19047619	0.48746668	0.637329529
G 7	0.68518519	3.19723100	0.007235278
G 8	-0.11904762	-0.19002572	0.855659897
G 9	-0.28571429	-0.89809357	0.381568276
G 10	-0.02380952	-0.06119901	0.952529740
G 11	0.37179487	1.52733153	0.143961226

Table 11: difference in means act as usual baseline compared to intervention

Noteworthy in table 11 is the observation that question G07 is both statistically significant, with a p-value lower than 0.05, and has a t-value which implies that the data is sound. For the rest there are no statistically significant results.

Figure 2a (Figure 2a: Differences in means for General Questions – Questions G01 to G06) and figure 2b (Figure 2b: Differences in means for General Questions – Questions G07 to G11) give a graphical representation of the differences in means between the baseline and the intervention subdivided against all the intervention types (if any):

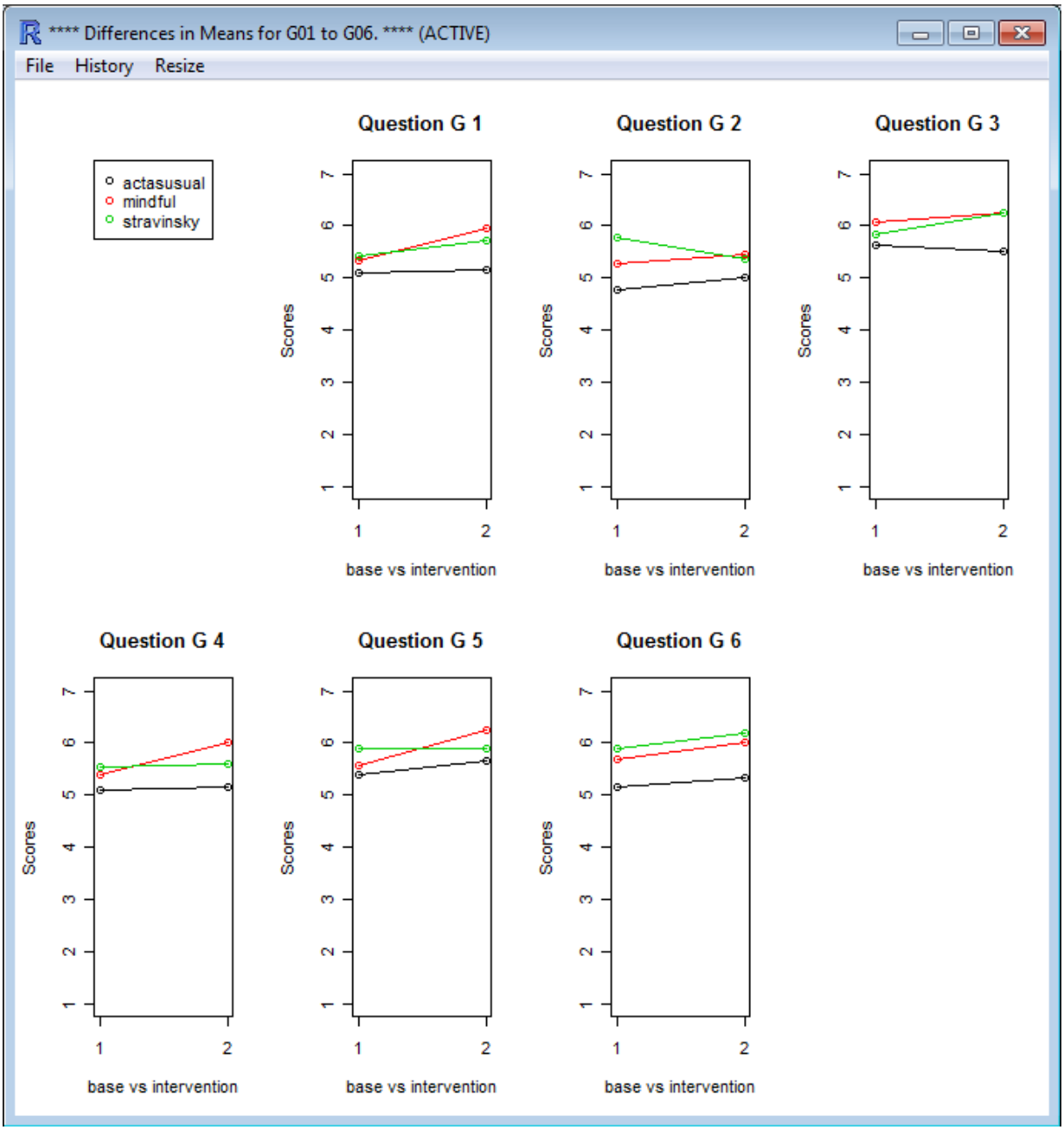


Figure 2a: Differences in means for General Questions – Questions G01 to G06

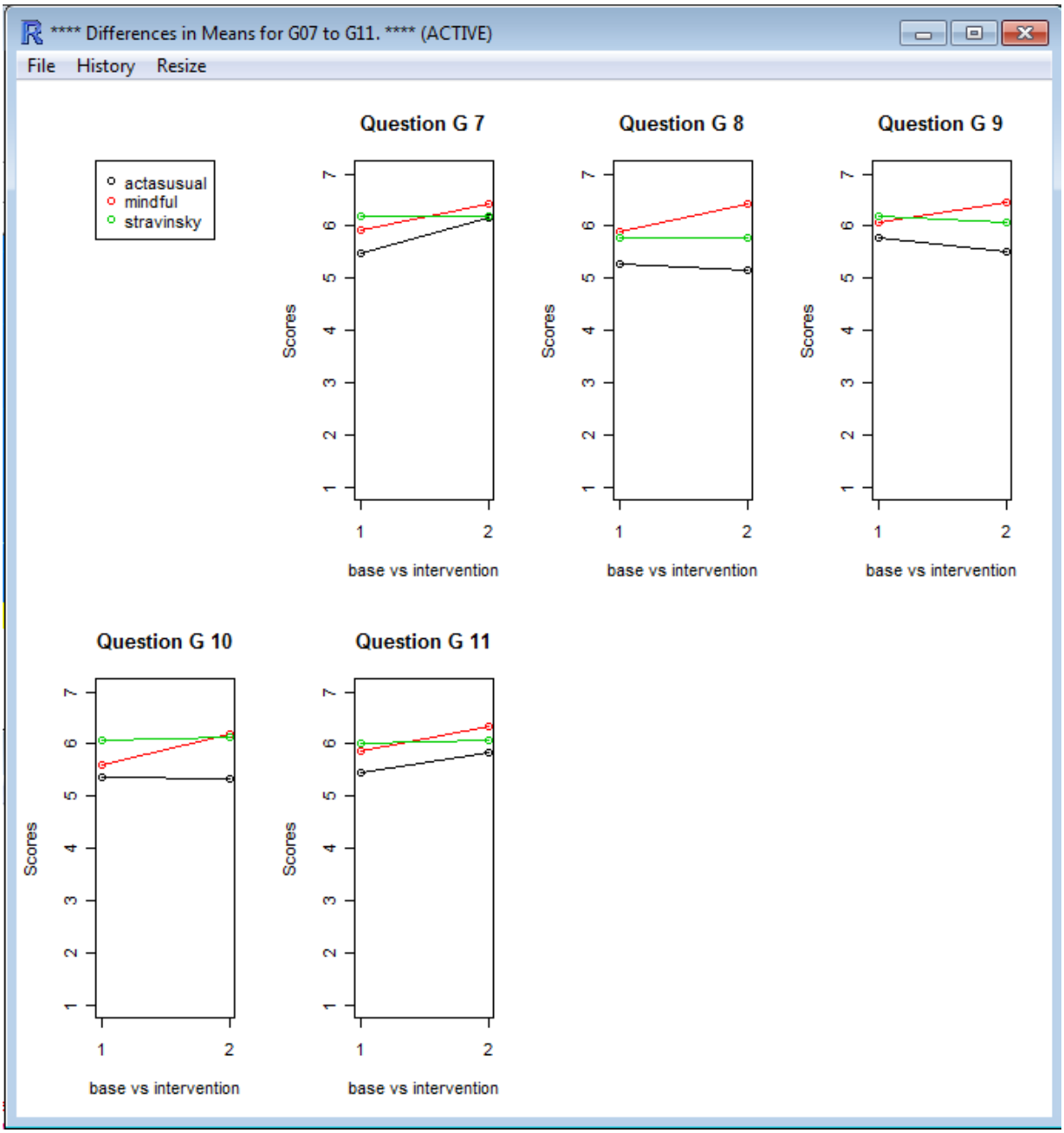


Figure 2b: Differences in means for General Questions – Questions G07 to G11

It is noticeable that the mindfulness intervention has caused an upward slope for all questions, meaning there is a positive effect of the intervention against the base line. The other two intervention types do not show this result. In almost all cases the mindfulness intervention scores the highest of the groups when the intervention is executed, except for question G03, where the placebo exercise scores highest.

The following paragraphs will present the findings that could be made for a the questions that had some degree of statistical significance in regards to the preparation type of the meeting. The questions that will be highlighted are:

1. G01 Everyone is involved in the decision-making process
2. G03 The meeting atmosphere was constructive, calm and open.
3. G04 The meeting was effective
4. G05 All meeting participants listened well to each other
5. G07 The meeting was honest
6. G08 The level of disagreement during the meeting was acceptable
7. G09 The tension during the meeting was tolerable.
8. G10 The interaction in the meeting was good.
9. G11 The emotional responses within the meeting were healthy.

6.2.1 G01 Everyone was involved in the decision-making process

Figure 3 shows the following results in regards to question “G01 - Everyone is involved in the decision-making process”:

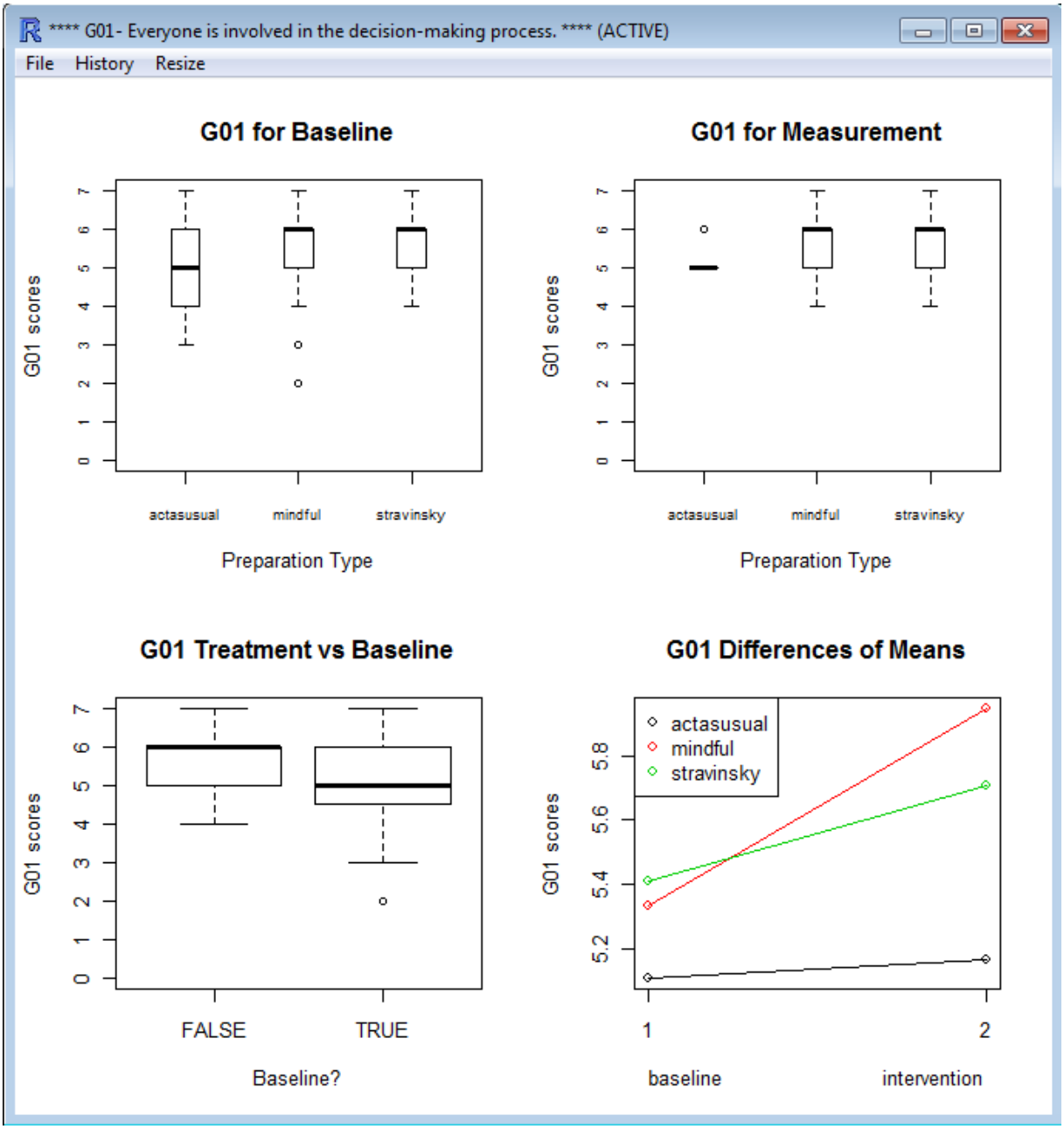


Figure 3: G01 - Everyone is involved in the decision-making process

Especially the figure in the right lower corner shows an interesting trend. The mean of the baseline is compared to the mean of the experiment and is subdivided in the respective preparation types. The act as usual groups show no significant difference where the scores of the baseline are almost the same throughout all the sessions. The Stravinsky placebo preparation shows a slight better result when the baseline is compared to the experiment phase. The mindfulness preparation shows an increase of 0.7 when the baseline is compared with the experiment phase. When a t.test is executed on this last subset of data, we can see the following results (see table 12):

Welch Two Sample t-test

data: effectiveness$G01[effectiveness$Preparation_type == "mindful" & and effectiveness$G01[effectiveness$Preparation_type == "mindful" & effectiveness$Base_line == "FALSE"] and effectiveness$Base_line == "TRUE"]

t = 2.2805, df = 38.138, p-value = 0.02825

alternative hypothesis: true difference in means is not equal to 0

95 percent confidence interval:

0.06902398 1.15904620

sample estimates:

mean of x mean of y

5.947368 5.333333

Table 12: T.Test G01 - Everyone is involved in the decision-making process mindfulness group

With a relative high t-value of 2.28, which indicates that the signal is greater than the noise, and a p-value that is smaller than 0.05, it can be concluded that the increase of the mean of the mindfulness group when the baseline is compared to the experiment is due to the experiment and not to chance.

For this question we have determined that only the mindfulness intervention resulted in a significant difference. Now we will see what the differences are when the retrospective is compared to the standup meeting. Figure 4 (Figure 4: G01 – Mindful Standup versus Retro) shows the difference in means between the two meeting types. It is interesting to see that the retrospective has a higher result (0.073 higher) than the standup despite the fact that retrospectives are longer.

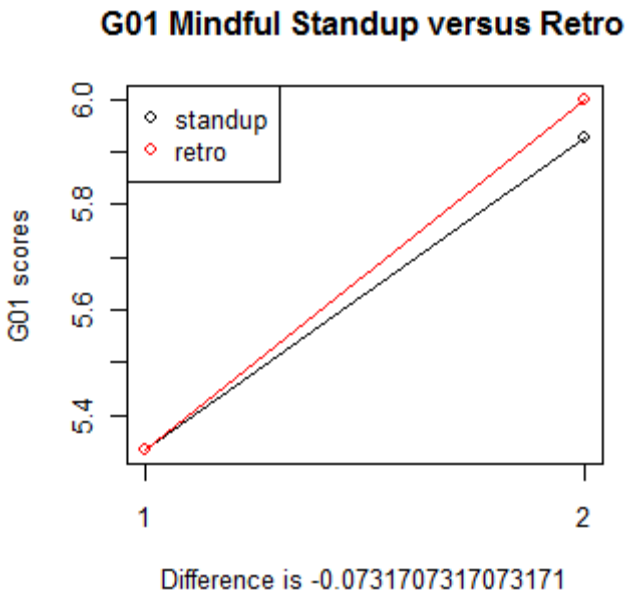


Figure 4: G01 - Mindful Standup versus Retro

The results of the t.test of these two groups is shown in table 13 (Table 13: t.test G01). The p-value of the retro meeting is slightly better and shows a stronger correlation with the intervention.

	preparation_type_G01	difference_of_means_G01	p_value_mindful_G01	t_value_mindful_G01
1	standup	0.5934959	0.03932601	2.125802
2	retro	0.6666667	0.02961149	2.249440

Table 13: t.test G01

6.2.2 G03 The meeting atmosphere was constructive, calm and open

The following question that we want to observe more closely is question G03 (the meeting atmosphere was constructive, calm and open). In figure 5 the results of question “G03 – the meeting atmosphere was constructive, calm and open” are shown:

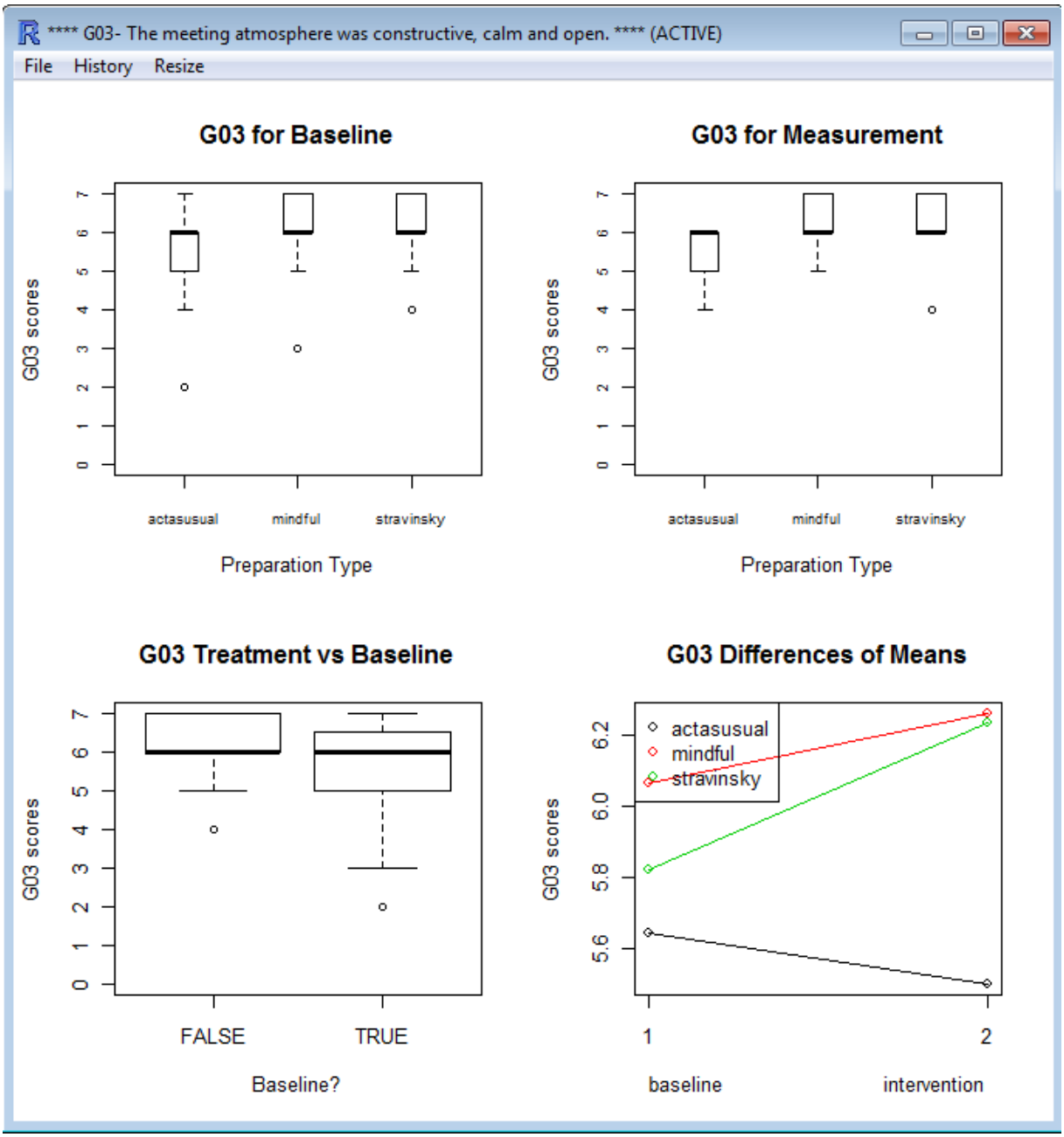


Figure 5: G03 - The meeting atmosphere was constructive, calm and open.

In this case the act as usual groups have a negative angle, the mindfulness groups a slight increase in means and the Stravinsky teams score the best. When a two way Welch T.Test is performed on both preparation types that show positive results we see the following. Table 14 shows the mindfulness intervention and table 14 the Stravinsky exercise.

Welch Two Sample t-test

data: effectiveness$G03[effectiveness$Preparation_type == "mindful" & and effectiveness$G03[effectiveness$Preparation_type == "mindful" & effectiveness$Base_line == "FALSE"] and effectiveness$Base_line == "TRUE"]

t = 1.1031, df = 44.625, p-value = 0.2759

alternative hypothesis: true difference in means is not equal to 0

95 percent confidence interval:

-0.1623598 0.5553423
sample estimates:
mean of x mean of y
6.263158 6.066667

Table 14: G03 – Mindfulness

Table 14 shows that the findings of the mindfulness groups concerning question G03 are not significant. A low t-value indicates a lot of clutter in the data and a high p-value indicates a low correlation between the higher mean and the mindfulness intervention. We can discard this finding as inconclusive.

6.2.3 G04 The meeting was effective

Another question that proved to be statistically significant is question G04 (The meeting was effective) which dealt with the effectiveness of the meeting. Figure 6 (Figure 6: G04 – The meeting was effective) shows the differences between the preparation types.

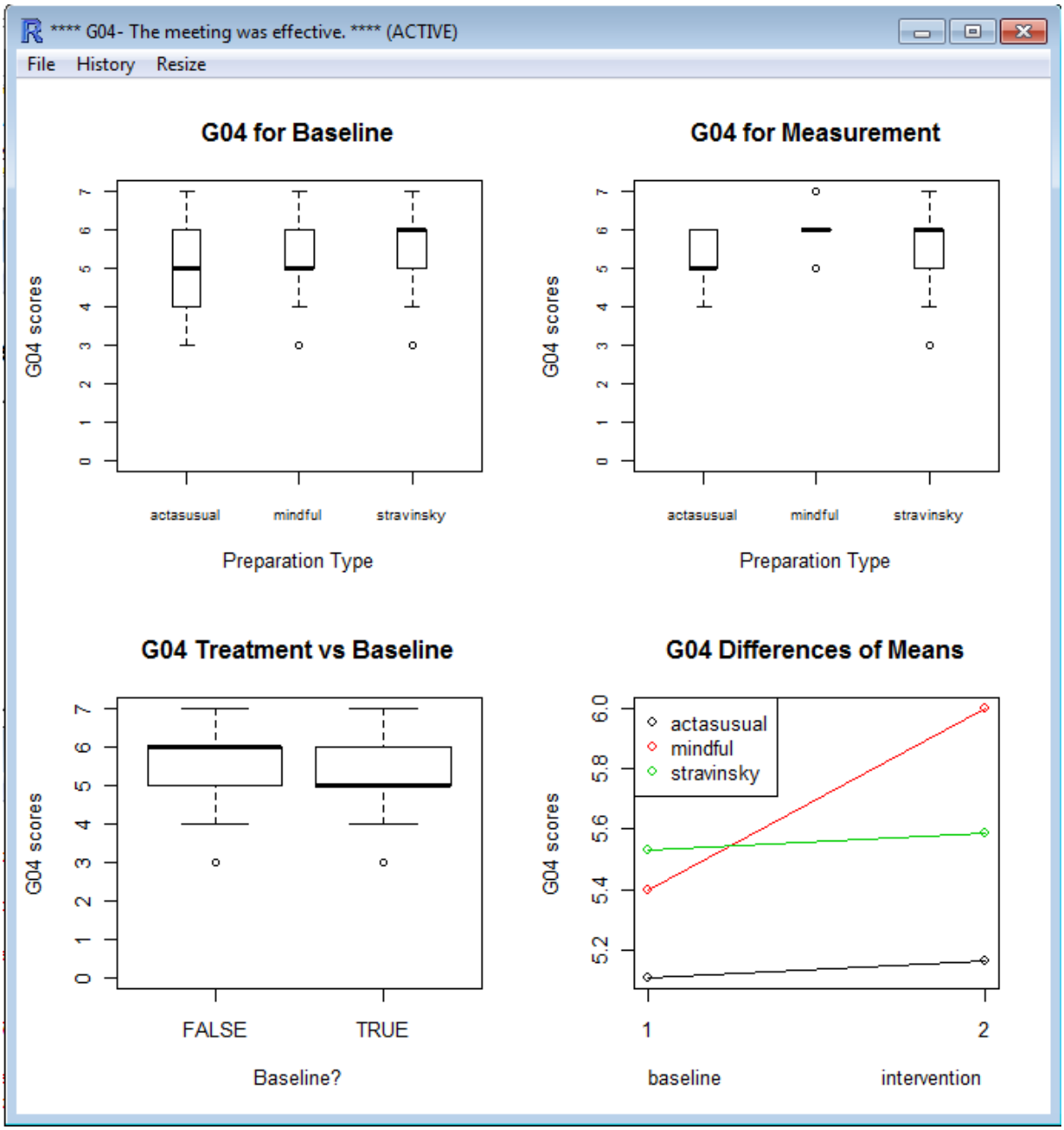


Figure 6: G04 – The meeting was effective

The slope of the mindfulness exercise is again the most prevalent observation. After the intervention, the scores show that teams using the mindfulness exercise were most effective in their meetings. When we continue our observations by focusing on the differences between the standup meeting and the retrospective we come to figure 7 (Figure 7: G04 - Mindful Standup versus Retro)

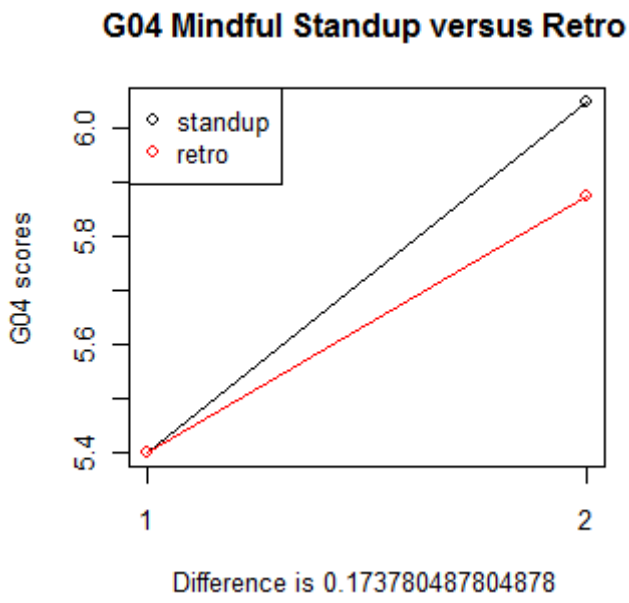


Figure 7: G04 - Mindful Standup versus Retro

It is noteworthy to see that the standup is regarded to be slightly more effective than the standup meeting. The t.test values can be found in table 15 (Table 15: t.test G04).

preparation_type_G04	difference_of_means_G04	p_value_mindful_G04	t_value_mindful_G04
standup	0.6487805	0.00217416	3.254437
retro	0.4750000	0.08493960	1.771582

Table 15: t.test G04

Noteworthy in this observation is that the p-value and t-value of the standup prove a stronger correlation between the intervention and the higher score.

6.2.4 G05 All meeting participants listened well to each other

Question G05 (all meeting participant listened well to each other) is the next question that showed a statistically significant result for the mindfulness group. Figure 8 (Figure 8: All meeting participants listened well to each other) graphically portrays the differences between the treatment groups.

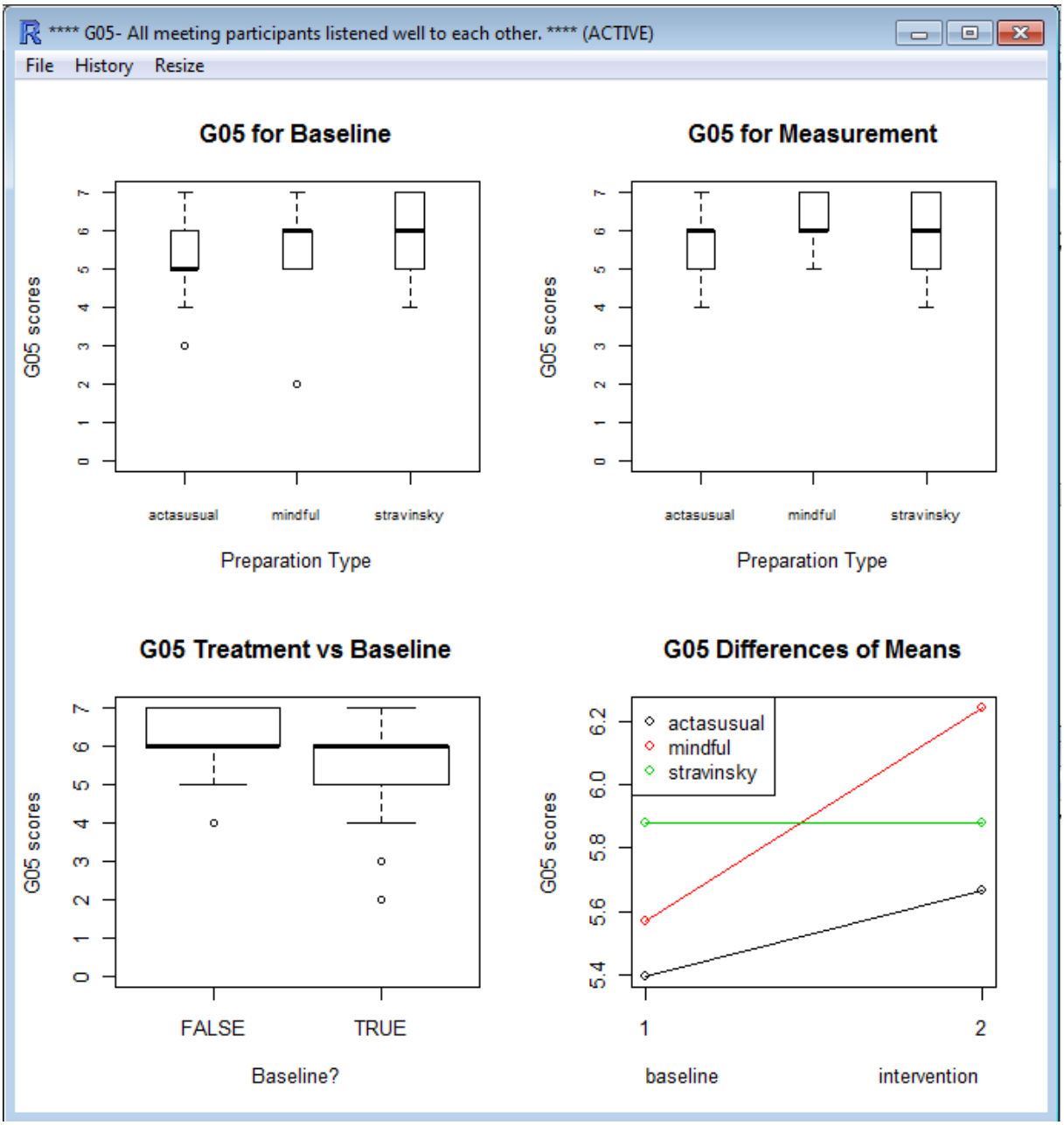


Figure 8: All meeting participants listened well to each other

With again the highest score of the mindfulness treatment group, we will look at the differences between the retrospective and the standup for that treatment group (see Figure 9: G05 – Mindful Standup versus Retro).

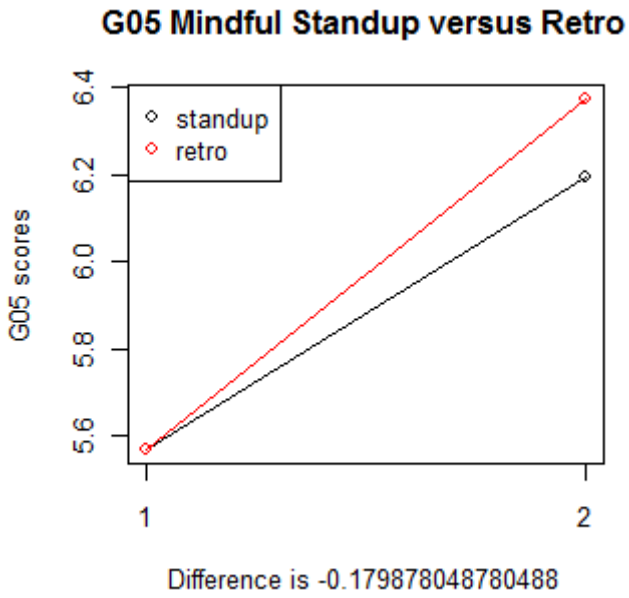


Figure 9: G05 – Mindful Standup versus Retro

The difference between both meeting types is small and negligible. Looking at some t.test factors that are given in table 16 (Table 16: t.test G05) we observe something interesting concerning the p-value. It turns out that the increase in difference of means for both the retrospective and the standup are statistically significant. The p-value of the both meeting types however becomes weaker when compared to the p-value we had discovered in table 9 (0,00077 versus 0,0020 and 0,0010 respectively) when we were observing the whole set regardless of the meeting type.

preparation_type_G05	difference_of_means_G05	p_value_mindful_G05	t_value_mindful_G05
standup	0.6284553	0.002045501	3.278641
retro	0.8083333	0.001097278	3.507359

Table 16: t.test G05

6.2.5 G07 The meeting was honest

The honesty of the meeting has also increased for the mindfulness group. Figure 10 (Figure 10: G07 - Mindful Standup versus Retro for Mindfulness) shows the difference of means for the two different meeting types for the mindfulness group.

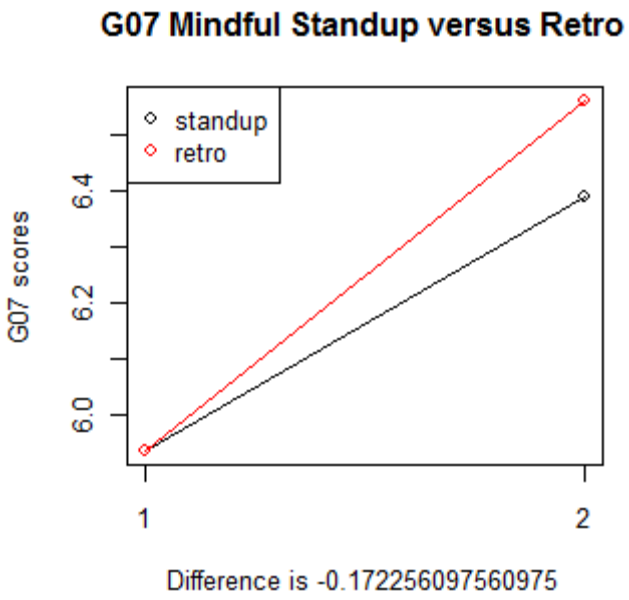


Figure 10: G07 - Mindful Standup versus Retro for Mindfulness

The retro scores 0,172 points higher in regards to the honesty of the meeting. Table 17 (Table 17: t.test for Mindfulness) shows the t.test results of these two meeting types.

preparation_type_G07	difference_of_means_G07	p_value_mindful_G07	t_value_mindful_G07
standup	0.4569106	0.05406351	1.982221
retro	0.6291667	0.02812936	2.273304

Table 17: t.test G07 for Mindfulness

We see that the mindfulness practice did provide a statistic significant result. The p-value of the retro meeting type is below 0.05.

6.2.6 G08 The level of disagreement during the meeting was acceptable

Question G08 – the level of disagreement during the meeting was acceptable – does have a significant difference when the mindfulness group is compared to the baseline. Figure 11 (Figure 11: G08 - Mindful Standup versus Retro) shows the differences of the treatment group against the baseline subdivided in the meeting types.

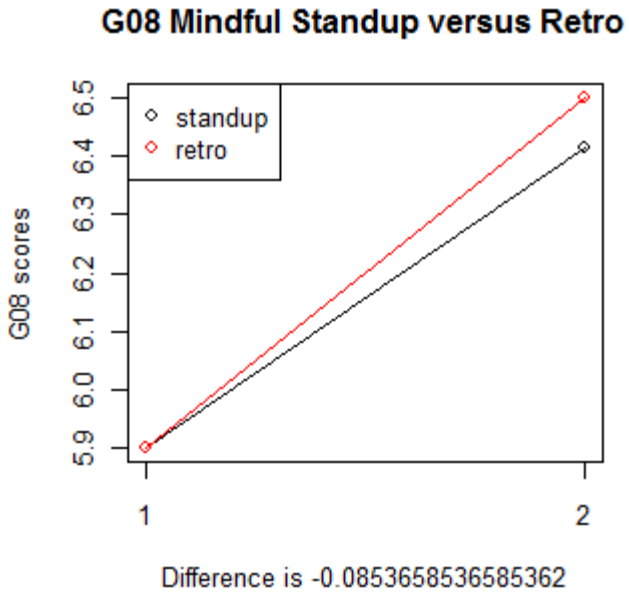


Figure 11: G08 - Mindful Standup versus Retro

The retro scores higher by a fraction (0.085). The t.test values that are portrayed in table 18 (Table 18: t.test G08 for Mindfulness) show that both the p-value and the t-value are stronger for the retro meeting type.

preparation_type_G08	difference_of_means_G08	p_value_mindful_G08	t_value_mindful_G08
standup	0.5146341	0.02911370	2.258770
retro	0.6000000	0.01738082	2.473295

Table 18: t.test G08 for Mindfulness

6.2.7 G09 The tension during the meeting was tolerable

The tolerability of tension within the meeting is also a statistically significant item within the mindfulness group. Figure 12 shows the differences of the treatment against the meeting type.

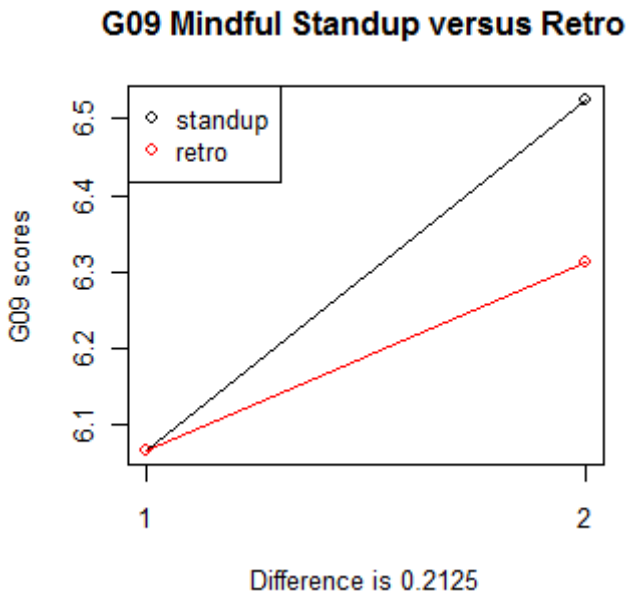


Figure 12: G09 – Mindful Standup versus Retro

The standup meeting scores better for this question (with 0.21 difference). The t.test are shown in table 19 (table 19: t.test G09 for Mindfulness).

preparation_type_G09	difference_of_means_G09	p_value_mindful_G09	t_value_mindful_G09
standup	0.4583333	0.01833330	2.436893
retro	0.2458333	0.26736417	1.124529

table 19: t.test G09 for Mindfulness

The retrospective shows no statistical significance while the p-value of the standup shows a value of 0,0183, indicating a significant correlation between both the mindfulness intervention combined with the standup meeting type in relation to the increased difference in means.

6.2.8 G10 The interaction in the meeting was good

A significant correlation can also be found for the interaction within the meeting when the mindfulness group is compared to the baseline. Figure 13 (Figure 13: Mindful Standup versus Retro) shows the difference in means for the two meeting types.

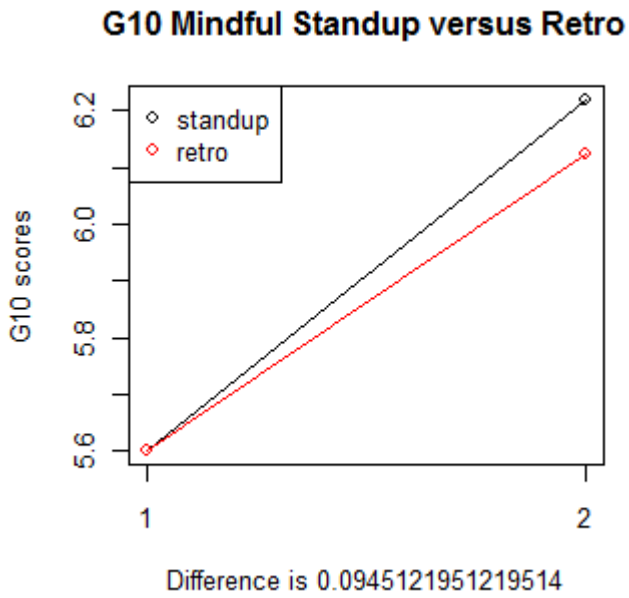


Figure 13: G10 – Mindful Standup versus Retro.

The difference of the two meeting types is small, where the standup is scoring 0.095 points better than the retro. When we look at the t.test scores of table 20 (Tabel 20: t.test G10 for Mindfulness) we see that the correlation of the standup meeting type is more significant to the rise in means than that of the retro, since the p-value is substantially lower.

preparation_type_G10	difference_of_means_G10	p_value_mindful_G10	t_value_mindful_G10
standup	0.6195122	0.004307654	2.992268
retro	0.5250000	0.043882625	2.082480

Tabel 20: t.test G10 for Mindfulness

6.2.9 G11 The emotional responses within the meeting were healthy

The last significant difference we have observed in the general questions is the question about the emotional responses. The emotional responses are significantly better after the use of the mindfulness exercise. Figure 14 (Figure 14: G11 – Mindful standup versus Retro) again shows the difference in the treatment group between the standup and the retrospective.

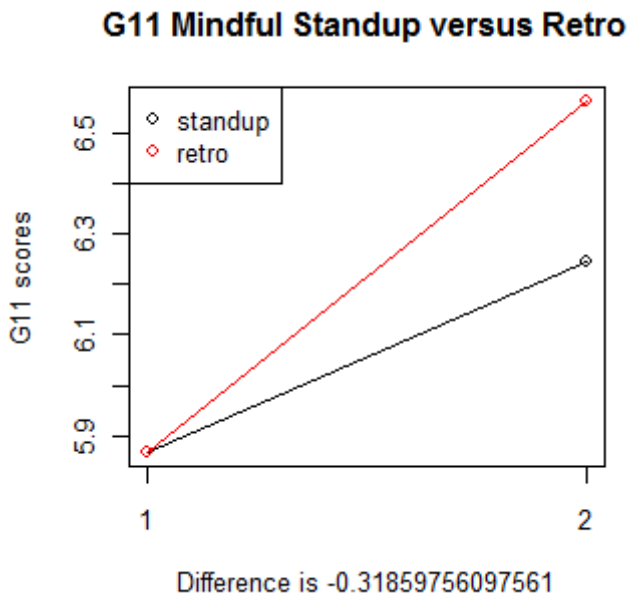


Figure 14: G11 – Mindful standup versus Retro

We can observe that the retrospective scores higher than the standup (with as much as 0.32 points). The t.test related variables are shown in table 21 (Table 21: t.test G11 for Mindfulness).

preparation_type_G11	difference_of_means_G11	p_value_mindful_G11	t_value_mindful_G11
standup	0.3772358	0.057525303	1.943350
retro	0.6958333	0.001716795	3.340899

Table 21: t.test G11 for Mindfulness

The table shows that in this case the standup meeting is not a significant finding. However, the retro meeting type does show a p-value of lower than 0.05 and can be regarded as significant.

6.2.10 Findings for General Section of the Questionnaire

After studying the results of the general section, it is safe to say that the data shows a significant result for several important features of effectiveness and culture in agile team meetings. The following questions have shown a greater score for teams that had committed themselves to a short mindfulness exercise:

- G01 Everyone is involved in the decision-making process.
- G04 The meeting was effective.
- G05 All meeting participants listened well to each other.
- G08 The level of disagreement during the meeting was acceptable.
- G09 The tension during the meeting was tolerable.
- G10 The interaction in the meeting was good.
- G11 The emotional responses within the meeting were healthy.

All these scores were statistically significant with a p-value lower than 0.05 and could therefore not be ascribed to the factor of chance only. In other words the observation of higher scores for the mindfulness group in comparison with the baseline would also have to be the result of the exercise.

The other groups did not show such features. No score could be found in both the act as usual group as well as in the placebo Stravinsky group that had any statistical significance and relevance.

The overview of significantly relevant increases of means in table 21 (Table 21: significant increases in means for general section) shows not only the absolute increase, as we have seen before in table 9, but also the percentage of the increase, taking in regard that the scale is a scale from 1 to 7. We see that the highest difference is almost 10 percent for the listening question. All the team members felt that the degree of listening skills after they had done a five minute lasting mindfulness exercise to prepare themselves for the meeting was higher than without such an exercise.

question	difference_of_means_mindful	Percentage
G01	0.6140351	8.57%
G04	0.6000000	8,57%
G05	0.6789474	9.24%
G08	0.5385965	8.48%
G09	0.3976190	6,29%
G10	0.5929825	7.62%
G11	0.4666667	7.05%

Table 21: significant increases in means for general section

The involvement, the interaction and the tension level have all been improved in the treatment group.

6.3 Standup Section of Questionnaire

This section covers the findings that can be made for the standup section of the questionnaire. The questions were developed by So and Scholl (So & Scholl, n.d.). So and Scholl performed a reliability analysis which showed a score of 0.79 for Cronbach's Alpha on this section. When we perform a similar analysis on this dataset we come to a Cronbach's Alpha value of 0.71 (see table 22), which is slightly lower than the conclusion of the developers of this questionnaire question set. Still the internal coherence of the questions is fairly high.

```
> cronbach(standup)
$sample.size
[1] 114

$number.of.items
[1] 5

$alpha
[1] 0.7059622
```

Table 22: Cronbach's Alpha for the standup question set

Now we will find if there are any significant findings that can be made concerning the preparation type and the increase or decrease in means when the baseline is compared to the intervention. Table 23 (Table 23: difference in means mindfulness baseline compared to intervention for standup meetings) shows the differences in means comparing the baseline to the mindfulness intervention.

question_mindful_standup	difference_of_means_mindful_standup	t_value_mindful_standup	p_value_mindful_standup
S 1	0.1407323	0.4511028	0.65436879
S 2	0.5058324	1.6182928	0.11492215
S 3	0.1039236	0.4490284	0.65583146
S 4	0.3457052	1.3190645	0.19608325
S 5	0.4019088	1.9991212	0.05427067

Table 23: difference in means mindfulness baseline compared to intervention for standup meetings

The table shows no significant findings. Having said that there is a substantial correlation between the mindfulness intervention and the increase of means of question S02 (S02 - Stand up meetings were to the point, focusing only on what had been done and needed to be done on that day). With a p-value of 0.11, it approaches the significance threshold of 0.05, but falls short slightly.

Another candidate for statistical significance is question S05 – instantaneous help that is being offered as the need arises. With a p-value of 0.054 it is the strongest correlation of the standup section.

It should be noted here again that the differences of means for all questions show a better result when the intervention is compared to the baseline.

Table 24 (Table 24: difference in means stravinsky baseline compared to intervention for standup meetings) shows the differences in means for the placebo exercise.

question_stravinsky_standup	difference_of_means_stravinsky_standup	t_value_stravinsky_standup	p_value_stravinsky_standup
S 1	0.23333333	0.3989546	0.6943661
S 2	0.03333333	0.1033781	0.9190055
S 3	0.30000000	0.8240400	0.4188876
S 4	0.00000000	0.0000000	1.0000000
S 5	-0.03333333	-0.1490712	0.8831437

Table 24: difference in means stravinsky baseline compared to intervention for standup meetings

Table 24 shows no indication of a difference that can statistically be explained through the placebo intervention. Not all differences of means show a positive correlation with the intervention. Questions S05 has a negative difference in mean when compared to the baseline.

Table 25 (Table 25: difference in means act as usual baseline compared to intervention for standup meetings) shows the differences in mean for the act as usual group.

question_actasusual_standup	difference_of_means_actasusual_standup	t_value_actasusual_standup	p_value_actasusual_standup
S 1	1.50000000	3.49500231	0.001788325
S 2	1.00000000	3.14194126	0.009527590
S 3	-0.39393939	-0.67385042	0.522980205
S 4	0.30303030	0.59702063	0.561794407
S 5	0.04545455	0.09666505	0.925628180

Table 25: difference in means act as usual baseline compared to intervention for standup meetings

Noteworthy to observe is that questions S01 and S02 do have a substantial and significant increase in means when the baseline is compared to the intervention (which of course was no intervention).

With a very low p-value and a fairly high t-value there should be a very valid correlation. Since there was no intervention, these figures are not easy to explain.

Graphically these differences are shown in figure 15 (Figure 15: Differences in means for Standup Questions).

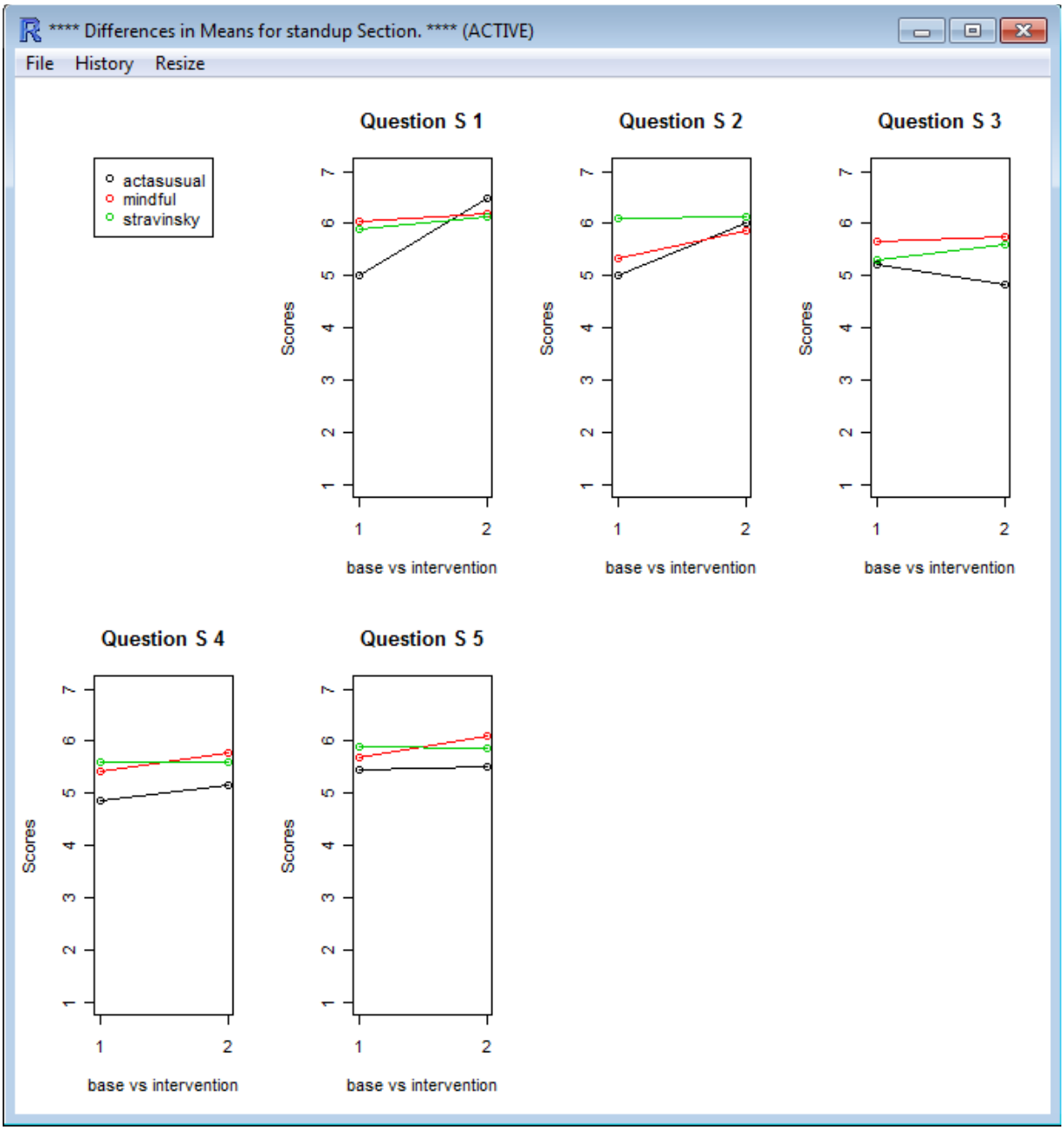


Figure 15: Differences in means for Standup Questions

6.4 Retrospective Section of Questionnaire

The last part of the results is the retrospective section. This section of the questionnaire was also carefully developed and tested by So and Scholl (So & Scholl, n.d.). So and Scholl have performed a reliability analysis of the retrospective question set and concluded a high reliability of this set in which Cronbach's Alpha had the value of 0,91. Performing that same analysis on the dataset of this

study shows a Cronbach's Alpha of 0,89 (see table 26), which confirms the findings of So & Scholl, concluding that there is a very high internal consistency in the retrospective section.

```
> cronbach(retro)
$sample.size
[1] 36

$number.of.items
[1] 6

$alpha
[1] 0.8898617
```

Table 26: Cronbach's Alpha for the retro question set

In figure 16 (Figure 16: Differences in means for Retrospective Questions) the differences of means are shown for all retrospective questions where the baseline is compared to the further measurements subdivided per treatment type:

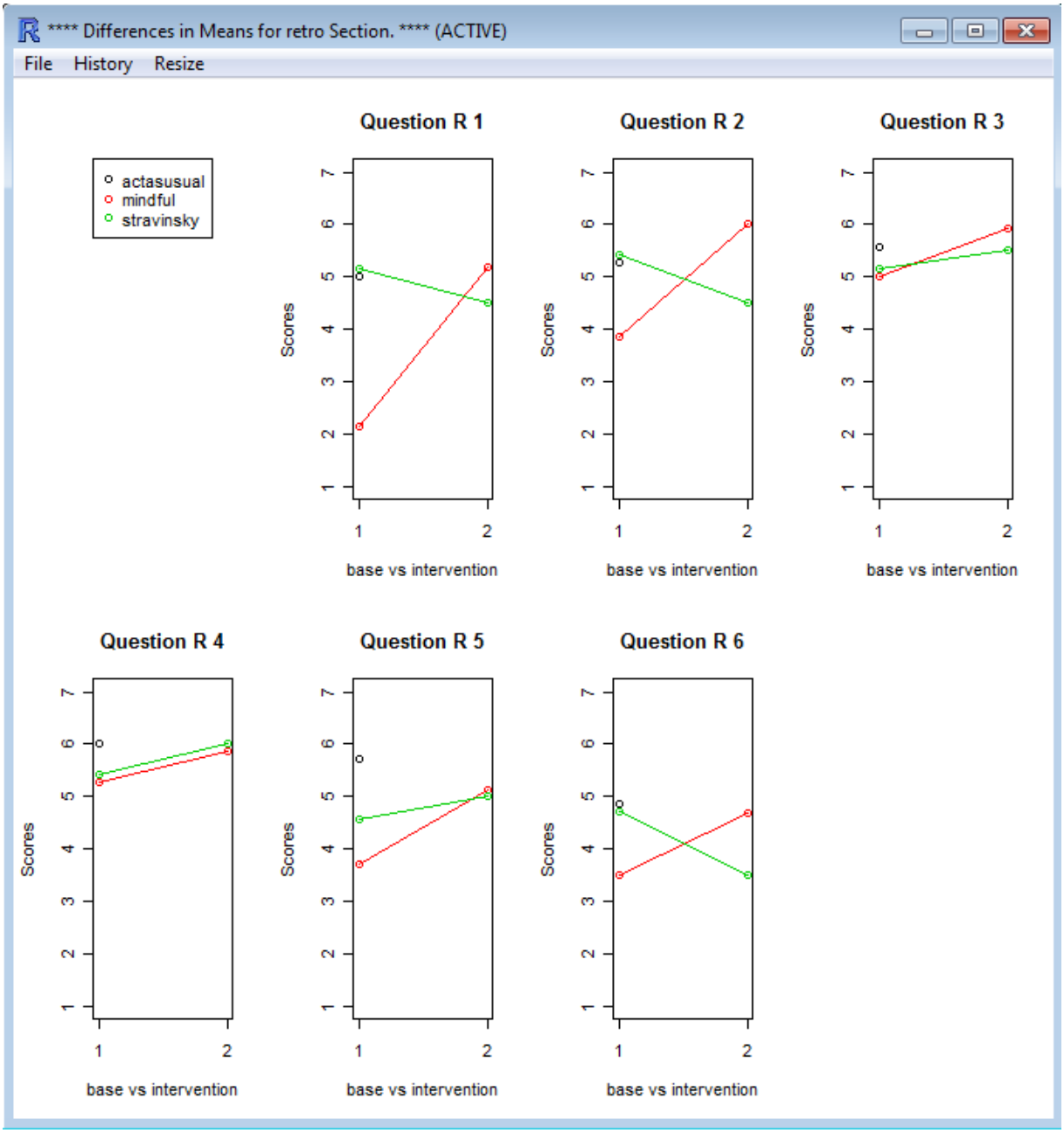


Figure 16: Differences in means for Retrospective Questions

7. Analysis and Discussion

This section will discuss the results of the experiment in the context of the research question.

7.1 Mindfulness, Does it Work?

The main query of this paper is whether a short mindfulness intervention would have a positive impact on the effectiveness and culture of the meetings of agile development teams. What can we conclude after the experiment has been conducted, does mindfulness have a positive impact on team meeting dynamics or can no such correlation be found? The experiment showed some significant findings for the treatment group. The teams that submitted themselves to the mindfulness exercise showed a slight but significant increase in some key elements of effectiveness and cultural aspects of the team. The control group showed no such results. Even a well prepared placebo exercise, that had some resemblance with the mindfulness approach, had no statistical significant improvements.

The three mindfulness teams showed more effectiveness in the areas of involvement, effectiveness, interaction, emotional responses and tension level. The increase in means cannot be labeled as spectacular, but is up to 10% better as the baseline and these results are statistically significant. Many of the randomized controlled trials of which some have been described in the literature review of this paper, were longer and more intense interventions of usually eight weeks, but could last up to one year. The intervention in this study was limited to a few minutes just before a meeting in order to keep the time investments of the participating companies manageable. This short guerilla type of intervention did prove to be successful in enhancing the team dynamics in such a manner that the team members labeled the meeting to be more effective. Long intensive treatments have a greater potential than these short pinpointed exercises. It is therefore remarkable that the short intervention led to the observed results.

With these results we see that these short exercises are a worthwhile investment to increase some elements of effectiveness for an agile team with a limited use of extra time for the teams involved. With a relative small investment of a business, it can increase the effectiveness and culture of the meetings of its teams on crucial points within those teams. Already after a short exercise the company will benefit from teams that have a better antennae for internal communication and a greater degree of mutual participation.

The conclusions that we have drawn are important for the effectiveness of team meetings in an agile setting. Through a relatively small investment the effectiveness of team meetings will increase on valuable points. Despite of the fact that longer Mindfulness tracks may give better results, it is interesting to see that an immediate result with a cost effective and less than 5 minute exercise already bears fruit for teams and companies.

The question that this papers seeks to answer is whether mindfulness practices increase the effectiveness and culture of agile teams in project organizations. That question can therefore be answered affirmatively. There is a significant correlation between effectiveness, well-being of

employees, internal communication and mutual participation. The degree of change is not a landslide, but with slight improvements on team workings, the agile team reaches more optimal results and comes to a greater cohesion and mutual understanding.

Better communication within team sessions lead to more balanced teams and have greater potential for more maturity of the teams in which anomalies are spotted early, leading to a proper and expected output of those teams. For companies this is an essential feature since their raison d'être is a proper response to changes in the market which can only be obtained by effectively steering changes within the organization and feed the property of teams that increase effectiveness and agility to make that happen. The mindfulness exercise might just be one tool to come to this essential greater maturity giving the teams and as a result the whole organization an edge over their competitors.

7.2 Mindfulness in Context

The results show that Mindfulness enhances some qualities of effectiveness in an agile team. However when we observe the responses of the participants after they had filled out the Open Questions that are portrayed in appendix 26, we receive a dominant signal that the participants would not continue such a practice without a trainer. One participant who filled out the online survey on July 12th, 2016 does "not think that everyone has noticed the effects of the exercise". Several participants saw the personal use of the exercise, since it "helped [them] to relax" (July 12th, 2016), "was refreshing" (July 12th, 2016) or provided a moment of "rest" (July 13th, 2016), but none would continue it in a public setting.

So, although the results show statistically significant increases of effectiveness on several entries, the perceived usefulness does not raise to the level that the participants want to keep on using it in a team setting. There is no "burning platform" that often initiates necessary change. Perhaps the routine of the repetitive meetings does not demand the use of an additional instrument to enhance its perceived effectiveness. Perhaps a mindfulness exercise would serve better before a higher demanding meeting, such as a brain storm session or a management meeting, since these meetings usually require more of the mental faculties than a daily standup meeting or a retrospective.

An increasingly more volatile environment with increasingly higher demands for businesses might eventually drive the perceived necessity to such a level that mindfulness exercises would be considered as an essential addition to stay standing in the storm of demands.

7.3 Results Compared to other Research

With the statistical significant findings that are stated as the result of this experiment, the following conclusions that were made in previous experiments of other researchers can be confirmed:

- G01 (Everyone is involved in the decision-making process) => The significant increase of question G01 indicates that mindfulness has a significant direct correlation with decision making as Hafenbrack et al. concluded (Hafenbrack et al., 2014);

- G05 (All meeting participants listened well to each other) = > The significant increase of question G05 indicates that mindfulness leads to increased scores on overall empathy levels as Shapiro et al. concluded (Shapiro et al., 1998);
- G08 (The level of disagreement during the meeting was acceptable) => The significant increase of question G08 indicates that Mindfulness leads to a greater level of agreeableness as Giluk concluded (Giluk, 2009);
- G09 (The tension during the meeting was tolerable) => The significant increase of question G09 indicates that mindfulness has better scores on "social functioning" as Gaudiano & Herbert concluded (Gaudiano & Herbert, 2006);
- G10 (The interaction in the meeting was good) => The significant increase of question G10 indicates that Mindfulness leads to interpersonal effectiveness skills as Dimeff & Linehan concluded (Dimeff & Linehan, 2001);
- G11 (The emotional responses within the meeting were healthy) => The significant increase of question G11 indicates that mindfulness leads to more positive emotions as Hafenbrack et al. concluded (Hafenbrack et al., 2014).

These findings will be further discussed in subsequent paragraphs.

7.3.1 Other Research on G01 - Everyone is involved in the decision-making Process

Hafenbrack et al. performed an experiment in which they concluded that the trait mindfulness had a significant correlation with the quality of decision-making (Hafenbrack et al., 2014). Several studies were done within the experiment in which the participants had to resist the sunk-cost bias. In study 1 the observation could be made that the higher the degree of mindfulness the better the decision toward resisting the sunk cost bias (n=178, r=.205, p = 0.003). Study 2a, 2b and 3 concluded the same with n=57 for study 2a, n=109 for study 2b and n=156 for study 3. The more mindful the participant, the better the resistance towards the sunk-cost bias. The decision-making aspect of teams and individuals has been significantly correlated with the trait mindfulness. Although question G01 primarily deals with the question of involvement in mutual decision making, it also alludes to the decision making in and of itself and with a significant increase of almost 10% for the mindfulness group in comparison to the baseline the better decision-making process can be supported.

7.3.2 Other Research on G05 - All meeting participants listened well to each other

Shapiro et al. performed an experiment among (pre)medical students in which they observed that there was a significant correlation between the trait mindfulness and the aspect of empathy and mindful listening (Shapiro et al., 1998). The study lasted 7 weeks and used an adaptive version of the Empathy Construct Rating Scale (Monica, 1981) to measure levels of empathy and listening skills. Two groups were formed in which one group was submitted to a Mindfulness treatment while the other group had no treatment. The treatment group scored higher on the element of empathy and mindful listening skills in general (N=200, $p<0.03$). This study comes to a similar conclusion, although the intervention was substantially shorter than the experiment that Shapiro conducted.

7.3.3 Other Research on G08 - The level of disagreement during the meeting was acceptable

Tamara Giluk (Giluk, 2009) performed a meta-analysis of 32 samples in 29 studies in order to synthesize the results of the Big Five personality traits (Barrick, Mount, & Judge, 2001) of which agreeableness is one. The total sample that was available in regards to the trait agreeableness was

1374. The combined sample showed that there is a moderate and positive relationship between mindfulness and agreeableness. The standard deviation of the sample however was quite large. This present study shows a 7% increase in this area, but views the question from a different angle namely an acceptable level of disagreement indicating an increased agreeableness.

7.3.4 Other Research on G09 - The tension during the meeting was tolerable

Gaudiano & Herbert conducted an experiment where social functioning was measured (Gaudiano & Herbert, 2006). The treatment group went through an official ACT treatment and consisted of 14 participants. The act as usual group consisted of 15 participants. The mindfulness group showed a superiority in this domain when compared to the treatment as usual group. The group in question had significant higher scores on the social subscale of the Sheehan Disability Scale (Leon, Olfson, Portera, Farber, & Sheehan, 1997) when compared to the act as usual group ($N=29$, $F=9.09$, $p<0.05$). Question G09 indicates a similar result in which the enhanced social skills lead to a better tension handling.

7.3.5 Other Research on G10 - The interaction in the meeting was good

Lynch et al. found there was a relation between the trait mindfulness and a positive effect on interpersonal sensitivity (Keng et al., 2011; Lynch, Trost, Salsman, & Linehan, 2007). A DBT treatment of 24 weeks showed a significant correlation between the traits within a treatment group of $N = 35$. The finding of this paper that the interaction factor within the team had a significant improvement in the treatment teams affirms the findings of Lynch et al. In the same experiment Lynch et al. also concluded that there was a lower interpersonal aggression level which would benefit team interaction as well. Question G10 therefore also affirms this latter finding of Lynch et al.

7.3.6 Other Research on G11 - The emotional responses within the meeting were healthy

In an experiment that Arch & Craske (Arch & Craske, 2006) executed it was evident that the treatment group that was assigned to focused breathing exercises scored better on emotional responses as they had the best scores on the aspect of emotional volatility. The study was done among 60 undergraduates students ($N=60$). These students were randomly assigned to either the mindfulness group, the unfocused attention and the worry group. The participants had to look at pictures that were either neutral, positive or negative, after which the students had to rate their own emotional state. As stated the group that performed the breathing exercise scored significantly better on the aspect of volatility which underlines the emotional regulatory properties of mindfulness. This study affirms these findings with a statistically significantly better score in the area of emotional responses which was measured by question G11.

7.4 Ethical Considerations for Future Use of Mindfulness Practices in Business Settings

Mindfulness raises a few ethical considerations when it is practiced in a business setting. First of all there is the aspect of whole teams being assigned to a mindfulness exercise. If a whole team is assigned to such an exercise, there is no choice or at least a lesser degree of choice to be able not to participate if a team member does not feel happy about the exercise. The exercise was executed in front of the whole team and all members of the team participated. This creates something forceful and lessens the degree of freely chosen participation. Usually when people want to start a mindfulness track, it is done on an individual basis, being the initiative of the individual. Within the

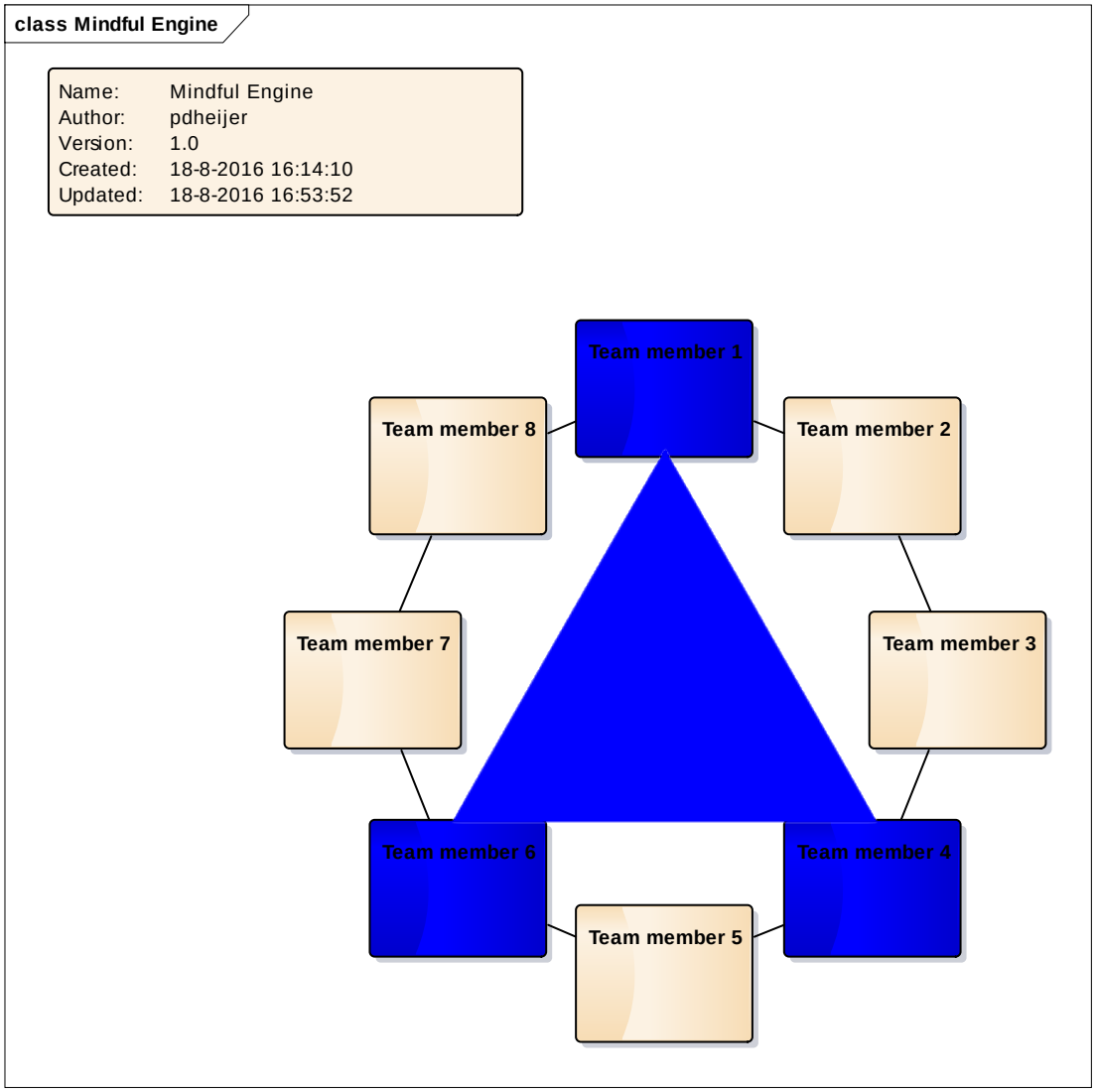
team setting there is both peer pressure as well as organizational pressure to be part of the exercise, since you don't want to be the odd one out and you do not want to get negative feedback from either your manager or from the scrum master. It would be interesting to do more research on this aspect of whole teams participating in a mindfulness trajectory. This of course does not only apply to the mindfulness exercise but also to the Stravinsky exercise: when a whole group is expected to play along, personal preferences are bypassed for the 'greater good' of the team.

Secondly, as Goto-Jones already referred to, mindfulness practitioners without a root in the tradition where it started can become potential Zombies (Goto-Jones, 2013). This fundamental origin is completely severed in the Western version of mindfulness. Mindfulness has become a popular feature in Western society, possibly as a result of the secularization that started in the middle of the previous century after which people were looking for alternatives. Mindfulness in and of itself does not provide an ethical framework in which questions about good or evil are addressed. Mindfulness practices however do give its practitioners a greater ability to deal with pain (Jon Kabat-Zinn, 2007), a reduction of stress (Alidina, 2015) and an acceptance of things the way they are (Hayes et al., 1999). With these features of mindfulness and the present emphasis of mindfulness practices towards effectiveness, it could be possible that mindfulness practices are abused for the greater good of the company, whatever that "greater good" is and can lead to a form of social control. Mindfulness practitioners might therefore accept the social evils around them, since they are provided with the tools to bear these, instead of addressing them and dealing with them. It would be an interesting study to deepen our understanding how mindfulness can be used for malicious purposes and to what degree the resilience can be raised to accept the social evils within a company. An even more interesting study would be how to prevent this possible raised resilience from turning sour.

7.5 Hybrid Mindfulness Team Model

We have observed that the application of a mindfulness exercise has a positive correlation with several important elements of effectiveness and culture within a team setting. This observation however does not prompt team members to continue the exercises after the experiment has ended. The perceived need to improve the team's effectiveness is lower than the perceived obstacles to implement Mindfulness as an instrument in the toolkit of the team. Whatever the reasons are, several participants have indicated that they would probably continue the mindfulness exercise in a private setting. With this knowledge we can say that it is probably not feasible to have whole development teams participate in a mutual exercise that is based on individual consent.

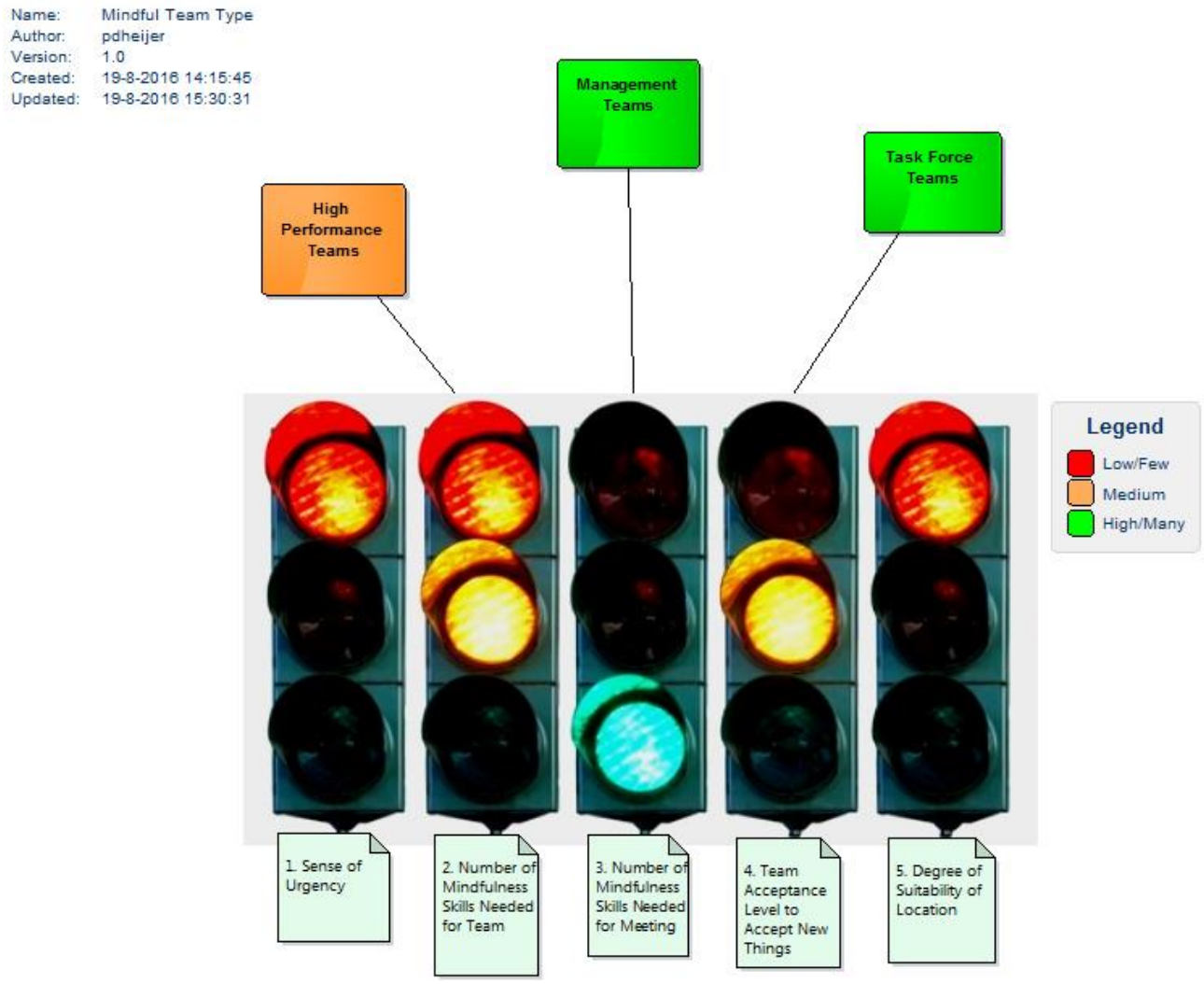
We can however consider a hybrid model in which the individuality of team members is still respected and in which those that do want to be aided by a mindfulness exercise can be supported in their wishes and those that do not want to participate have the choice to refrain. Model 1 (Model 1: The Mindful Engine) shows the setup of this reality. A few members do comply to an exercise and the rest will not participate. This might result in a critical mass of mindfulness in a team in which the mindfulness participants will be the catalyst to increase the effectiveness of the whole team. They will function as the mindful engine of the team and help the team to come to a higher degree of maturity through a virtual mindfulness triangle.



Model 1: The Mindful Engine

7.6 Model for Team Type Suitability for Mindfulness

Teams do not want to continue with mindfulness despite the perceived effects. The feedback that we received is that team members that wanted to participate felt uncomfortable before both other team members as well as towards other teams that were situated in the same office. The sense of urgency did not rise above the sense of discomfort. The type of meetings and the type of teams did not require additional tools to make them more effective and agile. Other team or meeting types could be considered in which the team or meeting would receive the tool of mindfulness more heartily. Model 2 (Model2: Team Type Suitability for Mindfulness) shows a possible representation in which the perceived necessity of a team is established. The model exists of 5 variables which predict whether a team is Mindfulness ready or not.



Model 2: Team Type Suitability for Mindfulness

The five elements that need to be determined to somewhat indicate that a team would embrace Mindfulness and profit from it are:

1. A sense of urgency of the team and organization that such a tool is necessary
2. The amount of essential basic team skills that are enhanced by the practice of Mindfulness
3. The amount of essential team skills for a particular meeting type that are enhanced by practice of Mindfulness
4. The degree of acceptance within a team to accept new and out of the ordinary things to improve themselves
5. The degree of suitability of the location that is available to the team to have their meeting and to have their preparation

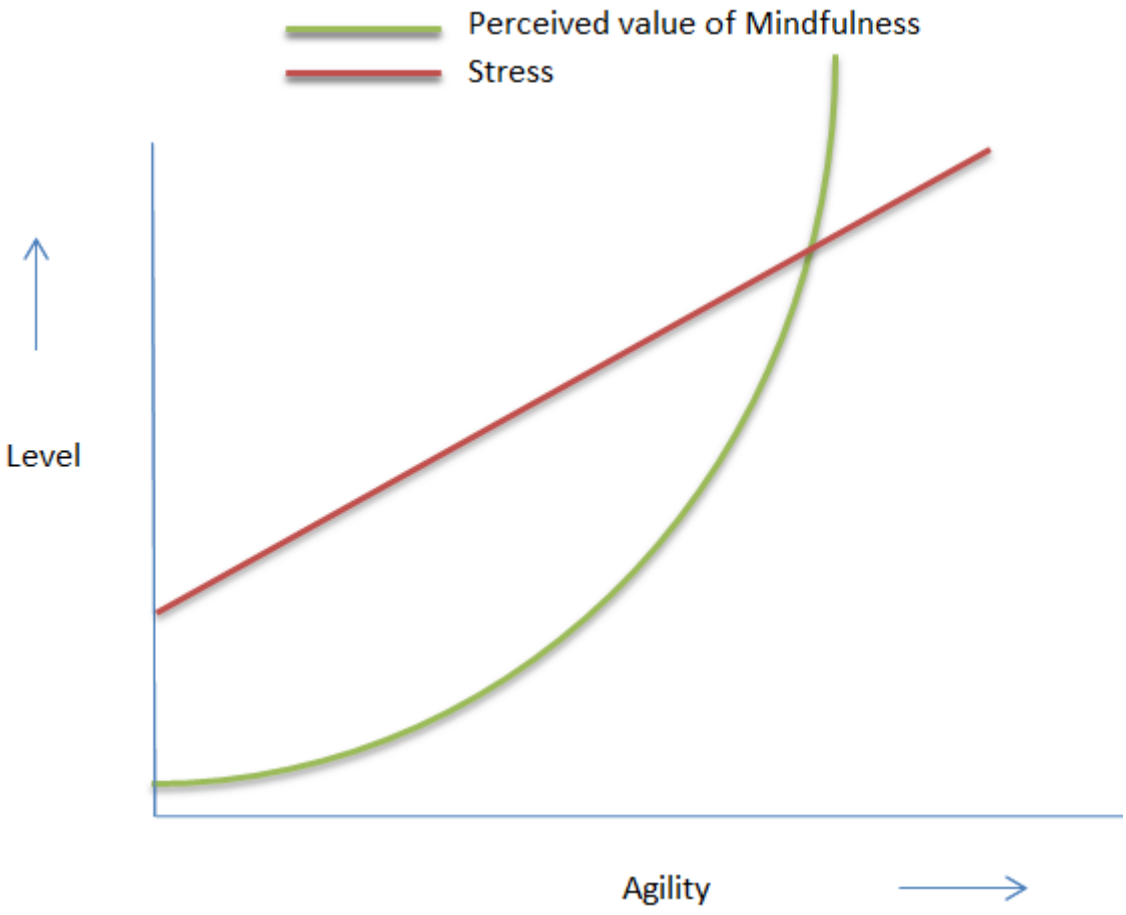
These questions are each represented by a traffic light in the model in question. The more traffic lights are green, indicating a high need, acceptance or availability, the higher the chance that the team is likely to embrace mindfulness as a tool within its toolset.

In this light, it is not unthinkable that management teams would be more prone to accept and benefit from the trait mindfulness than a high performance development team would, especially when the meeting type would entail serious decisions that need to be made about important issues.

Furthermore it is not unlikely that a task force team would greatly benefit from a Mindfulness practice before a brainstorm session. Brainstorm sessions are always about approaching a problem with new and out of the ordinary solutions instead of being a repetitive and daily meeting type in which the automatic pilot will lead you a long way.

7.7 Future of Work?

Will mindfulness become the future of the toolkit of work? Businesses are becoming increasingly more agile. Agility demands considerable efforts from its workers and causes stress levels that are getting higher the more agile an organization becomes. Mindfulness gives tools to handle the increased stress levels. There should be an intersection between the perceived need to use mindfulness as a tool when the stress levels spike through the perceived value of mindfulness. The model below (Model 3: Cross Roads Stress and Perceived Value of Mindfulness) shows this intersection.



Model 3: Cross Roads Stress and Perceived Value of Mindfulness

The moment the two lines cross, teams or team members will more readily use the tools that are offered to them despite the discomfort it causes them.

Since it is expected that businesses move increasingly more in the direction of agility, it is also likely that Mindfulness could be considered as a viable option for its workers.

7.8 Threats to Validity of the Experiment

An experiment that is executed within nine teams in three organizations tends to be messier in the operational phase then when designed on paper, despite the fact that the number of elements that could explain the differences in results between the intervention types was meant to be brought back to one, namely the intervention in and of itself. The following paragraphs state the possible weaknesses within the execution of this experiment.

7.8.1 The Bias of the Instructors

Since all the guided exercises were all done by mindfulness instructors, the instructors could have consciously or subconsciously influenced the responses of the team members which could result in higher scores for the treatment teams. It was in the interest of the mindfulness instructors to get good results for the treatment group and lesser results for the placebo and act as usual teams so as to prove that their field of expertise offers the best results. This bias assumption however cannot be proven and the instructors have been given guidelines to approach both the mindfulness and the placebo exercises in likewise manner.

7.8.2 The Bias of the participants

Related to the previous paragraph, the participants can also be biased without the interference of the instructors. Some participants might be prone to please the experiment leader and give him the answers he needs for his experiment to be successful. The participants however did not exactly know what experiment should have to lead to the best results since the placebo exercise was introduced in the same way as the mindfulness exercise. For them these two exercises both had to prove its validity. The data shows that there was no statistically significant result for the placebo exercise.

Another contradicting bias is that the participants would react on the concept of mindfulness, since it is a bit of an wooly subject for developers which is approached with much cynicism. Although we had instructed the instructors not to mention that they were giving a mindfulness exercise, it soon was known that this was indeed mindfulness. The skepticism might have influenced the answers of the participants.

Furthermore the participants might have completely uninterested in the whole experiment and might have given random answers just to get it over and done with. We have tried to notice this within the dataset and looked for outliers and noise in the data.

7.8.3 The Focus on Individual Questions

The analysis has been predominantly done on the results of individual questions. Aggregated analysis of a whole set of related questions has not been performed. This might lead to questions that have a significant difference just by chance. The data shows a p-value that is smaller than the significance level, indicating a significant finding, but still the difference can be ascribed to chance. Since seven questions showed a significant difference, it is not probable that all, if any, of these significant differences can be ascribed to chance, but the chance factor still remains present.

7.8.4 Other Influencing Factors

An experiment that is well designed knows only one factor to which a significant change can be assigned when results before and after the experiment are compared. The experiment of this paper had that exact same ambition. However, there are other factors that could have played a role in bringing about these results. Despite of the fact that the similarity in the approach wanted to prevent other factors to play a noteworthy role, it is conceivable that other external factors have been part of the equation. Team meetings can be a messy interaction in which incentives from the environment, people's moods, previous communication and present situations can influence team workings, just to name a few obstacles. A team that has just heard that it is not going to manage to reach its intended targets for the sprint will be more irritable than a team that has just achieved a good result. This might represent itself by lower or higher marks in the effectiveness totals. By using multiple teams in multiple organizations, we have tried to minimize this noise, but it might not have been totally eliminated from the test.

8. Conclusions

In this section we will portray the conclusions that can be drawn from this study and will end with some recommendations for further study.

The goals of this study were to see what the results are of a short mindfulness exercise on the quality of meetings in an agile project team. This study wanted to assess these claims in the context of an agile project organization and wanted to find whether there is a correlation between a short Mindfulness exercise and the effectiveness of an agile team meeting.

In order to do so an experiment was designed in which eight scrum teams took part spread over three organizations. These teams were assigned to either a small mindfulness exercise, a placebo exercise or no exercise whatsoever just before the start of their meetings. Afterwards they would have their meeting in their ordinary manner and then each team member would fill out a questionnaire to assess the perceived effectiveness of the meeting in question. The teams that received an exercise were all guided by professional Mindfulness trainers. Altogether 209 forms were collected in the experiment over a period from June 7th 2016 to July 28th 2016.

The conclusion that can be made is that mindfulness in the form of breathing exercises enhances the quality of meetings in an agile setting. Further research needs to be done in order to understand the circumstances under which its effects are perceived more or less.

If there is more collaboration and more pressure in future business settings to keep our organizations healthy, sustainable and effective, the use of mindfulness might be more essential.

8.1 Contribution to Research

This experiment has been a contribution to research in that it could find a positive correlation between the trait mindfulness and the optimization of team dynamics in team meetings in an agile project organization despite the short duration of the mindfulness experiment.

A whole team can benefit from a short mindfulness exercise and can increase its effectiveness. Previous studies have primarily entailed longer mindfulness tracks of usually 8 weeks in which mindfulness could be correlated to a positive result. This study has shown that also a short pinpointed guerrilla exercise can significantly add to the wellbeing and culture of a whole team in an agile setting.

Furthermore does this experiment underline previous research that has been commenced in the fact that the trait mindfulness has a positive correlation in the area of decision-making, involvement, listening skills, handling of stress, mutual interaction and emotional responses.

8.2 Recommendations to Practice

Teams that want to become more effective in its team meetings in the areas of decision-making, listening skills, acceptable disagreement levels, tension levels, level of interaction and emotional responses might consider to apply short mindfulness exercises to enhance these traits. This could be done on a team level with someone that is trained in mindfulness to guide these short sessions, possibly the scrum master of the team. The team members should be consulted in the application of this instrument. If they do not want to participate, they should feel free to sustain from participation. The team members that do agree to participate could focus on just one type of meeting and discuss

in the retrospective meeting if the exercise is indeed the exercise that would benefit the whole of the team.

If a team is not happy to comply in this exercise, individual team members could be asked if they see place for such an exercise. If some team members want to experiment with this exercise, they should receive room to execute the exercise and receive proper time to do so. The additional time that they get, either guided or unguided, should not negatively weigh on their working hours since the participation in such an exercise is for the benefit of the effectiveness of their work.

8.3 Recommendations for Further Research

This study has only done research over a relatively short period of time. It would be interesting to observe how teams would grow into maturity over a longer period of time by being aided by mindfulness practices. Would these short practices become increasingly more effective over time?

In clinical research, experiments have been more intense in nature. Usually these experiments lasted multiple hours per day over a period of several weeks and sometimes an experiment lasted even a year. It would be interesting to see if a whole team that volunteers to submit to a whole intensive MBSR, MBCT or DBT program will see even better results. Would the team that would go through daily Mindfulness exercises become the star team of the organization and would the investment be worthwhile? The Search Inside yourself practices developed by Tan (Tan, Goleman, & Kabat-Zinn, 2012) have been popularized in companies like Google and SAP. The approach is based on the MBSR program developed by Kabat-Zinn (Jon Kabat-Zinn, 1982) and it would be interesting to see how the program as it has been alternated for a business setting by Tan would improve the effectiveness of agile teams.

As already alluded to in paragraph 7.2, it would be interesting to see if the experiment that was conducted in this study might have other results in more intense meetings such as brain storm sessions or management meetings, not only in the scores that are recorded, but also in the personal feedback of the participants. Would the participants themselves see the added effectiveness and continue the practice even after the instructors are no longer present?

Lastly it would be interesting to do an experiment with a negative ethical incentive. Would teams that undergo an intense Mindfulness program be more prone to fall into unethical traps than teams that do not undergo such a program, since they have a higher ‘pain level’ towards the injustices of a situation as it presents itself? Would these teams be more vulnerable to social evils within an organization or would they be better in addressing it?

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Supplements

Appendix 1: Body Scan

Nr	Activity
1	Take a few moments to be still. Congratulate yourself for taking this time for meditation practice.
2	Do a mindful check-in, feeding into your body and mind and simply allowing any waves of thoughts, emotions, and physical sensations to just be.
3	Perhaps it's been a busy day and this is the first time you're stopping. As you begin to enter the world of being rather than doing, you may notice the trajectory of the feelings you've been carrying within you.
4	There is no need to judge, analyze, or figure things out. Just allow yourself to be in the moment with all that's there.
5	When you feel ready, gently shift the focus to the breath.
6	Now become aware of breathing.
7	Breathe normally and naturally and focus on the tip of the nose or the abdomen. Breathing in and knowing that you are breathing in, and breathing out and knowing that you are breathing out.
8	At times the mind may wander away from awareness of breathing. When you recognize this, acknowledge wherever you went and then come back to the breath, breathing in and out with awareness.
9	And now gently withdraw awareness from mindful breathing as you shift to the body scan. As you go through the body, you may come across areas that are tight or tense. If you can allow them to soften, let that happen; if you can't, just let the sensations be, letting them ripple in whatever direction they need to go. This applies not only to physical sensations but also to any emotions. As you go through the body be mindful of any physical sensations and any thoughts or emotions that may arise from sensations.
10	Bring awareness to the bottom of the left foot where you feel the contact of your foot on the floor. It could be the back of the heel or the bottom of the left foot. Sensing into what is being felt. Feeling the heel, ball, and sole of the left foot.
11	Feel into your toes and the top of the left foot and back into the Achilles tendon and up into the left ankle.
12	Now move your awareness up to the lower left leg, feeling into the calf and shin and their connection to the left knee. Being present.
13	Let awareness now rise up to the thigh, sensing into the upper leg and its connection above into the left hip.
14	And now draw awareness from the left hip down to the left foot, shifting it into the right

Nr	Activity
	foot and bringing awareness to where you feel the contact of your right foot on the floor. It could be the back of the heel or the bottom of the right foot. Sensing into what is being felt. Feeling the heel ball and the sole of the right foot.
15	Feel into the toes and the top of the right foot and back into the Achilles tendon and up into the right ankle.
16	Now move your awareness up to the lower right leg, feeling into the calf and shin and their connection to the right knee. Being present.
17	Let awareness now rise up into the thigh, sensing into the upper leg and its above into the right hip.
18	Gently withdraw your attention from the right hip and move into the pelvic region. Sense into the systems of elimination, sexuality, and reproduction. Feeling into the genitals and the anal region. Being mindful of any sensations, thoughts or emotions.
19	And now lift the awareness to the abdomen and into the belly, the home of digestion and assimilation, feeling into your guts with awareness and letting be.
20	Now withdraw your awareness from the belly and move to the tailbone and begin to sense into the lower, middle, and upper parts of the back. Feeling sensations. Allow any tightness to soften and let be what's not softening.
21	Let the awareness now shift into the chest, into the heart and lungs. Being present. Feeling into the rib cage and sternum and then into the breasts.
22	Now gently withdraw attention from the chest and shift awareness into the fingertips of the left hand. Feeling into the fingers and the palm, and then the back of the hand and up into the left wrist.
23	Proceed up into the forearm, elbow, and upper left arm, feeling sensations.
24	Now shift awareness to the fingertips of the right hand. Feeling into the fingers and palm, and then the back of the hand and up into the right wrist.
25	Proceed up into the forearm, elbow, and upper right arm, feeling sensations.
26	Let the awareness move into both shoulders and armpits and then up into the neck and throat. Being present to any sensations, thoughts or emotions.
27	Now bring your awareness into the jaw and then gently into the teeth, tongue, mouth, and lips. Allowing any resonating sensations to go wherever they need to go and letting be.
28	Feel into the cheeks, the sinus passages that go deep into the head, the eyes and the muscles around the eyes. Feel into the forehead and the temples, being present.
29	Let the awareness move into the top and back of the head. Feeling into the ears and then inside of the head and into the brain. Being present.
30	Now expand the field of awareness to the entire body from head to toe to fingertips.

Nr	Activity
	Connect from the head through the neck to the shoulders, arms, hands, chest, back, belly, hips, pelvic region, legs and feet.
31	Feel the body as a whole organism, with its various physical sensations, thoughts, and emotions. Being present.
32	Breathing in, feel the whole body rising and expanding on an inhalation and falling and contracting on an exhalation. Feel the body as a whole organism. Being present.
33	As you come to the end of the body scan, congratulate yourself for taking this time to be present. May you know that this is an act of love.
34	May all beings be at peace.

Appendix 1: Body scan (Stahl & Goldstein, 2010)

Appendix 2: Mindful Walking

Nr	Activity
1	Begin standing and by taking a moment to feel into the body. Feel the connection of the body to the ground or the floor.
2	Become aware of your surroundings, spending a few moments taking in any sights, smells, tastes, sounds or other sensations. Also note and acknowledge any thoughts and emotions, and let all of these sensations and internal experiences be.
3	Now mindfully begin to focus solely upon walking as you shift the weight to the left leg and begin to lift the right foot up, then move it forward, then place it back down on the ground.
4	And mindfully shift the weight to the right leg and begin to lift the left foot up, then move it forward, then place it back down on the ground.
5	Start off by walking slowly and paying attention to sensations on the soles of the feet as each part of the sole, from heel to toes, touches the ground. Notice how the body moves as you walk with your arms either swinging back and forth or clasped behind or in front of you.
6	Walk with awareness, one step at a time.
7	Continue walking one step at a time until you come to the designated end point. Without interrupting the flow of mindfulness, bring awareness to the intricate process of turning and beginning to walk back to where you started.
8	Walk with awareness one step at a time.
9	Continue walking, turning, and returning one step at a time.
10	Walk with mindfulness.

Appendix 2: Mindful Walking (Stahl & Goldstein, 2010)

Appendix 3: Mindful Sitting Meditation

Nr	Activity
1	We call the heart of the formal meditation practice “sitting meditation” or simply “sitting.” As with breathing, sitting is not foreign to anyone. We all sit, nothing special about that. But mindful sitting is different from ordinary sitting in the same way that mindful breathing is different from ordinary breathing. The difference, of course, is your awareness.
2	To practice sitting, we make a special time and place for non-doing. We consciously adopt an alert and relaxed body posture so that we can feel relatively comfortable without moving, and then we reside with calm acceptance in the present without trying to fill it with anything. You have already tried this in the various exercises in which you have watched your breathing.
3	It helps a lot to adopt an erect and dignified posture, with your head, neck, and back aligned vertically. This allows the breath to flow most easily. It is also the physical counterpart of the inner attitudes of self-reliance, self-acceptance, and alert attention that we are cultivating.
4	We usually practice the sitting meditation either on a chair or on the floor. If you choose a chair, the ideal is to use one that has a straight back and that allows your feet to be flat on the floor. We often recommend that if possible you sit away from the back of the chair so that you spine is self-supporting. But if you have to, leaning against the back of the chair is also fine. If you choose to sit on the floor, do so on firm, thick cushion which raises your buttocks off the floor three to six inches (a pillow folded over once or twice does nicely; or you can purchase a meditation cushion, or zafu, specifically for sitting).
5	There are a number of cross-legged sitting postures and kneeling postures that some people use when they sit on the floor. The one I use most is the so-called “Burmese” posture (see Figure B), which involves drawing one heel in close to the body and draping the other leg in front of it. Depending on how flexible your hips and knees and ankles are, your knees may or may not be touching the floor. It is somewhat more comfortable when they are. Others use a kneeling posture, placing the cushion between the feet.
6	Whether you choose the floor or a chair, posture is very important in meditation practice. It can be an outward support in cultivating an inner attitude of dignity, patience, and selfacceptance. The main points to keep in mind about your posture are to try to keep the back, neck, and head aligned in the vertical, to relax the shoulders, and to do something comfortable with your hands. Usually we place them on the knees, or we rest them in the lap with the fingers of the left hand above the fingers of the right and the tips of the thumbs just touching each other.
7	When we have assumed the posture we have selected, we bring our attention to our breathing. We feel it come in, we feel it go out. We dwell in the present, moment by moment, breath by breath. It sounds simple, and it is. Full awareness on the inbreath, full awareness on the outbreath. Letting the breath just happen, observing it, feeling all the sensations, gross and subtle, associated with it.

Nr	Activity
8	It is simple but it is not easy. You can probably sit in front of a TV set or in a car on a trip for hours without giving it a thought. But when you try sitting in your house with nothing to watch but your breath, your body and your mind, with nothing to entertain you and no place to go, the first thing you will probably notice is that at least part of you doesn't want to stay at this for very long. After perhaps a minute or two or three or four, either the body or the mind will have had enough and will demand something else, either to shift to some other posture or to do something else entirely. This is inevitable.
9	It is at this point that the work of self-observation gets particularly interesting and fruitful. Normally every time the mind moves, the body follows. If the mind is restless, the body is restless. If the mind wants a drink, the body goes to the kitchen sink or the refrigerator. If the mind says, "This is boring," then before you know it, the body is up and looking around fro the next thing to do to keep the mind happy. It also works the other way around. If the body feels the slightest discomfort, it will shift to be more comfortable or it will call on the mind to find something else for it to do, and again, you will be standing up literally before you know it.
10	If you are genuinely committed to being more peaceful and relaxed, you might wonder why it is that your mind is so quick to be bored with being with itself and why your body is so restless and uncomfortable. You might wonder what is behind your impulses to fill each moment with something; what is behind your need to be entertained whenever you have an "empty" moment, to jump up and get going, to get back to doing and being busy? What drives the body and mind to reject being still?
11	In practicing meditation we don't try to answer such questions. Rather we just observe the impulse to get up or the thoughts that come into the mind. And instead of jumping up and doing whatever the mind decides is next on the agenda, we gently but firmly bring our attention back to the belly and to the breathing and just continue to watch the breath, moment by moment. We may ponder why the mind is like this for a moment or two, but basically we are practicing accepting each moment as it is without reacting to how it is.
12	By doing so you are training your mind to be less reactive and more stable. You are making each moment count. You are taking each moment as it comes, not valuing any one above any other. In this way you are cultivating your natural ability to concentrate your mind. By repeatedly bringing your attention back to the breath each time it wanders off, concentration builds and deepens, much as muscles develop by repetitively lifting weights. Working regularly with (not struggling against) the resistance of your own mind builds inner strength. At the same time you are also developing patience and practicing being non-judgmental. You are not giving yourself a hard time because your mind left the breath. You simply and matter-of-factly return it to the breath, gently but firmly.
13	Meditation does not involve pushing thoughts away or walling yourself off from them to quiet your mind. We are not trying to stop our thoughts as they cascade through the mind. We are simply making room for them, observing them as thoughts, and letting

Nr	Activity
	them be, using the breath as our anchor or “home base” for observing, for reminding us to stay focused and calm.

Appendix 3: Mindful Sitting Meditation (Jon Kabat-Zinn, 1991)

Appendix 4: Mindful Stretching

Nr	Activity
1	When you practice the yoga, you should be on the lookout for the many ways, some quite subtle, in which your perspective on your body, your thoughts, and your whole sense of self can change when you adopt different postures on purpose and stay in them for a time, paying full attention from moment to moment. Practicing in this way enriches the inner work enormously and takes it far beyond the physical benefits that come naturally with the stretching and strengthening.
2	Work at or within your body's limits at all times, with the intention of observing and exploring the boundary between what your body can do and where it says, "Stop for now." Never stretch beyond this limit to the point of pain. Some discomfort is inevitable when you are working at your limits, but you will need to learn how to enter this healthy "stretching zone" slowly and mindfully so that you are nourishing your body, not damaging it as you explore your limits.

Appendix 4: Mindful Stretching (Jon Kabat-Zinn, 1991)

Appendix 5: Awareness of pleasant and unpleasant events

Nr	Activity
1	Be aware of one unpleasant event or occurrence each day while it is happening
2	At a later time, record the details of your experience on a calendar
3	What was the experience?
4	Were you aware of the pleasant or unpleasant feelings while the event was happening?
5	How did your body feel, in detail, during this experience? Describe the sensation you felt.
6	What moods, feelings and thoughts accompanied this event at the time?
7	What thoughts are in your mind now as you write this down?

Appendix 5: Awareness of pleasant and unpleasant events (Jon Kabat-Zinn, 1991)

Appendix 6: Mindful Breathing

Nr.	Activity
1	Assume a comfortable posture lying on your back or sitting.
2	If you are sitting, keep the spine straight and let your shoulders drop.
3	Close your eyes if it feels comfortable.
4	Bring your attention to your belly, feeling it rise or expand gently on the inbreath and fall or recede on the outbreath.
5	Keep your focus on the breathing, “being with” each inbreath for its full duration and with each outbreath for its full duration, as if you were riding the waves of your own breathing.
6	Every time you notice that your mind has wandered off the breath, notice what it was that took you away and then gently bring your attention back to your belly and the feeling of the breath coming in and out.
7	If your mind wanders away from the breath a thousand times, then your “job” is simply to bring it back to the breath every time, no matter what it becomes preoccupied with.
8	Practice this exercise for fifteen minutes at a convenient time every day, whether you feel like it or not, for one week and see how it feels to incorporate a disciplined meditation practice into your life. Be aware of how it feels to spend some time each day just being with your breath without having to do anything.

Appendix 6: Mindful Breathing (J. Kabat-Zinn, 1996)

Appendix 7: Raisin Exercise

Nr	Feature	Activity
1	Holding	First, take a raisin and hold it in the palm of your hand or between your finger and thumb.
2		Focusing on it, imagine that you've just dropped in from Mars and have never seen an object like this before in your life.
3	Seeing	Take time to really see it; gaze at the raisin with care and full attention.
4		Let your eyes explore every part of it, examining the highlights where the light shines, the darker hollows, the folds and ridges, and any asymmetries or unique features.
5	Touching	Turn the raisin over between your fingers, exploring its texture, maybe with your eyes closed if that enhances your sense of touch.
6	Smelling	Holding the raisin beneath your nose, with each inhalation drink in any smell, aroma, or fragrance that may arise, noticing as you do this anything interesting that may be happening in your mouth or stomach.
7	Placing	Now slowly bring the raisin up to your lips, noticing how your hand and arm know exactly how and where to position it.
8		Gently place the object in the mouth, without chewing, noticing how it gets into the mouth in the first place.
9		Spend a few moments exploring the sensations of having it in your mouth, exploring it with your tongue.
10	Tasting	When you are ready, prepare to chew the raisin, noticing how and where it needs to be for chewing.
11		Then, very consciously, take one or two bites into it and notice what happens in the aftermath, experiencing any waves of taste that emanate from it as you continue chewing.
12		Without swallowing yet, notice the bare sensations of taste and texture in the mouth and how these may change over time, moment by moment, as well as any changes in the object itself.
13	Swallowing	When you feel ready to swallow the raisin, see if you can first detect the intention to swallow as it comes up, so that even this is experienced consciously before you actually swallow the raisin.
14	Following	Finally, see if you can feel what is left of the raisin moving down into your stomach, and sense how the body as a whole is feeling after completing this exercise in mindful eating.

Appendix 7: Raisin Exercise (J. M. G. Williams, Teasdale, Segal, & Kabat-Zinn, 2012)

Appendix 8: Three-minute breathing space

Nr	Step	Activity
1		Sit straight (or stand if that's better for you). A position of dignity, relaxation, the back straight but not stiff.
2		Your attitude is alert and curious. You close your eyes.
3	1. Becoming aware	Shift your attention to the inner experience and explore it with the question: what exactly am I experiencing at this moment?
4		Which thoughts are going through my head? Observe them with your attention, recognize them as mental events.
5		What feelings am I now experiencing? The attention includes them in the observation, whether they are pleasant or unpleasant or neutral. They are there, you acknowledge them, and you don't need to change them.
6		What physical observations are there? Where is there any tension, prickling, where is there stiffness, where comfort? Here again you explore your sensations with attention, without needing to change them.
7	2. Focusing attention on breathing	Shift your attention to the breathing and the physical sensations associated with it.
8		The stomach rises as you breathe in and falls as you breathe out.
9		You follow with attention the whole movement inward and outward again. In this way you anchor yourself in the here and now.
10		If your mind wanders, bring the attention in a friendly but firm way back to the breathing.
11	3. Extending the attention	Extend the attention from following your breathing to the body as a whole. Including your pose, your expression, as if the whole body is breathing.
12		If you notice sensations, they may be there, they are part of our body as a whole. In this way, a somewhat larger, more spacious awareness arises.
13		Finally, you open – when you are ready – your eyes again.

Appendix 8: Three-minute breathing space (Koole, 2013; Segal, Teasdale, et al., 2002; M. Williams & Penman, 2011)

Appendix 9: The physical barometer

Nr	Activity
1	Determine some part of the body – preferably in the trunk – such as the chest area or the abdomen or somewhere between the two – that for you is especially sensitive to stress and difficulty. Place your hand there.
2	Once you have found the place, it can become your 'physical barometer'.
3	Tuning into it regularly, you may notice different sensations at different times. When you are under pressure, feeling anxious, or frustrated, you may notice sensations of tension, tightness, shakiness, or discomfort. The intensity of these sensations varies, depending on the level of your difficulty.
4	As you get used to practicing this, you can become aware of quite subtle sensations that may signal that something is brewing for you, long before you are consciously aware of this.
5	Being curious about these sensations moment by moment, without attempting to change them, means you can respond to what is arising quite differently – perhaps with more choice and kindness.

Appendix 9: The physical barometer (Kenny & Williams, 2007)

Appendix 10: Observe

Nr	Activity
0	Pre-condition: o JUST NOTICE THE EXPERIENCE. Notice without getting caught in the experience. Experience without reacting to your experience. o Have a “TEFLON MIND,”• letting experiences, feelings, and thoughts come into your mind and slip right out. o CONTROL your attention, but not what you see. Push away nothing. Cling to nothing. o Be like a guard at the palace gate. ALERT to every thought, feeling, and action that comes through the gate of your mind. o Step inside yourself and observe. WATCH your thoughts coming and going, like clouds in the sky. Notice each feeling, rising and falling, like waves in the ocean. Notice exactly what you are doing. o Notice what comes through your SENSES- your eyes, ears, nose, skin, tongue. See others' actions and expressions. “Smell the roses.”•
	Practice exercises- Practice observing, being in the moment.
1	Listen to music, remembering to detach yourself of all emotion you may have to the lyrics or musical style. Try to just observe the music itself, the voice of the singer, or perhaps a certain instrument.
2	Try to observe washing the dishes. Remember to notice what comes through your senses: the smell of the detergent, the water on your hands.
3	If you are around animals or kids, observe them playing or even sleeping. Remember to step back from the event itself.
4	Try going for a walk or run, observing your body movements. Remember to notice your senses, the smells and sounds.
5	Observe your thoughts as they come into your mind. Remember not to hold onto them or push them away, just observe them.
6	Observe your breathing, your stomach rising and descending.
7	Pick something of your choice to observe.
X	Additional notes: If you find yourself describing thoughts, feelings, or sensations, step back in your mind

Nr	Activity
	and observe your describing. If you find your self being distracted, observe yourself as you become aware of being distracted. See how long you can observe. It's common to have to start and restart in the course of one to two minutes. Step back within yourself, not outside of yourself, to observe. Observing is not disassociating. Remember that observing the event is separate from the event itself. Observing your thoughts is different from the thoughts themselves. Try not to put a feeling or an emotion on the thoughts. Just let them come into your mind and go out without holding onto them or pushing them away. Be in the moment, notice and attend.

Appendix 10: Observe (M. Linehan, 1993a)

Appendix 11: Describe

Nr	Activity
0	Pre-condition The second “what”• skill is describe, which also helps us stay in the present. We can use this skill to apply verbal labels to feelings. Being able to verbally describe events and feelings is necessary both so that we can manage our own thoughts and feelings, as well as communicate them to others. o PUT WORDS ON THE EXPERIENCE. When a feeling or thought arises, or you do something, acknowledge it. For example, say in your mind, “Sadness has just enveloped me.”• …or … “Stomach muscles tightening.”• …or… “A thought ‘I can't do this' has just come into my mind.”• …or… “Walking, step, step, step…”• o PUT EXPERIENCES INTO WORDS. Describe to yourself what is happening. Put a name on your feelings. Call a thought, just a thought… or a feeling, just a feeling. Don't get caught in content. Practice exercises- Practice describing the events around you and putting your feelings into words.
1	When doing dishes, try to describe the water, the smell of the soap, the way your hands feel.
2	Try describing an emotion, a thought, the way it makes you feel, physical symptoms. Remember that “thoughts are just thoughts and feelings are just feelings.”•
3	Go for a walk or run and describe your experience. Remember to not get caught in the content or judge the experience.
X	Additional notes: In learning to describe, it is important to learn how to not take your thoughts and emotions literally. For example, feeling afraid does not necessarily mean that something in life is threatening or dangerous to us. Our fear may come from some past experience, or from something that has some connection to the current situation, or from confusion about the event that triggers our fears.

Appendix 11: Describe (M. Linehan, 1993a)

Appendix 12: Participate

Nr	Activity
0	Pre-condition: Participating is part three of the “what”• skills in mindfulness. Participation is about awareness. It's about being totally present when engaging in an activity. By being in the moment, we are allowed to step back from our lives and our thoughts and be aware that we are alive in this moment and we are ok right now. Participation can be mindless and mindful. Participating without attention to the task is mindlessness. Thus, participating with attention to the task is mindfulness. Participating is throwing yourself into something. Participating is the ultimate goal. o Enter into your own experiences. Let yourself get involved in the moment, letting go of ruminating. BECOME ONE WITH YOUR EXPERIENCE. COMPLETELY FORGETTING YOURSELF. o ACT INTUITIVELY from wise mind. Do just what is needed in each situation- a skillful dancer on the dance floor, one with music and your partner, neither willful nor sitting on your hands. o Actively PRACTICE your skills as you learn them until they become part of you, where you can use them without self-consciousness. PRACTICE. Ã˜ Changing harmful situations. Ã˜ Changing your harmful reactions to situations. Ã˜ Accepting yourself and the situation as they are. Practice exercises- Participate by entering wholly into the activity, becoming one with it. Pick something that you like to do and try participating fully into the activity.
1	Playing with children
2	Walking or running
3	Dancing
4	Playing with animals
5	Driving
6	Painting
7	Taking a bath
8	Eating a meal

Appendix 12: Participate (M. Linehan, 1993a)

Appendix 13: Non-judgmentally

Nr	Activity
1	SEE, BUT DON'T EVALUATE. Take a non-judgmental stance. Just the facts.
2	Focus on the "what", not the "good" or "bad", the "terrible", the "should" or "should not".
3	UNGLUE YOUR OPINIONS from the facts, from the "who, what, when, and where.
4	ACCEPT each moment, each event as a blanket spread out on the lawn accepts both the rain and the sun, each leaf that falls upon it.
5	ACKNOWLEDGE the helpful, the wholesome, but don't judge it. Acknowledge the harmful, the unwholesome, but don't judge it.
6	When you find yourself judging, DON'T JUDGE YOUR JUDGING.

Appendix 13: Non-judgmentally (Fulton State Hospital, 2004; M. Linehan, 1993b)

Appendix 14: One-mindfully

Nr	Activity
1	DO ONE THING AT A TIME. When you are eating, eat. When you are walking, walk. When you are working, work. When you are in a group, or a conversation, focus your attention on the very moment you are in with the other person. Do each thing with all of your attention.
2	If other actions, thoughts, or strong feelings distract you, LET GO OF DISTRACTIONS and go back to what you are doing—again, and again, and again.
3	CONCENTRATE YOUR MIND. If you find you are doing two things at once, stop and go back to one thing at a time

Appendix 14: One-mindfully (Fulton State Hospital, 2004; M. Linehan, 1993a)

Appendix 15: Effectively

Nr	Activity
1	FOCUS ON WHAT WORKS. Do what needs to be done in each situation in order to meet your larger goals. Stay away from thoughts of “right”, “wrong”, “should”, “should not”, “fair” and “unfair”.
2	PLAY BY THE RULES. Act as skillfully as you can, meeting the needs of the situation you are in, not the situation you WISH you were in.
3	LET GO of vengeance, useless anger, and righteousness that hurts you and doesn’t work

Appendix 15: Effectively (Fulton State Hospital, 2004; M. Linehan, 1993a)

Appendix 16: Is Emotion Control Working?

Nr	Activity
1	Spend a few minutes thinking about an issue you've struggled with for a long time (it could be something that you struggle with all the time or something that just keeps coming back up again and again). It might be about your health, maybe your family / friends, or work. Also write down how long you have been struggling with this.
2	If you haven't already, write about the emotions that occur in this situation that you find are difficult or distressing (i.e., sadness, anger, hurt, anxiety, fear).
3	What are some common thoughts that show up when you think about this situation? What emotions do you experience when you think these thoughts? It may be one thought or several thoughts that reoccur (i.e., I can't handle / stand this? Why is this happening to me? I'm a failure. Nothing goes right for me? What if I don't get passed this? etc.)

Appendix 16: Is Emotion Control Working?

Appendix 17: Discovering the Power of Giving up Emotional Control

Nr	Activity
1	First, think about all the strategies that you have used to try control / get rid of / or fix the distress (difficult emotions and thoughts) that you experience as a result of this situation. In the column on the left below, identify all of these strategies. Make sure not to write anything in the right-hand columns yet. We'll be using that column for something else.
2	When you take a close look, you may notice that some of the things you do to try to get rid of your distress don't work at all. Go back and look at what you wrote down under "Strategies", above, and put a checkmark by those strategies you believe don't help at all under "Doesn't Help".
3	One of the toughest things about being human is that we love getting benefits in the short term. That is, if we do something that pays off at least a little in the short term, we continue to do it—even if it doesn't help in the long run or even makes things worse over time. For each strategy you listed above, put a check-mark (under "Short-Term") by those you believe work at least a little over the short-term.
4	Next, put a check-mark by those strategies you believe have lessened or gotten rid of that distress over the long-term.
5	Some of the things we do to manage our distress are physically harmful to ourselves or others. Put a check mark by those strategies you believe to be physically harmful to you or others under "Harmful".
6	Finally, some of the things we do to manage our distress move us further away from things that are important to us, from things that we value. They cost us, because our lives become less vital, meaningful, and purposeful as a result. Put a check mark by those strategies you believe move you farther away from the relationships and things that are truly important to you.
	If you are like most people, you probably noticed that most—if not all—of the strategies you've used to try and manage this problem aren't working, especially over the long run. Some of the strategies you've listed may work for smaller problems, for things that don't matter so much. But for big issues (like this one) that matter, you may be seeing that they just don't work. If you've discovered that some of your strategies are working over the long term, ask yourself the following questions for each of them: **Has this distress gone once and for all**?

Appendix 17: Discovering the Power of Giving up Emotional Control

Appendix 18: Defusion

Nr	Activity
1	Notice what's happening – your thoughts, physical sensations, emotions, images, memories. Notice the way you're interpreting what they mean, and how that's affecting you. Notice the unhelpful thoughts. It can help to say them differently, in a non-threatening way: slowly, in a squeaky or comic voice or write them down.
2	Identify the emotion you're feeling, and label the unhelpful thoughts • an evaluation • a prediction • a feeling or sensation • a memory • an unhelpful thinking habit: mind-reading (assuming we know what others are thinking), negative filter (only noticing the bad stuff), emotional reasoning (I feel bad so it must be bad), catastrophising (imagining the worst), the internal critic etc.
3	Learn more and practice mindfulness so that you can be aware of when you are in the present moment rather than being 'in your head' - perhaps thinking about the past or worrying about the future. Notice what you don't normally notice – sights, sounds, sensations, thoughts, textures etc.
4	Use metaphors try to see things differently. Metaphors can help us understand thoughts in a different way.

Appendix 18: Defusion (Ciarrochi & Bailey, 2008)

Appendix 19: Observing Self

Nr	Activity
0	Pre-instruction: X can include: thoughts, feelings, sensations, urges, memories, body, the roles you play
1	Bring your attention to X
2	As you notice X, be aware that you are noticing it.
3	There is X, and there you are, observing it.
4	X changes.
5	The you that notices X does not change.
6	Once again, notice X, and be aware that you're noticing. There's X, and there's you.

Appendix 19: Observing Self

Appendix 20: The Bull's Eye

Nr	Area	Activity
1	Work/Education	refers to your workplace & career, education and knowledge, skills development. (This may include volunteering and other forms of unpaid work). How do you want to be towards your clients, customers, colleagues, employees, fellow workers? What personal qualities do you want to bring to your work? What skills do you want to develop?
2	Relationships	refers to intimacy, closeness, friendship and bonding in your life: it includes relationships with your partner, children, parents, relatives, friends, co-workers, and other social contacts. What sort of relationships do you want to build? How do you want to be in these relationships? What personal qaulities do you want to develop?
3	Personal Grwoth/Health	refers to your ongoing development as a human being. This may include include organized religion, personal expressions of organization01uality, creativity, developing life skills, meditation, yoga, getting out into nature; exercise, nutrition, and addressing health risk factors like smoking.
4	Leisure	refers to how you play, relax, stimulate, or enjoy yourself; your hobbies or other activities for rest, recreation, fun and creativity.

Appendix 20: The Bull's Eye

Appendix 21: The Willingness and Action Plan

Nr	Activity
1	Commit yourself to the following
2	My goal is to (be specific):
3	The values underlying my goal are:
4	The actions I will take to achieve that goal are (be specific):
5	The thoughts/memories, feelings, sensations, urges I'm willing to make room for (in order to achieve this goal):- • Thoughts/memories: • Feelings: • Sensations: • Urges:
6	• It would be useful to remind myself that:
7	• If necessary, I can break this goal down into smaller steps, such as:
8	• The smallest, easiest step I can begin with is:
9	• The time, day and date that I will take that first step, is:

Appendix 21: The Willingness and Action Plan

Appendix 22: Focused Breathing Induction

Nr	Activity
0	Duration: 15 minutes Aim: to have participants direct their attention and awareness to whatever sensations they were experiencing in the present moment, with a particular focus on the experience of breathing.
1	'Now we're going to do an exercise for 15 minutes.
2	Settle into a comfortable sitting position'', and for providing instructions on what to do if one's attention wanders off (e.g. ''bring your mind back'' to the focus of the exercise).
3	Focus on the actual sensations of breath entering and leaving the body. There is no need to think about the breath—just experience the sensations of it
4	When you notice that your awareness is no longer on the breath gently bring your awareness back to the sensations of breathing.

Appendix 22: focused breathing induction (Arch & Craske, 2006; Hafenbrack et al., 2014)

Appendix 23: Questionnaire Guide for Stand-up Meetings

Date: [_____], Organization: [_____], Team: [_____]

General Section

1. G01. Everyone is involved in the decision-making process.								
Never	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐	6 ☐	7 ☐	***Always***
2. G02. The team vision was well defined.								
Never	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐	6 ☐	7 ☐	***Always***
3. G03. The meeting atmosphere was constructive, calm and open.								
Never	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐	6 ☐	7 ☐	***Always***
4. G04. The meeting was effective.								
Never	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐	6 ☐	7 ☐	***Always***
5. G05. All meeting participants listened well to each other.								
Never	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐	6 ☐	7 ☐	***Always***
6. G06. The meeting objectives were met.								
Never	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐	6 ☐	7 ☐	***Always***
7. G07. The meeting was honest.								
Never	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐	6 ☐	7 ☐	***Always***
8. G08. The level of disagreement during the meeting was acceptable.								
Never	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐	6 ☐	7 ☐	***Always***
9. G09. The tension during the meeting was tolerable.								
Never	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐	6 ☐	7 ☐	***Always***
10. G10. The interaction in the meeting was good.								
Never	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐	6 ☐	7 ☐	***Always***
11. G11. The emotional responses within the meeting were healthy.								
Never	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐	6 ☐	7 ☐	***Always***

Stand-up Meetings Section

1. S01. Stand up meetings were extremely short (max. 15 minutes).								
Never	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐	6 ☐	7 ☐	***Always***
2. S02. Stand up meetings were to the point, focusing only on what had been done and needed to be done on that day.								
Never	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐	6 ☐	7 ☐	***Always***
3. S03. All relevant technical issues or organizational impediments came up in the stand up meetings.								
Never	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐	6 ☐	7 ☐	***Always***
4. S04. Stand up meetings provided the quickest way to notify other team members about problems.								
Never	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐	6 ☐	7 ☐	***Always***
5. S05. When people reported problems in the stand up meetings, team members offered to help instantly.								
Never	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐	6 ☐	7 ☐	***Always***

Type of preparation: ☐ None, ☐ Three minute Breathing, ☐ Stravinsky

Appendix 24: Questionnaire Guide for Retrospectives

Date: [_____], Organization: [_____], Team: [_____]

General Section

1. G01. Everyone is involved in the decision-making process.

Never	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐	6 ☐	7 ☐	*Always*

2. G02. The team vision was well defined.

Never	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐	6 ☐	7 ☐	*Always*

3. G03. The meeting atmosphere was constructive, calm and open.

Never	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐	6 ☐	7 ☐	*Always*

4. G04. The meeting was effective.

Never	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐	6 ☐	7 ☐	*Always*

5. G05. All meeting participants listened well to each other.

Never	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐	6 ☐	7 ☐	*Always*

6. G06. The meeting objectives were met.

Never	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐	6 ☐	7 ☐	*Always*

7. G07. The meeting was honest.

Never	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐	6 ☐	7 ☐	*Always*

8. G08. The level of disagreement during the meeting was acceptable.

Never	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐	6 ☐	7 ☐	*Always*

9. G09. The tension during the meeting was tolerable.

Never	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐	6 ☐	7 ☐	*Always*

10. G10. The interaction in the meeting was good.

Never	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐	6 ☐	7 ☐	*Always*

11. G11. The emotional responses within the meeting were healthy.

Never	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐	6 ☐	7 ☐	*Always*

Retrospectives Section

1. R01. How often did you apply retrospectives?

Never	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐	6 ☐	7 ☐	*Always*

2. R02. All team members actively participated in gathering lessons learned in the retrospectives.

Never	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐	6 ☐	7 ☐	*Always*

3. R03. The retrospectives helped us become aware of what we did well in the past iteration/s.

Never	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐	6 ☐	7 ☐	*Always*

4. R04. The retrospectives helped us become aware of what we should improve in the upcoming iteration/s.

Never	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐	6 ☐	7 ☐	*Always*

5. R05. In the retrospectives (or shortly afterwards), we systematically assigned all important points for improvement to responsible individuals.

Never	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐	6 ☐	7 ☐	*Always*

6. R06. Our team followed up intensively on the progress of each improvement point elaborated in a retrospective.

Never	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐	6 ☐	7 ☐	*Always*

Type of preparation: ☐ None, ☐ Three minute Breathing, ☐ Stravinsky

Appendix 25: R Code for Statistical Analysis

```
# Research on Enhancing Team Effectiveness
# Data research executed by Peter den Heijer
# Research executed to fulful the demands of the University of Leiden toward a MSc in IT in Business
# Date: July 9th 2016
# Research on the collected data to be able to conlude if a short mindfulness exercise has any positive correlation on the effectiveness of team meetings in an Agile organisation

 effectiveness <- read.table("C:\\Users\\pdheijer\\CAI\\thesis\\Data\\datacollecting.csv", sep = ";",     row.names = 1, header = TRUE)    # read prepared data in memory of R
 # mindful <- read.table("C:\\Users\\pdheijer\\CAI\\thesis\\Data\\datacollecting_mindful.csv", sep = ";",     row.names = 1, header = TRUE)
 # actasusual <- read.table("C:\\Users\\pdheijer\\CAI\\thesis\\Data\\datacollecting_actasusual.csv", sep = ";",     row.names = 1, header = TRUE)

save(effectiveness, file = "C:\\Users\\pdheijer\\CAI\\thesis\\Data processing\\effectiveness.rda")
load("C:\\Users\\pdheijer\\CAI\\thesis\\Data processing\\effectiveness.rda")
attach(effectiveness)

# Questions
# Date      Organisation            Team        Meeting_type          Preparation_type Preparation_number       Base_Line
# G01       Everyone is involved in the decision-making process.
# G02       The team vision was well defined.
# G03       The meeting atmosphere was constructive, calm and open.
# G04       The meeting was effective.
# G05       All meeting participants listened well to each other.
# G06       The meeting objectives were met.
# G07       The meeting was honest.
# G08       The level of disagreement during the meeting was acceptable.
# G09       The tension during the meeting was tolerable.
# G10       The interaction in the meeting was good.
# G11       The emotional responses within the meeting were healthy.
# S01       Stand up meetings were extremely short (max. 15 minutes).
# S02       Stand up meetings were to the point, focusing only on what had been done and needed to be done on that day.
# S03       All relevant technical issues or organizational impediments came up in the stand up meetings.
# S04       Stand up meetings provided the quickest way to notify other team members about problems.
# S05       When people reported problems in the stand up meetings, team members offered to help instantly.
# R01       How often did you apply retrospectives?
# R02       All team members actively participated in gathering lessons learned in the retrospectives.
# R03       The retrospectives helped us become aware of what we did well in the past iteration/s.
# R04       The retrospectives helped us become aware of what we should improve in the upcoming iteration/s.
# R05       In the retrospectives (or shortly afterwards), we systematically assigned all important points for improvement to responsible individuals.
# R06       Our team followed up intensively on the progress of each improvement point elaborated in a retrospective.


# VARIANCE AND MEAN PER TEAM FOR ALL QUESTIONS
################################################

team01 = data.frame(subset(effectiveness,  effectiveness$Organisation == 'organization01' & effectiveness$Team == 'blauw'))
team01questions = data.frame(team01$G01, team01$G02, team01$G03, team01$G04, team01$G05, team01$G06, team01$G07, team01$G08, team01$G09, team01$G10, team01$G11, team01$S01, team01$S02, team01$S03, team01$S04, team01$S05, team01$R01, team01$R02, team01$R03, team01$R04, team01$R05, team01$R06)
team01qstack = stack(team01questions)     # setting up team blauw  (team 1 - organization01)

 team02 = data.frame(subset(effectiveness,  effectiveness$Organisation == 'organization01' & effectiveness$Team == 'pintreg'))
team02questions = data.frame(team02$G01, team02$G02, team02$G03, team02$G04, team02$G05, team02$G06, team02$G07, team02$G08, team02$G09, team02$G10, team02$G11, team02$S01, team02$S02, team02$S03, team02$S04, team02$S05, team02$R01, team02$R02, team02$R03, team02$R04, team02$R05, team02$R06)
team02qstack = stack(team02questions) # setting up team pintreg  (team 2 - organization01)

team03 = data.frame(subset(effectiveness,  effectiveness$Organisation == 'organization01' & effectiveness$Team == 'rood'))
team03questions = data.frame(team03$G01, team03$G02, team03$G03, team03$G04, team03$G05, team03$G06, team03$G07, team03$G08, team03$G09, team03$G10, team03$G11, team03$S01, team03$S02, team03$S03, team03$S04, team03$S05, team03$R01, team03$R02, team03$R03, team03$R04, team03$R05, team03$R06)
team03qstack = stack(team03questions) # setting up team rood (team 3 - organization01)

team04 = data.frame(subset(effectiveness,  effectiveness$Organisation == 'Organization02' & effectiveness$Team == 'Mobile'))
team04questions = data.frame(team04$G01, team04$G02, team04$G03, team04$G04, team04$G05, team04$G06, team04$G07, team04$G08, team04$G09, team04$G10, team04$G11, team04$S01, team04$S02, team04$S03, team04$S04, team04$S05, team04$R01,
```

```
team04$R02, team04$R03, team04$R04, team04$R05, team04$R06)
team04qstack = stack(team04questions) # setting up Mobile team (team 4 - Organization02)

team05 = data.frame(subset(effectiveness,  effectiveness$Organisation == 'Organization02' & effectiveness$Team == 'Backoffice'))
team05questions = data.frame(team05$G01, team05$G02, team05$G03, team05$G04, team05$G05, team05$G06, team05$G07,
team05$G08, team05$G09, team05$G10, team05$G11, team05$S01, team05$S02, team05$S03, team05$S04, team05$S05, team05$R01,
team05$R02, team05$R03, team05$R04, team05$R05, team05$R06)
team05qstack = stack(team05questions)    # setting up team Backoffice (team 5 - Organization02)

team06 = data.frame(subset(effectiveness,  effectiveness$Organisation == 'Organization02' & effectiveness$Team == 'Quarant'))
team06questions = data.frame(team06$G01, team06$G02, team06$G03, team06$G04, team06$G05, team06$G06, team06$G07,
team06$G08, team06$G09, team06$G10, team06$G11, team06$S01, team06$S02, team06$S03, team06$S04, team06$S05, team06$R01,
team06$R02, team06$R03, team06$R04, team06$R05, team06$R06)
team06qstack = stack(team06questions)    # setting up Quarant team (team 6 - Organization02)

team07 = data.frame(subset(effectiveness,  effectiveness$Organisation == 'organization03' & effectiveness$Team == 'blitzkikkers'))
team07questions = data.frame(team07$G01, team07$G02, team07$G03, team07$G04, team07$G05, team07$G06, team07$G07,
team07$G08, team07$G09, team07$G10, team07$G11, team07$S01, team07$S02, team07$S03, team07$S04, team07$S05, team07$R01,
team07$R02, team07$R03, team07$R04, team07$R05, team07$R06)
team07qstack = stack(team07questions)    # setting up blitzkikkers team (team 7 - organization03)

team08 = data.frame(subset(effectiveness,  effectiveness$Organisation == 'organization03' & effectiveness$Team == 'kaeru'))
team08questions = data.frame(team08$G01, team08$G02, team08$G03, team08$G04, team08$G05, team08$G06, team08$G07,
team08$G08, team08$G09, team08$G10, team08$G11, team08$S01, team08$S02, team08$S03, team08$S04, team08$S05, team08$R01,
team08$R02, team08$R03, team08$R04, team08$R05, team08$R06)
team08qstack = stack(team08questions)    # setting up kaeru team (team 8 - organization03)

print(paste("The variance of team 1 is: ", var(subset(team01qstack$values, team01qstack$values != 'NA')) ))
print(paste("The variance of team 2 is: ", var(subset(team02qstack$values, team02qstack$values != 'NA')) ))
print(paste("The variance of team 3 is: ", var(subset(team03qstack$values, team03qstack$values != 'NA')) ))
print(paste("The variance of team 4 is: ", var(subset(team04qstack$values, team04qstack$values != 'NA')) ))
print(paste("The variance of team 5 is: ", var(subset(team05qstack$values, team05qstack$values != 'NA')) ))
print(paste("The variance of team 6 is: ", var(subset(team06qstack$values, team06qstack$values != 'NA')) ))
print(paste("The variance of team 7 is: ", var(subset(team07qstack$values, team07qstack$values != 'NA')) ))
print(paste("The variance of team 8 is: ", var(subset(team08qstack$values, team08qstack$values != 'NA')) ))

print(paste("The mean of team 1 is: ", mean(subset(team01qstack$values, team01qstack$values != 'NA')) ))
print(paste("The mean of team 2 is: ", mean(subset(team02qstack$values, team02qstack$values != 'NA')) ))
print(paste("The mean of team 3 is: ", mean(subset(team03qstack$values, team03qstack$values != 'NA')) ))
print(paste("The mean of team 4 is: ", mean(subset(team04qstack$values, team04qstack$values != 'NA')) ))
print(paste("The mean of team 5 is: ", mean(subset(team05qstack$values, team05qstack$values != 'NA')) ))
print(paste("The mean of team 6 is: ", mean(subset(team06qstack$values, team06qstack$values != 'NA')) ))
print(paste("The mean of team 7 is: ", mean(subset(team07qstack$values, team07qstack$values != 'NA')) ))
print(paste("The mean of team 8 is: ", mean(subset(team08qstack$values, team08qstack$values != 'NA')) ))


# DIFFERENCES OF MEANS OF GENERAL QUESTIONS BASELINE COMPARED WITH INTERVENTION
#######################################

# MINDFUL

question = c()
difference_of_means_mindful = c()
p_value_mindful = c()
t_value_mindful = c()

for(i in 7:17)

{
# print(paste("The difference of means between baseline and mindfulness experiment of question G", (i - 7), "is: ",
mean(subset(effectiveness[[i]], effectiveness$Preparation_type == 'mindful' & effectiveness$Base_line == 'FALSE' & effectiveness[[i]] != ''))
- mean(subset(effectiveness[[i]], effectiveness$Preparation_type == 'mindful' & effectiveness$Base_line == 'TRUE' & effectiveness[[i]] != ''))
))

tempq = paste("G", (i-6))    # giving question number to temporary variable
tmp =  mean(subset(effectiveness[[i]], effectiveness$Preparation_type == 'mindful' & effectiveness$Base_line == 'FALSE' &
effectiveness[[i]] != '')) - mean(subset(effectiveness[[i]], effectiveness$Preparation_type == 'mindful' & effectiveness$Base_line == 'TRUE' &
effectiveness[[i]] != ''))  # giving difference of means of baseline mindfulness and the actual mindfulness intervention to temporary variabel

ttestframe =  t.test(effectiveness[[i]][effectiveness$Preparation_type == "mindful" & effectiveness$Base_line == 'FALSE'],
effectiveness[[i]][effectiveness$Preparation_type == "mindful" & effectiveness$Base_line == 'TRUE']) # T.Test to compare baseline of
```

```
Question of mindfulness groups with results of actual mindfulness exercise

tmppvalue = ttestframe$p.value   # Extract the p-value from this test
tmptvalue = ttestframe$statistic # Extract the t-value from this test

question = append (question, tempq)   # adding question number to variable
difference_of_means_mindful = append(difference_of_means_mindful,  tmp)
p_value_mindful = append(p_value_mindful, tmppvalue)
t_value_mindful = append(t_value_mindful, tmptvalue)

}  #    The difference of means between baseline and mindfulness experiment

diffmeans = data.frame(question, difference_of_means_mindful, t_value_mindful, p_value_mindful) # creating data frame for overview
mindfulness
write.csv(diffmeans, file = "diffmeans.csv")   # writing the results to CSV


######################
# STRAVINSKY

question = c()
difference_of_means_stravinsky = c()
p_value_stravinsky = c()
t_value_stravinsky = c()

for(i in 7:17)

{
# print(paste("The difference of means between baseline and stravinskyness experiment of question G", (i - 7), "is: ",
mean(subset(effectiveness[[i]], effectiveness$Preparation_type == 'stravinsky' & effectiveness$Base_line == 'FALSE' & effectiveness[[i]] !=
'')) - mean(subset(effectiveness[[i]], effectiveness$Preparation_type == 'stravinsky' & effectiveness$Base_line == 'TRUE' & effectiveness[[i]]
!= '')) ))

tempq = paste("G", (i-6))    # giving question number to temporary variable
tmp =  mean(subset(effectiveness[[i]], effectiveness$Preparation_type == 'stravinsky' & effectiveness$Base_line == 'FALSE' &
effectiveness[[i]] != '')) - mean(subset(effectiveness[[i]], effectiveness$Preparation_type == 'stravinsky' & effectiveness$Base_line == 'TRUE'
& effectiveness[[i]] != ''))  # giving difference of means of baseline stravinskyness and the actual stravinsky intervention to temporary
variabel

ttestframe =  t.test(effectiveness[[i]][effectiveness$Preparation_type == "stravinsky" & effectiveness$Base_line == 'FALSE'],
effectiveness[[i]][effectiveness$Preparation_type == "stravinsky" & effectiveness$Base_line == 'TRUE']) # T.Test to compare baseline of
Question of stravinskyness groups with results of actual stravinsky exercise

tmppvalue = ttestframe$p.value   # Extract the p-value from this test
tmptvalue = ttestframe$statistic # Extract the t-value from this test

question = append (question, tempq)   # adding question number to variable
difference_of_means_stravinsky = append(difference_of_means_stravinsky,  tmp)
p_value_stravinsky = append(p_value_stravinsky, tmppvalue)
t_value_stravinsky = append(t_value_stravinsky, tmptvalue)

}  #    The difference of means between baseline and stravinsky experiment

diffmeans = data.frame(question, difference_of_means_stravinsky, t_value_stravinsky, p_value_stravinsky) # creating data frame for
overview stravinskyness
write.csv(diffmeans, file = "diffmeansstravinsky.csv")   # writing the results to CSV


 ####################
 # ACT AS USUAL

 question = c()
difference_of_means_actasusual = c()
p_value_actasusual = c()
t_value_actasusual = c()

for(i in 7:17)

{
# print(paste("The difference of means between baseline and actasusualness experiment of question G", (i - 7), "is: ",
mean(subset(effectiveness[[i]], effectiveness$Preparation_type == 'actasusual' & effectiveness$Base_line == 'FALSE' & effectiveness[[i]] !=
```

```
'')) - mean(subset(effectiveness[[i]], effectiveness$Preparation_type == 'actasusual' & effectiveness$Base_line == 'TRUE' & effectiveness[[i]]
!= '')) ))

tempq = paste("G", (i-6))    # giving question number to temporary variable
tmp =  mean(subset(effectiveness[[i]], effectiveness$Preparation_type == 'actasusual' & effectiveness$Base_line == 'FALSE' &
effectiveness[[i]] != '')) - mean(subset(effectiveness[[i]], effectiveness$Preparation_type == 'actasusual' & effectiveness$Base_line ==
'TRUE' & effectiveness[[i]] != ''))  # giving difference of means of baseline actasusualness and the actual actasusual intervention to
temporary variabel

ttestframe =  t.test(effectiveness[[i]][effectiveness$Preparation_type == "actasusual" & effectiveness$Base_line == 'FALSE'],
effectiveness[[i]][effectiveness$Preparation_type == "actasusual" & effectiveness$Base_line == 'TRUE']) # T.Test to compare baseline of
Question of actasusualness groups with results of actual actasusual exercise

tmppvalue = ttestframe$p.value   # Extract the p-value from this test
tmptvalue = ttestframe$statistic # Extract the t-value from this test

question = append (question, tempq)   # adding question number to variable
difference_of_means_actasusual = append(difference_of_means_actasusual,  tmp)
p_value_actasusual = append(p_value_actasusual, tmppvalue)
t_value_actasusual = append(t_value_actasusual, tmptvalue)

}  #    The difference of means between baseline and actasusual experiment

diffmeans = data.frame(question, difference_of_means_actasusual, t_value_actasusual, p_value_actasusual) # creating data frame for
overview actasusualness
write.csv(diffmeans, file = "diffmeansactasusual.csv")   # writing the results to CSV

# DIFFERENCES OF MEANS OF STANDUP QUESTIONS BASELINE COMPARED WITH INTERVENTION
#####################################

# stravinsky

question_stravinsky_standup = c()
difference_of_means_stravinsky_standup = c()
p_value_stravinsky_standup = c()
t_value_stravinsky_standup = c()

for(i in 18:22)

{
# print(paste("The difference of means between baseline and stravinskyness experiment of question S", (i - 18), "is: ",
mean(subset(effectiveness[[i]], effectiveness$Preparation_type == 'stravinsky' & effectiveness$Base_line == 'FALSE' & effectiveness[[i]] !=
'')) - mean(subset(effectiveness[[i]], effectiveness$Preparation_type == 'stravinsky' & effectiveness$Base_line == 'TRUE' & effectiveness[[i]]
!= '')) ))

tempq_stravinsky_standup = paste("S", (i-17))    # giving question number to temporary variable
tmp_stravinsky_standup =  mean(subset(effectiveness[[i]], effectiveness$Preparation_type == 'stravinsky' & effectiveness$Base_line ==
'FALSE' & effectiveness[[i]] != '')) - mean(subset(effectiveness[[i]], effectiveness$Preparation_type == 'stravinsky' & effectiveness$Base_line
== 'TRUE' & effectiveness[[i]] != ''))  # giving difference of means of baseline stravinskyness and the actual stravinskyness intervention to
temporary variabel

ttestframe_stravinsky_standup =  t.test(effectiveness[[i]][effectiveness$Preparation_type == "stravinsky" & effectiveness$Base_line ==
'FALSE'], effectiveness[[i]][effectiveness$Preparation_type == "stravinsky" & effectiveness$Base_line == 'TRUE']) # T.Test to compare
baseline of Question of stravinskyness groups with results of actual stravinskyness exercise

tmppvalue_standup = ttestframe_stravinsky_standup$p.value   # Extract the p-value from this test
tmptvalue_standup = ttestframe_stravinsky_standup$statistic # Extract the t-value from this test

question_stravinsky_standup = append (question_stravinsky_standup, tempq_stravinsky_standup)   # adding question number to variable
difference_of_means_stravinsky_standup = append(difference_of_means_stravinsky_standup,  tmp_stravinsky_standup)
p_value_stravinsky_standup = append(p_value_stravinsky_standup, tmppvalue_standup)
t_value_stravinsky_standup = append(t_value_stravinsky_standup, tmptvalue_standup)

}  #    The difference of means between baseline and stravinsky experiment

diffmeans_stravinsky_standup = data.frame(question_stravinsky_standup, difference_of_means_stravinsky_standup,
t_value_stravinsky_standup, p_value_stravinsky_standup) # creating data frame for overview stravinskyness
write.csv(diffmeans_stravinsky_standup, file = "diffmeans_stravinsky_standup.csv")   # writing the results to CSV

# actasusual
```

```
question_actasusual_standup = c()
difference_of_means_actasusual_standup = c()
p_value_actasusual_standup = c()
t_value_actasusual_standup = c()

for(i in 18:22)

{
# print(paste("The difference of means between baseline and actasusualness experiment of question S", (i - 18), "is: ",
mean(subset(effectiveness[[i]], effectiveness$Preparation_type == 'actasusual' & effectiveness$Base_line == 'FALSE' & effectiveness[[i]] !=
'')) - mean(subset(effectiveness[[i]], effectiveness$Preparation_type == 'actasusual' & effectiveness$Base_line == 'TRUE' & effectiveness[[i]]
!= '')) ))

tempq_actasusual_standup = paste("S", (i-17))    # giving question number to temporary variable
tmp_actasusual_standup =  mean(subset(effectiveness[[i]], effectiveness$Preparation_type == 'actasusual' & effectiveness$Base_line ==
'FALSE' & effectiveness[[i]] != '')) - mean(subset(effectiveness[[i]], effectiveness$Preparation_type == 'actasusual' &
effectiveness$Base_line == 'TRUE' & effectiveness[[i]] != ''))  # giving difference of means of baseline actasusualness and the actual
actasusualness intervention to temporary variabel

ttestframe_actasusual_standup =  t.test(effectiveness[[i]][effectiveness$Preparation_type == "actasusual" & effectiveness$Base_line ==
'FALSE'], effectiveness[[i]][effectiveness$Preparation_type == "actasusual" & effectiveness$Base_line == 'TRUE']) # T.Test to compare
baseline of Question of actasusualness groups with results of actual actasusualness exercise

tmppvalue_standup = ttestframe_actasusual_standup$p.value   # Extract the p-value from this test
tmptvalue_standup = ttestframe_actasusual_standup$statistic # Extract the t-value from this test

question_actasusual_standup = append (question_actasusual_standup, tempq_actasusual_standup)   # adding question number to
variable
difference_of_means_actasusual_standup = append(difference_of_means_actasusual_standup,  tmp_actasusual_standup)
p_value_actasusual_standup = append(p_value_actasusual_standup, tmppvalue_standup)
t_value_actasusual_standup = append(t_value_actasusual_standup, tmptvalue_standup)

}  #    The difference of means between baseline and actasusual experiment

diffmeans_actasusual_standup = data.frame(question_actasusual_standup, difference_of_means_actasusual_standup,
t_value_actasusual_standup, p_value_actasusual_standup) # creating data frame for overview actasusualness
write.csv(diffmeans_actasusual_standup, file = "diffmeans_actasusual_standup.csv")   # writing the results to CSV

# DIFFERENCES OF MEANS OF retro QUESTIONS BASELINE COMPARED WITH INTERVENTION
#######################################

# stravinsky

question_stravinsky_retro = c()
difference_of_means_stravinsky_retro = c()
p_value_stravinsky_retro = c()
t_value_stravinsky_retro = c()

for(i in 23:28)

{

tempq_stravinsky_retro = paste("R", (i-22))    # giving question number to temporary variable
tmp_stravinsky_retro =  mean(subset(effectiveness[[i]], effectiveness$Preparation_type == 'stravinsky' & effectiveness$Base_line ==
'FALSE' & effectiveness[[i]] != '')) - mean(subset(effectiveness[[i]], effectiveness$Preparation_type == 'stravinsky' & effectiveness$Base_line
== 'TRUE' & effectiveness[[i]] != ''))  # giving difference of means of baseline stravinskyness and the actual stravinskyness intervention to
temporary variabel

ttestframe_stravinsky_retro =  t.test(effectiveness[[i]][effectiveness$Preparation_type == "stravinsky" & effectiveness$Base_line ==
'FALSE'], effectiveness[[i]][effectiveness$Preparation_type == "stravinsky" & effectiveness$Base_line == 'TRUE']) # T.Test to compare
baseline of Question of stravinskyness groups with results of actual stravinskyness exercise

tmppvalue_retro = ttestframe_stravinsky_retro$p.value   # Extract the p-value from this test
tmptvalue_retro = ttestframe_stravinsky_retro$statistic # Extract the t-value from this test

question_stravinsky_retro = append (question_stravinsky_retro, tempq_stravinsky_retro)   # adding question number to variable
difference_of_means_stravinsky_retro = append(difference_of_means_stravinsky_retro,  tmp_stravinsky_retro)
p_value_stravinsky_retro = append(p_value_stravinsky_retro, tmppvalue_retro)
t_value_stravinsky_retro = append(t_value_stravinsky_retro, tmptvalue_retro)

}  #    The difference of means between baseline and stravinsky experiment
```

```
diffmeans_stravinsky_retro = data.frame(question_stravinsky_retro, difference_of_means_stravinsky_retro, t_value_stravinsky_retro,
p_value_stravinsky_retro) # creating data frame for overview stravinskyness
write.csv(diffmeans_stravinsky_retro, file = "diffmeans_stravinsky_retro.csv")   # writing the results to CSV


# mindful

question_mindful_retro = c()
difference_of_means_mindful_retro = c()
p_value_mindful_retro = c()
t_value_mindful_retro = c()

for(i in 23:28)

{

tempq_mindful_retro = paste("R", (i-22))    # giving question number to temporary variable
tmp_mindful_retro =  mean(subset(effectiveness[[i]], effectiveness$Preparation_type == 'mindful' & effectiveness$Base_line == 'FALSE' &
effectiveness[[i]] != '')) - mean(subset(effectiveness[[i]], effectiveness$Preparation_type == 'mindful' & effectiveness$Base_line == 'TRUE' &
effectiveness[[i]] != ''))  # giving difference of means of baseline mindfulness and the actual mindfulness intervention to temporary variabel

ttestframe_mindful_retro =  t.test(effectiveness[[i]][effectiveness$Preparation_type == "mindful" & effectiveness$Base_line == 'FALSE'],
effectiveness[[i]][effectiveness$Preparation_type == "mindful" & effectiveness$Base_line == 'TRUE']) # T.Test to compare baseline of
Question of mindfulness groups with results of actual mindfulness exercise

tmppvalue_retro = ttestframe_mindful_retro$p.value   # Extract the p-value from this test
tmptvalue_retro = ttestframe_mindful_retro$statistic # Extract the t-value from this test

question_mindful_retro = append (question_mindful_retro, tempq_mindful_retro)   # adding question number to variable
difference_of_means_mindful_retro = append(difference_of_means_mindful_retro,  tmp_mindful_retro)
p_value_mindful_retro = append(p_value_mindful_retro, tmppvalue_retro)
t_value_mindful_retro = append(t_value_mindful_retro, tmptvalue_retro)

}  #    The difference of means between baseline and mindful experiment

diffmeans_mindful_retro = data.frame(question_mindful_retro, difference_of_means_mindful_retro, t_value_mindful_retro,
p_value_mindful_retro) # creating data frame for overview mindfulness
write.csv(diffmeans_mindful_retro, file = "diffmeans_mindful_retro.csv")   # writing the results to CSV

# DIFFERENCES OF MEANS OF retro QUESTIONS BASELINE COMPARED WITH INTERVENTION
#####################################

# actasusual

question_actasusual_retro = c()
difference_of_means_actasusual_retro = c()
p_value_actasusual_retro = c()
t_value_actasusual_retro = c()

for(i in 23:28)

{

tempq_actasusual_retro = paste("R", (i-22))    # giving question number to temporary variable
tmp_actasusual_retro =  mean(subset(effectiveness[[i]], effectiveness$Preparation_type == 'actasusual' & effectiveness$Base_line ==
'FALSE' & effectiveness[[i]] != '')) - mean(subset(effectiveness[[i]], effectiveness$Preparation_type == 'actasusual' &
effectiveness$Base_line == 'TRUE' & effectiveness[[i]] != ''))  # giving difference of means of baseline actasusualness and the actual
actasusualness intervention to temporary variabel

ttestframe_actasusual_retro =  t.test(effectiveness[[i]][effectiveness$Preparation_type == "actasusual" & effectiveness$Base_line ==
'FALSE'], effectiveness[[i]][effectiveness$Preparation_type == "actasusual" & effectiveness$Base_line == 'TRUE']) # T.Test to compare
baseline of Question of actasusualness groups with results of actual actasusualness exercise

tmppvalue_retro = ttestframe_actasusual_retro$p.value   # Extract the p-value from this test
tmptvalue_retro = ttestframe_actasusual_retro$statistic # Extract the t-value from this test

question_actasusual_retro = append (question_actasusual_retro, tempq_actasusual_retro)   # adding question number to variable
difference_of_means_actasusual_retro = append(difference_of_means_actasusual_retro,  tmp_actasusual_retro)
p_value_actasusual_retro = append(p_value_actasusual_retro, tmppvalue_retro)
t_value_actasusual_retro = append(t_value_actasusual_retro, tmptvalue_retro)
```

```
} #    The difference of means between baseline and actasusual experiment

diffmeans_actasusual_retro = data.frame(question_actasusual_retro, difference_of_means_actasusual_retro, t_value_actasusual_retro,
p_value_actasusual_retro) # creating data frame for overview actasusualness
write.csv(diffmeans_actasusual_retro, file = "diffmeans_actasusual_retro.csv")   # writing the results to CSV

# GRAPHICS
##############################


##########
# GRAPHIC DIFFERENCE IN MEANS FOR ALL GENERAL QUESTIONS

#################
# Questions G01 to G06

 windows(title = "**** Differences in Means for G01 to G06. ****")
 par(mfrow=c(2,4))              # Prepares a window for 3 figures beside one another and 2 underneath one another.

 plot(0,xaxt='n',yaxt='n',bty='n',pch='',ylab='',xlab='')
 legend("topleft", legend = c("actasusual", "mindful", "stravinsky"), col=1:3, pch=1) #  legend for matplot

for(i in 7:12)

{

 actasusual = c(mean(subset(effectiveness[[i]], effectiveness$Preparation_type == 'actasusual' & effectiveness$Base_line == 'TRUE' &
effectiveness$G08 != '')), mean(subset(effectiveness[[i]], effectiveness$Preparation_type == 'actasusual' & effectiveness$Base_line ==
'FALSE' & effectiveness[[i]] != '')))  # dataset => mean of act as usual baseline and mean of act as usual measurement
 mindful = c(mean(subset(effectiveness[[i]], effectiveness$Preparation_type == 'mindful' & effectiveness$Base_line == 'TRUE' &
effectiveness[[i]] != '')), mean(subset(effectiveness[[i]], effectiveness$Preparation_type == 'mindful' & effectiveness$Base_line == 'FALSE' &
effectiveness$G08 != '')))  # dataset => mean of mindful baseline and mean of mindful measurement
 stravinsky = c(mean(subset(effectiveness[[i]], effectiveness$Preparation_type == 'stravinsky' & effectiveness$Base_line == 'TRUE' &
effectiveness[[i]] != '')), mean(subset(effectiveness[[i]], effectiveness$Preparation_type == 'stravinsky' & effectiveness$Base_line == 'FALSE'
& effectiveness[[i]] != '')))  # dataset => mean of mindful baseline and mean of mindful measurement
 overzicht = cbind(actasusual, mindful, stravinsky)     # group the means of types and baseline
 matplot(overzicht, type = c("o"),pch=1,lty = 1, col = 1:3, main = paste('Question G', (i-6)),  xlab = 'base vs intervention', ylab = 'Scores', xaxp
= c(1, 2, 1), ylim = c(0, 7)) #plot to see the differences in mean between the preparation types when the baseline is compared with the
measurements

 }

 #################
# Questions G07 to G11

 windows(title = "**** Differences in Means for G07 to G11. ****")
 par(mfrow=c(2,4))              # Prepares a window for 3 figures beside one another and 2 underneath one another.

 plot(0,xaxt='n',yaxt='n',bty='n',pch='',ylab='',xlab='')
 legend("topleft", legend = c("actasusual", "mindful", "stravinsky"), col=1:3, pch=1) #  legend for matplot

for(i in 13:17)

{

 actasusual = c(mean(subset(effectiveness[[i]], effectiveness$Preparation_type == 'actasusual' & effectiveness$Base_line == 'TRUE' &
effectiveness$G08 != '')), mean(subset(effectiveness[[i]], effectiveness$Preparation_type == 'actasusual' & effectiveness$Base_line ==
'FALSE' & effectiveness[[i]] != '')))  # dataset => mean of act as usual baseline and mean of act as usual measurement
 mindful = c(mean(subset(effectiveness[[i]], effectiveness$Preparation_type == 'mindful' & effectiveness$Base_line == 'TRUE' &
effectiveness[[i]] != '')), mean(subset(effectiveness[[i]], effectiveness$Preparation_type == 'mindful' & effectiveness$Base_line == 'FALSE' &
effectiveness$G08 != '')))  # dataset => mean of mindful baseline and mean of mindful measurement
 stravinsky = c(mean(subset(effectiveness[[i]], effectiveness$Preparation_type == 'stravinsky' & effectiveness$Base_line == 'TRUE' &
effectiveness[[i]] != '')), mean(subset(effectiveness[[i]], effectiveness$Preparation_type == 'stravinsky' & effectiveness$Base_line == 'FALSE'
& effectiveness[[i]] != '')))  # dataset => mean of mindful baseline and mean of mindful measurement
 overzicht = cbind(actasusual, mindful, stravinsky)     # group the means of types and baseline
 matplot(overzicht, type = c("o"),pch=1,lty = 1, col = 1:3, main = paste('Question G', (i-6)),  xlab = 'base vs intervention', ylab = 'Scores', xaxp
= c(1, 2, 1), ylim = c(0, 7)) #plot to see the differences in mean between the preparation types when the baseline is compared with the
measurements

 }
```

```
####################################


##########
# GRAPHIC DIFFERENCE IN MEANS FOR ALL standup QUESTIONS

windows(title = "**** Differences in Means for standup Section. ****")
par(mfrow=c(2,4))              # Prepares a window for 2 figures beside one another and 3 underneath one another.

plot(0,xaxt='n',yaxt='n',bty='n',pch='',ylab='',xlab='')
legend("topleft", legend = c("actasusual", "mindful", "stravinsky"), col=1:3, pch=1) #  legend for matplot

for(i in 18:22)

{

actasusual = c(mean(subset(effectiveness[[i]], effectiveness$Preparation_type == 'actasusual' & effectiveness$Base_line == 'TRUE' &
effectiveness[[i]] != '')), mean(subset(effectiveness[[i]], effectiveness$Preparation_type == 'actasusual' & effectiveness$Base_line ==
'FALSE' & effectiveness[[i]] != ''))) # dataset => mean of act as usual baseline and mean of act as usual measurement
mindful = c(mean(subset(effectiveness[[i]], effectiveness$Preparation_type == 'mindful' & effectiveness$Base_line == 'TRUE' &
effectiveness[[i]] != '')), mean(subset(effectiveness[[i]], effectiveness$Preparation_type == 'mindful' & effectiveness$Base_line == 'FALSE' &
effectiveness[[i]] != ''))) # dataset => mean of mindful baseline and mean of mindful measurement
stravinsky = c(mean(subset(effectiveness[[i]], effectiveness$Preparation_type == 'stravinsky' & effectiveness$Base_line == 'TRUE' &
effectiveness[[i]] != '')), mean(subset(effectiveness[[i]], effectiveness$Preparation_type == 'stravinsky' & effectiveness$Base_line == 'FALSE'
& effectiveness[[i]] != ''))) # dataset => mean of mindful baseline and mean of mindful measurement
overzicht = cbind(actasusual, mindful, stravinsky)    # group the means of types and baseline
matplot(overzicht, type = c("o"),pch=1,lty = 1, col = 1:3, main = paste('Question S', (i-17)), xlab = 'base vs intervention', ylab = 'Scores',
xaxp  = c(1, 2, 1), ylim = c(0, 7)) #plot to see the differences in mean between the preparation types when the baseline is compared with
the measurements

}



##########
# GRAPHIC DIFFERENCE IN MEANS FOR ALL retro QUESTIONS

windows(title = "**** Differences in Means for retro Section. ****")
par(mfrow=c(2,4))              # Prepares a window for 2 figures beside one another and 3 underneath one another.

plot(0,xaxt='n',yaxt='n',bty='n',pch='',ylab='',xlab='')
legend("topleft", legend = c("actasusual", "mindful", "stravinsky"), col=1:3, pch=1) #  legend for matplot

for(i in 23:28)

{

actasusual = c(mean(subset(effectiveness[[i]], effectiveness$Preparation_type == 'actasusual' & effectiveness$Base_line == 'TRUE' &
effectiveness[[i]] != '')), mean(subset(effectiveness[[i]], effectiveness$Preparation_type == 'actasusual' & effectiveness$Base_line ==
'FALSE' & effectiveness[[i]] != ''))) # dataset => mean of act as usual baseline and mean of act as usual measurement
mindful = c(mean(subset(effectiveness[[i]], effectiveness$Preparation_type == 'mindful' & effectiveness$Base_line == 'TRUE' &
effectiveness[[i]] != '')), mean(subset(effectiveness[[i]], effectiveness$Preparation_type == 'mindful' & effectiveness$Base_line == 'FALSE' &
effectiveness[[i]] != ''))) # dataset => mean of mindful baseline and mean of mindful measurement
stravinsky = c(mean(subset(effectiveness[[i]], effectiveness$Preparation_type == 'stravinsky' & effectiveness$Base_line == 'TRUE' &
effectiveness[[i]] != '')), mean(subset(effectiveness[[i]], effectiveness$Preparation_type == 'stravinsky' & effectiveness$Base_line == 'FALSE'
& effectiveness[[i]] != ''))) # dataset => mean of mindful baseline and mean of mindful measurement
overzicht = cbind(actasusual, mindful, stravinsky)    # group the means of types and baseline
matplot(overzicht, type = c("o"),pch=1,lty = 1, col = 1:3, main = paste('Question R', (i-22)), xlab = 'base vs intervention', ylab = 'Scores',
xaxp  = c(1, 2, 1), ylim = c(0, 7)) #plot to see the differences in mean between the preparation types when the baseline is compared with
the measurements

}

#################################
# Graphics G01
windows(title = "**** G01          - Everyone is involved in the decision-making process. ****")
par(mfrow=c(2,2))              # Prepares a window for 2 figures beside one another and 2 figures below one another.
boxplot (effectiveness$G01 ~ effectiveness$Preparation_type, boxwex = 0.25, ylim = c(0, 7), cex.axis=.75, xlab = 'Preparation Type', ylab =
'G01 scores', main = "G01 for Baseline", me = effectiveness$Base_line == 'TRUE') # boxplot of Question  G01 per preparation type for
```

```
baseline

boxplot (effectiveness$G01 ~ effectiveness$Preparation_type, boxwex = 0.25,  cex.axis=.75, ylim = c(0, 7), xlab = 'Preparation Type', ylab = 'G01 scores', main = "G01 for Measurement", subset = effectiveness$Base_line == 'FALSE') # boxplot of Question  G01 per preparation type for measurement

 boxplot (effectiveness$G01 ~ effectiveness$Base_line, xlab = 'Baseline?', ylab = 'G01 scores', main = "G01 Treatment vs Baseline", ylim = c(0, 7)) # boxplot of Question G01 dividing between the baseline and the rest of the measurements
 actasusual = c(mean(subset(effectiveness$G01, effectiveness$Preparation_type == 'actasusual' & effectiveness$Base_line == 'TRUE' & effectiveness$G01 != '')), mean(subset(effectiveness$G01, effectiveness$Preparation_type == 'actasusual' & effectiveness$Base_line == 'FALSE' & effectiveness$G01 != ''))) # dataset => mean of act as usual baseline and mean of act as usual measurement
 mindful = c(mean(subset(effectiveness$G01, effectiveness$Preparation_type == 'mindful' & effectiveness$Base_line == 'TRUE' & effectiveness$G01 != '')), mean(subset(effectiveness$G01, effectiveness$Preparation_type == 'mindful' & effectiveness$Base_line == 'FALSE' & effectiveness$G01 != ''))) # dataset => mean of mindful baseline and mean of mindful measurement
 stravinsky = c(mean(subset(effectiveness$G01, effectiveness$Preparation_type == 'stravinsky' & effectiveness$Base_line == 'TRUE' & effectiveness$G01 != '')), mean(subset(effectiveness$G01, effectiveness$Preparation_type == 'stravinsky' & effectiveness$Base_line == 'FALSE' & effectiveness$G01 != ''))) # dataset => mean of mindful baseline and mean of mindful measurement
 overzicht = cbind(actasusual, mindful, stravinsky)     # group the means of types and baseline
 matplot(overzicht, type = c("o"),pch=1,lty = 1, col = 1:3, main = "G01 Differences of Means", xlab = 'baseline                    intervention', ylab = 'G01 scores', xaxp  = c(1, 2, 1)) #plot to see the differences in mean between the preparation types when the baseline is compared with the measurements
 legend("topleft", legend = c("actasusual", "mindful", "stravinsky"), col=1:3, pch=1) #  legend for matplot

 # mindfulness standup versus mindfulness retro:

windows(title = "**** G01 - Mindful Standup  versus Retro ****")
par(mfrow=c(2,2))              # Prepares a window
 mindfulstandup = c(mean(subset(effectiveness$G01, effectiveness$Preparation_type == 'mindful' & effectiveness$Base_line == 'TRUE' & effectiveness$G01 != '')), mean(subset(effectiveness$G01, effectiveness$Preparation_type == 'mindful' & effectiveness$Base_line == 'FALSE' & effectiveness$Meeting_type == 'standup' & effectiveness$G01 != ''))) # dataset => mean of mindful baseline and mean of mindful measurement
 mindfulretro = c(mean(subset(effectiveness$G01, effectiveness$Preparation_type == 'mindful' & effectiveness$Base_line == 'TRUE' & effectiveness$G01 != '')), mean(subset(effectiveness$G01, effectiveness$Preparation_type == 'mindful' & effectiveness$Base_line == 'FALSE' & effectiveness$Meeting_type == 'retro' & effectiveness$G01 != ''))) # dataset => mean of mindful baseline and mean of mindful measurement
 overzicht = cbind(mindfulstandup, mindfulretro)
 difference =  (mean(subset(effectiveness$G01, effectiveness$Preparation_type == 'mindful' & effectiveness$Base_line == 'FALSE' & Meeting_type == 'standup')) - mean(subset(effectiveness$G01, effectiveness$Preparation_type == 'mindful' & effectiveness$Base_line == 'TRUE' ))) -  (mean(subset(effectiveness$G01, effectiveness$Preparation_type == 'mindful' & effectiveness$Base_line == 'FALSE' & Meeting_type == 'retro')) - mean(subset(effectiveness$G01, effectiveness$Preparation_type == 'mindful' & effectiveness$Base_line == 'TRUE' )))
 matplot(overzicht, type = c("o"),pch=1,lty = 1, col = 1:3, main = "G01 Mindful Standup versus Retro",  xlab = paste ('Difference is', difference) , ylab = 'G01 scores', xaxp  = c(1, 2, 1)) #plot to see the differences in mean between the preparation types when the baseline is compared with the measurements
 legend("topleft", legend = c("standup", "retro"), col=1:3, pch=1) #  legend for matplot


 ###################################
# Graphics G03
windows(title = "**** G03          - The meeting atmosphere was constructive, calm and open. ****")
par(mfrow=c(2,2))              # Prepares a window for 2 figures beside one another and 2 figures below one another.
boxplot (effectiveness$G03 ~ effectiveness$Preparation_type, boxwex = 0.25, ylim = c(0, 7), cex.axis=.75, xlab = 'Preparation Type', ylab = 'G03 scores', main = "G03 for Baseline", me = effectiveness$Base_line == 'TRUE') # boxplot of Question  G03 per preparation type for baseline

boxplot (effectiveness$G03 ~ effectiveness$Preparation_type, boxwex = 0.25,  cex.axis=.75, ylim = c(0, 7), xlab = 'Preparation Type', ylab = 'G03 scores', main = "G03 for Measurement", subset = effectiveness$Base_line == 'FALSE') # boxplot of Question  G03 per preparation type for measurement

 boxplot (effectiveness$G03 ~ effectiveness$Base_line, xlab = 'Baseline?', ylab = 'G03 scores', main = "G03 Treatment vs Baseline", ylim = c(0, 7)) # boxplot of Question G03 dividing between the baseline and the rest of the measurements
 actasusual = c(mean(subset(effectiveness$G03, effectiveness$Preparation_type == 'actasusual' & effectiveness$Base_line == 'TRUE' & effectiveness$G03 != '')), mean(subset(effectiveness$G03, effectiveness$Preparation_type == 'actasusual' & effectiveness$Base_line == 'FALSE' & effectiveness$G03 != ''))) # dataset => mean of act as usual baseline and mean of act as usual measurement
 mindful = c(mean(subset(effectiveness$G03, effectiveness$Preparation_type == 'mindful' & effectiveness$Base_line == 'TRUE' & effectiveness$G03 != '')), mean(subset(effectiveness$G03, effectiveness$Preparation_type == 'mindful' & effectiveness$Base_line == 'FALSE' & effectiveness$G03 != ''))) # dataset => mean of mindful baseline and mean of mindful measurement
 stravinsky = c(mean(subset(effectiveness$G03, effectiveness$Preparation_type == 'stravinsky' & effectiveness$Base_line == 'TRUE' & effectiveness$G03 != '')), mean(subset(effectiveness$G03, effectiveness$Preparation_type == 'stravinsky' & effectiveness$Base_line == 'FALSE' & effectiveness$G03 != ''))) # dataset => mean of mindful baseline and mean of mindful measurement
 overzicht = cbind(actasusual, mindful, stravinsky)     # group the means of types and baseline
```

```
 matplot(overzicht, type = c("o"),pch=1,lty = 1, col = 1:3, main = "G03 Differences of Means", xlab = 'baseline                    intervention', ylab = 'G03 scores', xaxp  = c(1, 2, 1)) #plot to see the differences in mean between the preparation types when the baseline is compared with the measurements

 legend("topleft", legend = c("actasusual", "mindful", "stravinsky"), col=1:3, pch=1) #  legend for matplot

 # Stravinsky standup versus Stravinsky retro:

windows(title = "**** G03 - Stravinsky Standup  versus Retro ****")
par(mfrow=c(2,2))              # Prepares a window
 stravinskystandup = c(mean(subset(effectiveness$G03, effectiveness$Preparation_type == 'stravinsky' & effectiveness$Base_line == 'TRUE' & effectiveness$G03 != '')), mean(subset(effectiveness$G03, effectiveness$Preparation_type == 'stravinsky' & effectiveness$Base_line == 'FALSE' & effectiveness$Meeting_type == 'standup' & effectiveness$G03 != '')))  # dataset => mean of stravinsky baseline and mean of stravinsky measurement
 stravinskyretro = c(mean(subset(effectiveness$G03, effectiveness$Preparation_type == 'stravinsky' & effectiveness$Base_line == 'TRUE' & effectiveness$G03 != '')), mean(subset(effectiveness$G03, effectiveness$Preparation_type == 'stravinsky' & effectiveness$Base_line == 'FALSE' & effectiveness$Meeting_type == 'retro' & effectiveness$G03 != '')))  # dataset => mean of stravinsky baseline and mean of stravinsky measurement
 overzicht = cbind(stravinskystandup, stravinskyretro)
 difference =  (mean(subset(effectiveness$G03, effectiveness$Preparation_type == 'stravinsky' & effectiveness$Base_line == 'FALSE' & Meeting_type == 'standup')) - mean(subset(effectiveness$G03, effectiveness$Preparation_type == 'stravinsky' & effectiveness$Base_line == 'TRUE' ))) -  (mean(subset(effectiveness$G03, effectiveness$Preparation_type == 'stravinsky' & effectiveness$Base_line == 'FALSE' & Meeting_type == 'retro')) - mean(subset(effectiveness$G03, effectiveness$Preparation_type == 'stravinsky' & effectiveness$Base_line == 'TRUE' )))
 matplot(overzicht, type = c("o"),pch=1,lty = 1, col = 1:3, main = "G03 stravinsky Standup versus Retro",  xlab = paste ('Difference is', difference) , ylab = 'G03 scores', xaxp  = c(1, 2, 1)) #plot to see the differences in mean between the preparation types when the baseline is compared with the measurements
 legend("topleft", legend = c("standup", "retro"), col=1:3, pch=1) #  legend for matplot

 ##################################
# Graphics G04
windows(title = "**** G04          - The meeting was effective. ****")
par(mfrow=c(2,2))              # Prepares a window for 2 figures beside one another and 2 figures below one another.
boxplot (effectiveness$G04 ~ effectiveness$Preparation_type, boxwex = 0.25, ylim = c(0, 7), cex.axis=.75, xlab = 'Preparation Type', ylab = 'G04 scores', main = "G04 for Baseline", subset = effectiveness$Base_line == 'TRUE') # boxplot of Question  G04 per preparation type for baseline

boxplot (effectiveness$G04 ~ effectiveness$Preparation_type, boxwex = 0.25,  cex.axis=.75, ylim = c(0, 7), xlab = 'Preparation Type', ylab = 'G04 scores', main = "G04 for Measurement", subset = effectiveness$Base_line == 'FALSE') # boxplot of Question  G04 per preparation type for measurement

 boxplot (effectiveness$G04 ~ effectiveness$Base_line, xlab = 'Baseline?', ylab = 'G04 scores', main = "G04 Treatment vs Baseline", ylim = c(0, 7)) # boxplot of Question G04 dividing between the baseline and the rest of the measurements
 actasusual = c(mean(subset(effectiveness$G04, effectiveness$Preparation_type == 'actasusual' & effectiveness$Base_line == 'TRUE' & effectiveness$G04 != '')), mean(subset(effectiveness$G04, effectiveness$Preparation_type == 'actasusual' & effectiveness$Base_line == 'FALSE' & effectiveness$G04 != '')))  # dataset => mean of act as usual baseline and mean of act as usual measurement
 mindful = c(mean(subset(effectiveness$G04, effectiveness$Preparation_type == 'mindful' & effectiveness$Base_line == 'TRUE' & effectiveness$G04 != '')), mean(subset(effectiveness$G04, effectiveness$Preparation_type == 'mindful' & effectiveness$Base_line == 'FALSE' & effectiveness$G04 != '')))  # dataset => mean of mindful baseline and mean of mindful measurement
 stravinsky = c(mean(subset(effectiveness$G04, effectiveness$Preparation_type == 'stravinsky' & effectiveness$Base_line == 'TRUE' & effectiveness$G04 != '')), mean(subset(effectiveness$G04, effectiveness$Preparation_type == 'stravinsky' & effectiveness$Base_line == 'FALSE' & effectiveness$G04 != '')))  # dataset => mean of mindful baseline and mean of mindful measurement
 overzicht = cbind(actasusual, mindful, stravinsky)     # group the means of types and baseline
 matplot(overzicht, type = c("o"),pch=1,lty = 1, col = 1:3, main = "G04 Differences of Means", xlab = 'baseline                    intervention', ylab = 'G04 scores', xaxp  = c(1, 2, 1)) #plot to see the differences in mean between the preparation types when the baseline is compared with the measurements

 legend("topleft", legend = c("actasusual", "mindful", "stravinsky"), col=1:3, pch=1) #  legend for matplot

  # mindfulness standup versus mindfulness retro:

windows(title = "**** G04 - Mindful Standup  versus Retro ****")
par(mfrow=c(2,2))              # Prepares a window
 mindfulstandup = c(mean(subset(effectiveness$G04, effectiveness$Preparation_type == 'mindful' & effectiveness$Base_line == 'TRUE' & effectiveness$G04 != '')), mean(subset(effectiveness$G04, effectiveness$Preparation_type == 'mindful' & effectiveness$Base_line == 'FALSE' & effectiveness$Meeting_type == 'standup' & effectiveness$G04 != '')))  # dataset => mean of mindful baseline and mean of mindful measurement
 mindfulretro = c(mean(subset(effectiveness$G04, effectiveness$Preparation_type == 'mindful' & effectiveness$Base_line == 'TRUE' & effectiveness$G04 != '')), mean(subset(effectiveness$G04, effectiveness$Preparation_type == 'mindful' & effectiveness$Base_line == 'FALSE' & effectiveness$Meeting_type == 'retro' & effectiveness$G04 != '')))  # dataset => mean of mindful baseline and mean of mindful measurement
```

```
 overzicht = cbind(mindfulstandup, mindfulretro)
 difference =  (mean(subset(effectiveness$G04, effectiveness$Preparation_type == 'mindful' & effectiveness$Base_line == 'FALSE' & Meeting_type == 'standup')) - mean(subset(effectiveness$G04, effectiveness$Preparation_type == 'mindful' & effectiveness$Base_line == 'TRUE' ))) -  (mean(subset(effectiveness$G04, effectiveness$Preparation_type == 'mindful' & effectiveness$Base_line == 'FALSE' & Meeting_type == 'retro')) - mean(subset(effectiveness$G04, effectiveness$Preparation_type == 'mindful' & effectiveness$Base_line == 'TRUE' )))
 matplot(overzicht, type = c("o"),pch=1,lty = 1, col = 1:3, main = "G04 Mindful Standup versus Retro",  xlab = paste ('Difference is', difference) , ylab = 'G04 scores', xaxp  = c(1, 2, 1)) #plot to see the differences in mean between the preparation types when the baseline is compared with the measurements
 legend("topleft", legend = c("standup", "retro"), col=1:3, pch=1) #  legend for matplot

 ##################################
# Graphics G05
windows(title = "**** G05          - All meeting participants listened well to each other. ****")
par(mfrow=c(2,2))               # Prepares a window for 2 figures beside one another and 2 figures below one another.
boxplot (effectiveness$G05 ~ effectiveness$Preparation_type, boxwex = 0.25, ylim = c(0, 7), cex.axis=.75, xlab = 'Preparation Type', ylab = 'G05 scores', main = "G05 for Baseline", subset = effectiveness$Base_line == 'TRUE') # boxplot of Question  G05 per preparation type for baseline

boxplot (effectiveness$G05 ~ effectiveness$Preparation_type, boxwex = 0.25,  cex.axis=.75, ylim = c(0, 7), xlab = 'Preparation Type', ylab = 'G05 scores', main = "G05 for Measurement", subset = effectiveness$Base_line == 'FALSE') # boxplot of Question  G05 per preparation type for measurement

 boxplot (effectiveness$G05 ~ effectiveness$Base_line, xlab = 'Baseline?', ylab = 'G05 scores', main = "G05 Treatment vs Baseline", ylim = c(0, 7)) # boxplot of Question G05 dividing between the baseline and the rest of the measurements
 actasusual = c(mean(subset(effectiveness$G05, effectiveness$Preparation_type == 'actasusual' & effectiveness$Base_line == 'TRUE' & effectiveness$G05 != '')), mean(subset(effectiveness$G05, effectiveness$Preparation_type == 'actasusual' & effectiveness$Base_line == 'FALSE' & effectiveness$G05 != '')))  # dataset => mean of act as usual baseline and mean of act as usual measurement
 mindful = c(mean(subset(effectiveness$G05, effectiveness$Preparation_type == 'mindful' & effectiveness$Base_line == 'TRUE' & effectiveness$G05 != '')), mean(subset(effectiveness$G05, effectiveness$Preparation_type == 'mindful' & effectiveness$Base_line == 'FALSE' & effectiveness$G05 != '')))  # dataset => mean of mindful baseline and mean of mindful measurement
 stravinsky = c(mean(subset(effectiveness$G05, effectiveness$Preparation_type == 'stravinsky' & effectiveness$Base_line == 'TRUE' & effectiveness$G05 != '')), mean(subset(effectiveness$G05, effectiveness$Preparation_type == 'stravinsky' & effectiveness$Base_line == 'FALSE' & effectiveness$G05 != '')))  # dataset => mean of mindful baseline and mean of mindful measurement
 overzicht = cbind(actasusual, mindful, stravinsky)     # group the means of types and baseline
 matplot(overzicht, type = c("o"),pch=1,lty = 1, col = 1:3, main = "G05 Differences of Means", xlab = 'baseline                    intervention', ylab = 'G05 scores', xaxp  = c(1, 2, 1)) #plot to see the differences in mean between the preparation types when the baseline is compared with the measurements

 legend("topleft", legend = c("actasusual", "mindful", "stravinsky"), col=1:3, pch=1) #  legend for matplot

  # mindfulness standup versus mindfulness retro:

windows(title = "**** G05 - Mindful Standup  versus Retro ****")
par(mfrow=c(2,2))               # Prepares a window
 mindfulstandup = c(mean(subset(effectiveness$G05, effectiveness$Preparation_type == 'mindful' & effectiveness$Base_line == 'TRUE' & effectiveness$G05 != '')), mean(subset(effectiveness$G05, effectiveness$Preparation_type == 'mindful' & effectiveness$Base_line == 'FALSE' & effectiveness$Meeting_type == 'standup' & effectiveness$G05 != '')))  # dataset => mean of mindful baseline and mean of mindful measurement
 mindfulretro = c(mean(subset(effectiveness$G05, effectiveness$Preparation_type == 'mindful' & effectiveness$Base_line == 'TRUE' & effectiveness$G05 != '')), mean(subset(effectiveness$G05, effectiveness$Preparation_type == 'mindful' & effectiveness$Base_line == 'FALSE' & effectiveness$Meeting_type == 'retro' & effectiveness$G05 != '')))  # dataset => mean of mindful baseline and mean of mindful measurement
 overzicht = cbind(mindfulstandup, mindfulretro)
 difference =  (mean(subset(effectiveness$G05, effectiveness$Preparation_type == 'mindful' & effectiveness$Base_line == 'FALSE' & Meeting_type == 'standup')) - mean(subset(effectiveness$G05, effectiveness$Preparation_type == 'mindful' & effectiveness$Base_line == 'TRUE' ))) -  (mean(subset(effectiveness$G05, effectiveness$Preparation_type == 'mindful' & effectiveness$Base_line == 'FALSE' & Meeting_type == 'retro')) - mean(subset(effectiveness$G05, effectiveness$Preparation_type == 'mindful' & effectiveness$Base_line == 'TRUE' )))
 matplot(overzicht, type = c("o"),pch=1,lty = 1, col = 1:3, main = "G05 Mindful Standup versus Retro",  xlab = paste ('Difference is', difference) , ylab = 'G05 scores', xaxp  = c(1, 2, 1)) #plot to see the differences in mean between the preparation types when the baseline is compared with the measurements
 legend("topleft", legend = c("standup", "retro"), col=1:3, pch=1) #  legend for matplot

##################################
# Graphics G07

  # mindfulness standup versus mindfulness retro:

windows(title = "**** G07 - Mindful Standup  versus Retro ****")
par(mfrow=c(2,2))               # Prepares a window
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 mindfulstandup = c(mean(subset(effectiveness$G07, effectiveness$Preparation_type == 'mindful' & effectiveness$Base_line == 'TRUE' & effectiveness$G07 != '')), mean(subset(effectiveness$G07, effectiveness$Preparation_type == 'mindful' & effectiveness$Base_line == 'FALSE' & effectiveness$Meeting_type == 'standup' & effectiveness$G07 != '')))  # dataset => mean of mindful baseline and mean of mindful measurement
 mindfulretro = c(mean(subset(effectiveness$G07, effectiveness$Preparation_type == 'mindful' & effectiveness$Base_line == 'TRUE' & effectiveness$G07 != '')), mean(subset(effectiveness$G07, effectiveness$Preparation_type == 'mindful' & effectiveness$Base_line == 'FALSE' & effectiveness$Meeting_type == 'retro' & effectiveness$G07 != '')))  # dataset => mean of mindful baseline and mean of mindful measurement
 overzicht = cbind(mindfulstandup, mindfulretro)
 difference =  (mean(subset(effectiveness$G07, effectiveness$Preparation_type == 'mindful' & effectiveness$Base_line == 'FALSE' & Meeting_type == 'standup')) - mean(subset(effectiveness$G07, effectiveness$Preparation_type == 'mindful' & effectiveness$Base_line == 'TRUE' ))) -  (mean(subset(effectiveness$G07, effectiveness$Preparation_type == 'mindful' & effectiveness$Base_line == 'FALSE' & Meeting_type == 'retro')) - mean(subset(effectiveness$G07, effectiveness$Preparation_type == 'mindful' & effectiveness$Base_line == 'TRUE' )))
 matplot(overzicht, type = c("o"),pch=1,lty = 1, col = 1:3, main = "G07 Mindful Standup versus Retro",  xlab = paste ('Difference is', difference) , ylab = 'G07 scores', xaxp  = c(1, 2, 1)) #plot to see the differences in mean between the preparation types when the baseline is compared with the measurements
 legend("topleft", legend = c("standup", "retro"), col=1:3, pch=1) #  legend for matplot



  ##################################
# Graphics G08
windows(title = "**** G08          - The level of disagreement during the meeting was acceptable. ****")
par(mfrow=c(2,2))               # Prepares a window for 2 figures beside one another and 2 figures below one another.
boxplot (effectiveness$G08 ~ effectiveness$Preparation_type, boxwex = 0.25, ylim = c(0, 7), cex.axis=.75, xlab = 'Preparation Type', ylab = 'G08 scores', main = "G08 for Baseline", me = effectiveness$Base_line == 'TRUE') # boxplot of Question  G08 per preparation type for baseline

boxplot (effectiveness$G08 ~ effectiveness$Preparation_type, boxwex = 0.25,  cex.axis=.75, ylim = c(0, 7), xlab = 'Preparation Type', ylab = 'G08 scores', main = "G08 for Measurement", subset = effectiveness$Base_line == 'FALSE') # boxplot of Question  G08 per preparation type for measurement

 boxplot (effectiveness$G08 ~ effectiveness$Base_line, xlab = 'Baseline?', ylab = 'G08 scores', main = "G08 Treatment vs Baseline", ylim = c(0, 7)) # boxplot of Question G08 dividing between the baseline and the rest of the measurements
 actasusual = c(mean(subset(effectiveness$G08, effectiveness$Preparation_type == 'actasusual' & effectiveness$Base_line == 'TRUE' & effectiveness$G08 != '')), mean(subset(effectiveness$G08, effectiveness$Preparation_type == 'actasusual' & effectiveness$Base_line == 'FALSE' & effectiveness$G08 != '')))  # dataset => mean of act as usual baseline and mean of act as usual measurement
 mindful = c(mean(subset(effectiveness$G08, effectiveness$Preparation_type == 'mindful' & effectiveness$Base_line == 'TRUE' & effectiveness$G08 != '')), mean(subset(effectiveness$G08, effectiveness$Preparation_type == 'mindful' & effectiveness$Base_line == 'FALSE' & effectiveness$G08 != '')))  # dataset => mean of mindful baseline and mean of mindful measurement
 stravinsky = c(mean(subset(effectiveness$G08, effectiveness$Preparation_type == 'stravinsky' & effectiveness$Base_line == 'TRUE' & effectiveness$G08 != '')), mean(subset(effectiveness$G08, effectiveness$Preparation_type == 'stravinsky' & effectiveness$Base_line == 'FALSE' & effectiveness$G08 != '')))  # dataset => mean of mindful baseline and mean of mindful measurement
 overzicht = cbind(actasusual, mindful, stravinsky)     # group the means of types and baseline
 matplot(overzicht, type = c("o"),pch=1,lty = 1, col = 1:3, main = "G08 Differences of Means", xlab = 'baseline                    intervention', ylab = 'G08 scores', xaxp  = c(1, 2, 1)) #plot to see the differences in mean between the preparation types when the baseline is compared with the measurements

 legend("topleft", legend = c("actasusual", "mindful", "stravinsky"), col=1:3, pch=1) #  legend for matplot

 ################################
# Graphics G10

  # mindfulness standup versus mindfulness retro:

windows(title = "**** G10 - Mindful Standup  versus Retro ****")
par(mfrow=c(2,2))               # Prepares a window
 mindfulstandup = c(mean(subset(effectiveness$G10, effectiveness$Preparation_type == 'mindful' & effectiveness$Base_line == 'TRUE' & effectiveness$G10 != '')), mean(subset(effectiveness$G10, effectiveness$Preparation_type == 'mindful' & effectiveness$Base_line == 'FALSE' & effectiveness$Meeting_type == 'standup' & effectiveness$G10 != '')))  # dataset => mean of mindful baseline and mean of mindful measurement
 mindfulretro = c(mean(subset(effectiveness$G10, effectiveness$Preparation_type == 'mindful' & effectiveness$Base_line == 'TRUE' & effectiveness$G10 != '')), mean(subset(effectiveness$G10, effectiveness$Preparation_type == 'mindful' & effectiveness$Base_line == 'FALSE' & effectiveness$Meeting_type == 'retro' & effectiveness$G10 != '')))  # dataset => mean of mindful baseline and mean of mindful measurement
 overzicht = cbind(mindfulstandup, mindfulretro)
 difference =  (mean(subset(effectiveness$G10, effectiveness$Preparation_type == 'mindful' & effectiveness$Base_line == 'FALSE' & Meeting_type == 'standup')) - mean(subset(effectiveness$G10, effectiveness$Preparation_type == 'mindful' & effectiveness$Base_line == 'TRUE' ))) -  (mean(subset(effectiveness$G10, effectiveness$Preparation_type == 'mindful' & effectiveness$Base_line == 'FALSE' & Meeting_type == 'retro')) - mean(subset(effectiveness$G10, effectiveness$Preparation_type == 'mindful' & effectiveness$Base_line ==
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'TRUE' )))
 matplot(overzicht, type = c("o"),pch=1,lty = 1, col = 1:3, main = "G10 Mindful Standup versus Retro",  xlab = paste ('Difference is', difference) , ylab = 'G10 scores', xaxp  = c(1, 2, 1)) #plot to see the differences in mean between the preparation types when the baseline is compared with the measurements
 legend("topleft", legend = c("standup", "retro"), col=1:3, pch=1) #  legend for matplot

 ##############################
# Graphics G11

  # mindfulness standup versus mindfulness retro:

windows(title = "**** G11 - Mindful Standup  versus Retro ****")
par(mfrow=c(2,2))              # Prepares a window
 mindfulstandup = c(mean(subset(effectiveness$G11, effectiveness$Preparation_type == 'mindful' & effectiveness$Base_line == 'TRUE' & effectiveness$G11 != '')), mean(subset(effectiveness$G11, effectiveness$Preparation_type == 'mindful' & effectiveness$Base_line == 'FALSE' & effectiveness$Meeting_type == 'standup' & effectiveness$G11 != '')))  # dataset => mean of mindful baseline and mean of mindful measurement
 mindfulretro = c(mean(subset(effectiveness$G11, effectiveness$Preparation_type == 'mindful' & effectiveness$Base_line == 'TRUE' & effectiveness$G11 != '')), mean(subset(effectiveness$G11, effectiveness$Preparation_type == 'mindful' & effectiveness$Base_line == 'FALSE' & effectiveness$Meeting_type == 'retro' & effectiveness$G11 != '')))  # dataset => mean of mindful baseline and mean of mindful measurement
 overzicht = cbind(mindfulstandup, mindfulretro)
 difference =  (mean(subset(effectiveness$G11, effectiveness$Preparation_type == 'mindful' & effectiveness$Base_line == 'FALSE' & Meeting_type == 'standup')) - mean(subset(effectiveness$G11, effectiveness$Preparation_type == 'mindful' & effectiveness$Base_line == 'TRUE' ))) -  (mean(subset(effectiveness$G11, effectiveness$Preparation_type == 'mindful' & effectiveness$Base_line == 'FALSE' & Meeting_type == 'retro')) - mean(subset(effectiveness$G11, effectiveness$Preparation_type == 'mindful' & effectiveness$Base_line == 'TRUE' )))
 matplot(overzicht, type = c("o"),pch=1,lty = 1, col = 1:3, main = "G11 Mindful Standup versus Retro",  xlab = paste ('Difference is', difference) , ylab = 'G11 scores', xaxp  = c(1, 2, 1)) #plot to see the differences in mean between the preparation types when the baseline is compared with the measurements
 legend("topleft", legend = c("standup", "retro"), col=1:3, pch=1) #  legend for matplot


#########################################################
# DIFFERENCES IN MEANS PER INDIVIDUAL QUESTION

################################################
# G01       Everyone is involved in the decision-making process.

mean(subset(effectiveness$G01, effectiveness$Preparation_type == 'mindful' & effectiveness$Base_line == 'FALSE')) - mean(subset(effectiveness$G01, effectiveness$Preparation_type == 'mindful' & effectiveness$Base_line == 'TRUE')) # The mean of Question G01 of the difference of all the mindfulness teams when compared to the baseline. If this number is positive there it can be concluded that there is a correlation between the preparation type mindful and the involvement of everyone in the team meeting.
 mean(subset(effectiveness$G01, effectiveness$Preparation_type == 'mindful' & effectiveness$Base_line == 'FALSE' & Meeting_type == 'standup')) - mean(subset(effectiveness$G01, effectiveness$Preparation_type == 'mindful' & effectiveness$Base_line == 'TRUE' )) # The mean of Question G01 of the difference of all the mindfulness teams when compared to the baseline for standup meetings.
 mean(subset(effectiveness$G01, effectiveness$Preparation_type == 'mindful' & effectiveness$Base_line == 'FALSE' & Meeting_type == 'retro')) - mean(subset(effectiveness$G01, effectiveness$Preparation_type == 'mindful' & effectiveness$Base_line == 'TRUE' )) # The mean of Question G01 of the difference of all the mindfulness teams when compared to the baseline for retro meetings.

  (mean(subset(effectiveness$G01, effectiveness$Preparation_type == 'mindful' & effectiveness$Base_line == 'FALSE' & Meeting_type == 'standup')) - mean(subset(effectiveness$G01, effectiveness$Preparation_type == 'mindful' & effectiveness$Base_line == 'TRUE' ))) - (mean(subset(effectiveness$G01, effectiveness$Preparation_type == 'mindful' & effectiveness$Base_line == 'FALSE' & Meeting_type == 'retro')) - mean(subset(effectiveness$G01, effectiveness$Preparation_type == 'mindful' & effectiveness$Base_line == 'TRUE' ))) # The mean of Question G01 of the difference of all the mindfulness teams when compared to the baseline for retro versus standup meetings.



#####################################################
# T.TEST
# if t-value is high then the signal is greater than the noise
# t-value = (difference of means) / sum(squareroot(sd squared/number of samples))
# Df (degrees of freedom) = number of samples in dataset 1 (n1) + number of samples in dataset 2 (n2) - 2
# The lower the p-value the higher the likelihood that we should reject the 0-hypothesis  (lower than 0.05 is a significant difference; indicating the strength of the evidence)
#####################################################
# t.tests for Question G01 =>   Everyone is involved in the decision-making process.

t.test(effectiveness$G01 ~  effectiveness$Base_line)  # T.Test to compare baseline of Question G01 of all groups with results of further measurements
t.test(effectiveness$G01[effectiveness$Preparation_type == "mindful" & effectiveness$Base_line == 'FALSE'],
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```
effectiveness$G01[effectiveness$Preparation_type == "mindful" & effectiveness$Base_line == 'TRUE']) # T.Test to compare baseline of Question G01 of mindfulness groups with results of actual mindfulness exercise
t.test(effectiveness$G01[effectiveness$Preparation_type == "mindful" & effectiveness$Base_line == 'FALSE' & effectiveness$Meeting_type == 'standup'], effectiveness$G01[effectiveness$Preparation_type == "mindful" & effectiveness$Base_line == 'TRUE']) # T.Test to compare baseline of Question G01 of mindfulness groups with results of actual mindfulness exercise for the standup
 t.test(effectiveness$G01[effectiveness$Preparation_type == "mindful" & effectiveness$Base_line == 'FALSE' & effectiveness$Meeting_type == 'retro'], effectiveness$G01[effectiveness$Preparation_type == "mindful" & effectiveness$Base_line == 'TRUE']) # T.Test to compare baseline of Question G01 of mindfulness groups with results of actual mindfulness exercise for the retro


#### standup versus retro ttest G01

preparation_type_G01 = c()
difference_of_means_G01 = c()
p_value_mindful_G01 = c()
t_value_mindful_G01 = c()

ttestframeG01standup =  t.test(effectiveness$G01[effectiveness$Preparation_type == "mindful" & effectiveness$Base_line == 'FALSE' & effectiveness$Meeting_type == 'standup'], effectiveness$G01[effectiveness$Preparation_type == "mindful" & effectiveness$Base_line == 'TRUE']) # T.Test to compare baseline of Question of mindfulness groups with results of actual mindfulness exercise for standup

tempqG01 = 'standup'
tempdiffG01 =   mean(subset(effectiveness$G01, effectiveness$Preparation_type == 'mindful' & effectiveness$Base_line == 'FALSE' & Meeting_type == 'standup')) - mean(subset(effectiveness$G01, effectiveness$Preparation_type == 'mindful' & effectiveness$Base_line == 'TRUE' )) # The mean of Question G01 of the difference of all the mindfulness teams when compared to the baseline for standup meetings.
tmppvalueG01 = ttestframeG01standup$p.value   # Extract the p-value from this test
tmptvalueG01 = ttestframeG01standup$statistic # Extract the t-value from this test

ttestframeG01standup =  t.test(effectiveness$G01[effectiveness$Preparation_type == "mindful" & effectiveness$Base_line == 'FALSE' & effectiveness$Meeting_type == 'retro'], effectiveness$G01[effectiveness$Preparation_type == "mindful" & effectiveness$Base_line == 'TRUE']) # T.Test to compare baseline of Question of mindfulness groups with results of actual mindfulness exercise for standup

preparation_type_G01 = append(preparation_type_G01, tempqG01)
difference_of_means_G01 = append(difference_of_means_G01,  tempdiffG01)
p_value_mindful_G01 = append(p_value_mindful_G01, tmppvalueG01)
t_value_mindful_G01 = append(t_value_mindful_G01, tmptvalueG01)

tempqG01 = 'retro'
tempdiffG01 =   mean(subset(effectiveness$G01, effectiveness$Preparation_type == 'mindful' & effectiveness$Base_line == 'FALSE' & Meeting_type == 'retro')) - mean(subset(effectiveness$G01, effectiveness$Preparation_type == 'mindful' & effectiveness$Base_line == 'TRUE' )) # The mean of Question G01 of the difference of all the mindfulness teams when compared to the baseline for standup meetings.
tmppvalueG01 = ttestframeG01standup$p.value   # Extract the p-value from this test
tmptvalueG01 = ttestframeG01standup$statistic # Extract the t-value from this test

preparation_type_G01 = append(preparation_type_G01, tempqG01)
difference_of_means_G01 = append(difference_of_means_G01,  tempdiffG01)
p_value_mindful_G01 = append(p_value_mindful_G01, tmppvalueG01)
t_value_mindful_G01 = append(t_value_mindful_G01, tmptvalueG01)

diffmeansG01 = data.frame(preparation_type_G01, difference_of_means_G01, p_value_mindful_G01, t_value_mindful_G01)

diffmeansG01
write.csv(diffmeansG01, file = "diffmeansG01.csv")   # writing the results to CSV


#####################################################
# t.tests for Question G03 =>  The meeting atmosphere was constructive, calm and open.

t.test(effectiveness$G03 ~  effectiveness$Base_line)  # T.Test to compare baseline of Question G03 of all groups with results of further measurements
t.test(effectiveness$G03[effectiveness$Preparation_type == "mindful" & effectiveness$Base_line == 'FALSE'], effectiveness$G03[effectiveness$Preparation_type == "mindful" & effectiveness$Base_line == 'TRUE']) # T.Test to compare baseline of Question G03 of mindfulness groups with results of actual mindfulness exercise


#### standup versus retro ttest G03

preparation_type_G03 = c()
difference_of_means_G03 = c()
p_value_stravinsky_G03 = c()
t_value_stravinsky_G03 = c()
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ttestframeG03standup =  t.test(effectiveness$G03[effectiveness$Preparation_type == "stravinsky" & effectiveness$Base_line == 'FALSE' & effectiveness$Meeting_type == 'standup'], effectiveness$G03[effectiveness$Preparation_type == "stravinsky" & effectiveness$Base_line == 'TRUE']) # T.Test to compare baseline of Question of stravinskyness groups with results of actual stravinskyness exercise for standup

tempqG03 = 'standup'
tempdiffG03 =   mean(subset(effectiveness$G03, effectiveness$Preparation_type == 'stravinsky' & effectiveness$Base_line == 'FALSE' & Meeting_type == 'standup')) - mean(subset(effectiveness$G03, effectiveness$Preparation_type == 'stravinsky' & effectiveness$Base_line == 'TRUE' )) # The mean of Question G03 of the difference of all the stravinskyness teams when compared to the baseline for standup meetings.
tmppvalueG03 = ttestframeG03standup$p.value   # Extract the p-value from this test
tmptvalueG03 = ttestframeG03standup$statistic # Extract the t-value from this test

ttestframeG03standup =  t.test(effectiveness$G03[effectiveness$Preparation_type == "stravinsky" & effectiveness$Base_line == 'FALSE' & effectiveness$Meeting_type == 'retro'], effectiveness$G03[effectiveness$Preparation_type == "stravinsky" & effectiveness$Base_line == 'TRUE']) # T.Test to compare baseline of Question of stravinskyness groups with results of actual stravinskyness exercise for standup

preparation_type_G03 = append(preparation_type_G03, tempqG03)
difference_of_means_G03 = append(difference_of_means_G03,  tempdiffG03)
p_value_stravinsky_G03 = append(p_value_stravinsky_G03, tmppvalueG03)
t_value_stravinsky_G03 = append(t_value_stravinsky_G03, tmptvalueG03)

tempqG03 = 'retro'
tempdiffG03 =   mean(subset(effectiveness$G03, effectiveness$Preparation_type == 'stravinsky' & effectiveness$Base_line == 'FALSE' & Meeting_type == 'retro')) - mean(subset(effectiveness$G03, effectiveness$Preparation_type == 'stravinsky' & effectiveness$Base_line == 'TRUE' )) # The mean of Question G03 of the difference of all the stravinskyness teams when compared to the baseline for standup meetings.
tmppvalueG03 = ttestframeG03standup$p.value   # Extract the p-value from this test
tmptvalueG03 = ttestframeG03standup$statistic # Extract the t-value from this test

preparation_type_G03 = append(preparation_type_G03, tempqG03)
difference_of_means_G03 = append(difference_of_means_G03,  tempdiffG03)
p_value_stravinsky_G03 = append(p_value_stravinsky_G03, tmppvalueG03)
t_value_stravinsky_G03 = append(t_value_stravinsky_G03, tmptvalueG03)

diffmeansG03 = data.frame(preparation_type_G03, difference_of_means_G03, p_value_stravinsky_G03, t_value_stravinsky_G03)

diffmeansG03
write.csv(diffmeansG03, file = "diffmeansG03.csv")   # writing the results to CSV

#####################################
# t.tests for Question G04 => The meeting was effective

 t.test(effectiveness$G04 ~  effectiveness$Base_line)  # T.Test to compare baseline of Question G04 of all groups with results of further measurements
t.test(effectiveness$G04[effectiveness$Preparation_type == "mindful" & effectiveness$Base_line == 'FALSE'], effectiveness$G04[effectiveness$Preparation_type == "mindful" & effectiveness$Base_line == 'TRUE']) # T.Test to compare baseline of Question G04 of mindfulness groups with results of actual mindfulness exercise


#### standup versus retro ttest G04

preparation_type_G04 = c()
difference_of_means_G04 = c()
p_value_mindful_G04 = c()
t_value_mindful_G04 = c()

ttestframeG04standup =  t.test(effectiveness$G04[effectiveness$Preparation_type == "mindful" & effectiveness$Base_line == 'FALSE' & effectiveness$Meeting_type == 'standup'], effectiveness$G04[effectiveness$Preparation_type == "mindful" & effectiveness$Base_line == 'TRUE']) # T.Test to compare baseline of Question of mindfulness groups with results of actual mindfulness exercise for standup

tempqG04 = 'standup'
tempdiffG04 =   mean(subset(effectiveness$G04, effectiveness$Preparation_type == 'mindful' & effectiveness$Base_line == 'FALSE' & Meeting_type == 'standup')) - mean(subset(effectiveness$G04, effectiveness$Preparation_type == 'mindful' & effectiveness$Base_line == 'TRUE' )) # The mean of Question G04 of the difference of all the mindfulness teams when compared to the baseline for standup meetings.
tmppvalueG04 = ttestframeG04standup$p.value   # Extract the p-value from this test
tmptvalueG04 = ttestframeG04standup$statistic # Extract the t-value from this test

ttestframeG04standup =  t.test(effectiveness$G04[effectiveness$Preparation_type == "mindful" & effectiveness$Base_line == 'FALSE' & effectiveness$Meeting_type == 'retro'], effectiveness$G04[effectiveness$Preparation_type == "mindful" & effectiveness$Base_line == 'TRUE']) # T.Test to compare baseline of Question of mindfulness groups with results of actual mindfulness exercise for standup
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preparation_type_G04 = append(preparation_type_G04, tempqG04)
difference_of_means_G04 = append(difference_of_means_G04,  tempdiffG04)
p_value_mindful_G04 = append(p_value_mindful_G04, tmppvalueG04)
t_value_mindful_G04 = append(t_value_mindful_G04, tmptvalueG04)

tempqG04 = 'retro'
tempdiffG04 =   mean(subset(effectiveness$G04, effectiveness$Preparation_type == 'mindful' & effectiveness$Base_line == 'FALSE' &
Meeting_type == 'retro')) - mean(subset(effectiveness$G04, effectiveness$Preparation_type == 'mindful' & effectiveness$Base_line ==
'TRUE' )) # The mean of Question G04 of the difference of all the mindfulness teams when compared to the baseline for standup meetings.
tmppvalueG04 = ttestframeG04standup$p.value   # Extract the p-value from this test
tmptvalueG04 = ttestframeG04standup$statistic # Extract the t-value from this test

preparation_type_G04 = append(preparation_type_G04, tempqG04)
difference_of_means_G04 = append(difference_of_means_G04,  tempdiffG04)
p_value_mindful_G04 = append(p_value_mindful_G04, tmppvalueG04)
t_value_mindful_G04 = append(t_value_mindful_G04, tmptvalueG04)

diffmeansG04 = data.frame(preparation_type_G04, difference_of_means_G04, p_value_mindful_G04, t_value_mindful_G04)

diffmeansG04
write.csv(diffmeansG04, file = "diffmeansG04.csv")   # writing the results to CSV

###########
# G05

#### standup versus retro ttest G05

preparation_type_G05 = c()
difference_of_means_G05 = c()
p_value_mindful_G05 = c()
t_value_mindful_G05 = c()

ttestframeG05standup =  t.test(effectiveness$G05[effectiveness$Preparation_type == "mindful" & effectiveness$Base_line == 'FALSE' &
effectiveness$Meeting_type == 'standup'], effectiveness$G05[effectiveness$Preparation_type == "mindful" & effectiveness$Base_line ==
'TRUE']) # T.Test to compare baseline of Question of mindfulness groups with results of actual mindfulness exercise for standup

tempqG05 = 'standup'
tempdiffG05 =   mean(subset(effectiveness$G05, effectiveness$Preparation_type == 'mindful' & effectiveness$Base_line == 'FALSE' &
Meeting_type == 'standup')) - mean(subset(effectiveness$G05, effectiveness$Preparation_type == 'mindful' & effectiveness$Base_line ==
'TRUE' )) # The mean of Question G05 of the difference of all the mindfulness teams when compared to the baseline for standup meetings.
tmppvalueG05 = ttestframeG05standup$p.value   # Extract the p-value from this test
tmptvalueG05 = ttestframeG05standup$statistic # Extract the t-value from this test

ttestframeG05standup =  t.test(effectiveness$G05[effectiveness$Preparation_type == "mindful" & effectiveness$Base_line == 'FALSE' &
effectiveness$Meeting_type == 'retro'], effectiveness$G05[effectiveness$Preparation_type == "mindful" & effectiveness$Base_line ==
'TRUE']) # T.Test to compare baseline of Question of mindfulness groups with results of actual mindfulness exercise for standup

preparation_type_G05 = append(preparation_type_G05, tempqG05)
difference_of_means_G05 = append(difference_of_means_G05,  tempdiffG05)
p_value_mindful_G05 = append(p_value_mindful_G05, tmppvalueG05)
t_value_mindful_G05 = append(t_value_mindful_G05, tmptvalueG05)

tempqG05 = 'retro'
tempdiffG05 =   mean(subset(effectiveness$G05, effectiveness$Preparation_type == 'mindful' & effectiveness$Base_line == 'FALSE' &
Meeting_type == 'retro')) - mean(subset(effectiveness$G05, effectiveness$Preparation_type == 'mindful' & effectiveness$Base_line ==
'TRUE' )) # The mean of Question G05 of the difference of all the mindfulness teams when compared to the baseline for standup meetings.
tmppvalueG05 = ttestframeG05standup$p.value   # Extract the p-value from this test
tmptvalueG05 = ttestframeG05standup$statistic # Extract the t-value from this test

preparation_type_G05 = append(preparation_type_G05, tempqG05)
difference_of_means_G05 = append(difference_of_means_G05,  tempdiffG05)
p_value_mindful_G05 = append(p_value_mindful_G05, tmppvalueG05)
t_value_mindful_G05 = append(t_value_mindful_G05, tmptvalueG05)

diffmeansG05 = data.frame(preparation_type_G05, difference_of_means_G05, p_value_mindful_G05, t_value_mindful_G05)

diffmeansG05
write.csv(diffmeansG05, file = "diffmeansG05.csv")   # writing the results to CSV

#### standup versus retro ttest G07
```

```
preparation_type_G07 = c()
difference_of_means_G07 = c()
p_value_mindful_G07 = c()
t_value_mindful_G07 = c()

ttestframeG07standup =  t.test(effectiveness$G07[effectiveness$Preparation_type == "mindful" & effectiveness$Base_line == 'FALSE' &
effectiveness$Meeting_type == 'standup'], effectiveness$G07[effectiveness$Preparation_type == "mindful" & effectiveness$Base_line ==
'TRUE']) # T.Test to compare baseline of Question of mindfulness groups with results of actual mindfulness exercise for standup

tempqG07 = 'standup'
tempdiffG07 =   mean(subset(effectiveness$G07, effectiveness$Preparation_type == 'mindful' & effectiveness$Base_line == 'FALSE' &
Meeting_type == 'standup')) - mean(subset(effectiveness$G07, effectiveness$Preparation_type == 'mindful' & effectiveness$Base_line ==
'TRUE' )) # The mean of Question G07 of the difference of all the mindfulness teams when compared to the baseline for standup meetings.
tmppvalueG07 = ttestframeG07standup$p.value   # Extract the p-value from this test
tmptvalueG07 = ttestframeG07standup$statistic # Extract the t-value from this test

ttestframeG07standup =  t.test(effectiveness$G07[effectiveness$Preparation_type == "mindful" & effectiveness$Base_line == 'FALSE' &
effectiveness$Meeting_type == 'retro'], effectiveness$G07[effectiveness$Preparation_type == "mindful" & effectiveness$Base_line ==
'TRUE']) # T.Test to compare baseline of Question of mindfulness groups with results of actual mindfulness exercise for standup

preparation_type_G07 = append(preparation_type_G07, tempqG07)
difference_of_means_G07 = append(difference_of_means_G07,  tempdiffG07)
p_value_mindful_G07 = append(p_value_mindful_G07, tmppvalueG07)
t_value_mindful_G07 = append(t_value_mindful_G07, tmptvalueG07)

tempqG07 = 'retro'
tempdiffG07 =   mean(subset(effectiveness$G07, effectiveness$Preparation_type == 'mindful' & effectiveness$Base_line == 'FALSE' &
Meeting_type == 'retro')) - mean(subset(effectiveness$G07, effectiveness$Preparation_type == 'mindful' & effectiveness$Base_line ==
'TRUE' )) # The mean of Question G07 of the difference of all the mindfulness teams when compared to the baseline for standup meetings.
tmppvalueG07 = ttestframeG07standup$p.value   # Extract the p-value from this test
tmptvalueG07 = ttestframeG07standup$statistic # Extract the t-value from this test

preparation_type_G07 = append(preparation_type_G07, tempqG07)
difference_of_means_G07 = append(difference_of_means_G07,  tempdiffG07)
p_value_mindful_G07 = append(p_value_mindful_G07, tmppvalueG07)
t_value_mindful_G07 = append(t_value_mindful_G07, tmptvalueG07)

diffmeansG07 = data.frame(preparation_type_G07, difference_of_means_G07, p_value_mindful_G07, t_value_mindful_G07)

diffmeansG07
write.csv(diffmeansG07, file = "diffmeansG07.csv")   # writing the results to CSV

#### standup versus retro ttest G08

preparation_type_G08 = c()
difference_of_means_G08 = c()
p_value_mindful_G08 = c()
t_value_mindful_G08 = c()

ttestframeG08standup =  t.test(effectiveness$G08[effectiveness$Preparation_type == "mindful" & effectiveness$Base_line == 'FALSE' &
effectiveness$Meeting_type == 'standup'], effectiveness$G08[effectiveness$Preparation_type == "mindful" & effectiveness$Base_line ==
'TRUE']) # T.Test to compare baseline of Question of mindfulness groups with results of actual mindfulness exercise for standup

tempqG08 = 'standup'
tempdiffG08 =   mean(subset(effectiveness$G08, effectiveness$Preparation_type == 'mindful' & effectiveness$Base_line == 'FALSE' &
Meeting_type == 'standup')) - mean(subset(effectiveness$G08, effectiveness$Preparation_type == 'mindful' & effectiveness$Base_line ==
'TRUE' )) # The mean of Question G08 of the difference of all the mindfulness teams when compared to the baseline for standup meetings.
tmppvalueG08 = ttestframeG08standup$p.value   # Extract the p-value from this test
tmptvalueG08 = ttestframeG08standup$statistic # Extract the t-value from this test

ttestframeG08standup =  t.test(effectiveness$G08[effectiveness$Preparation_type == "mindful" & effectiveness$Base_line == 'FALSE' &
effectiveness$Meeting_type == 'retro'], effectiveness$G08[effectiveness$Preparation_type == "mindful" & effectiveness$Base_line ==
'TRUE']) # T.Test to compare baseline of Question of mindfulness groups with results of actual mindfulness exercise for standup

preparation_type_G08 = append(preparation_type_G08, tempqG08)
difference_of_means_G08 = append(difference_of_means_G08,  tempdiffG08)
p_value_mindful_G08 = append(p_value_mindful_G08, tmppvalueG08)
t_value_mindful_G08 = append(t_value_mindful_G08, tmptvalueG08)

tempqG08 = 'retro'
```

```
tempdiffG08 =   mean(subset(effectiveness$G08, effectiveness$Preparation_type == 'mindful' & effectiveness$Base_line == 'FALSE' &
Meeting_type == 'retro')) - mean(subset(effectiveness$G08, effectiveness$Preparation_type == 'mindful' & effectiveness$Base_line ==
'TRUE' )) # The mean of Question G08 of the difference of all the mindfulness teams when compared to the baseline for standup meetings.
tmppvalueG08 = ttestframeG08standup$p.value   # Extract the p-value from this test
tmptvalueG08 = ttestframeG08standup$statistic # Extract the t-value from this test

preparation_type_G08 = append(preparation_type_G08, tempqG08)
difference_of_means_G08 = append(difference_of_means_G08,  tempdiffG08)
p_value_mindful_G08 = append(p_value_mindful_G08, tmppvalueG08)
t_value_mindful_G08 = append(t_value_mindful_G08, tmptvalueG08)

diffmeansG08 = data.frame(preparation_type_G08, difference_of_means_G08, p_value_mindful_G08, t_value_mindful_G08)

diffmeansG08
write.csv(diffmeansG08, file = "diffmeansG08.csv")   # writing the results to CSV

 #### standup versus retro ttest G09

preparation_type_G09 = c()
difference_of_means_G09 = c()
p_value_mindful_G09 = c()
t_value_mindful_G09 = c()

ttestframeG09standup =  t.test(effectiveness$G09[effectiveness$Preparation_type == "mindful" & effectiveness$Base_line == 'FALSE' &
effectiveness$Meeting_type == 'standup'], effectiveness$G09[effectiveness$Preparation_type == "mindful" & effectiveness$Base_line ==
'TRUE']) # T.Test to compare baseline of Question of mindfulness groups with results of actual mindfulness exercise for standup

tempqG09 = 'standup'
tempdiffG09 =   mean(subset(effectiveness$G09, effectiveness$Preparation_type == 'mindful' & effectiveness$Base_line == 'FALSE' &
Meeting_type == 'standup')) - mean(subset(effectiveness$G09, effectiveness$Preparation_type == 'mindful' & effectiveness$Base_line ==
'TRUE' )) # The mean of Question G09 of the difference of all the mindfulness teams when compared to the baseline for standup meetings.
tmppvalueG09 = ttestframeG09standup$p.value   # Extract the p-value from this test
tmptvalueG09 = ttestframeG09standup$statistic # Extract the t-value from this test

ttestframeG09standup =  t.test(effectiveness$G09[effectiveness$Preparation_type == "mindful" & effectiveness$Base_line == 'FALSE' &
effectiveness$Meeting_type == 'retro'], effectiveness$G09[effectiveness$Preparation_type == "mindful" & effectiveness$Base_line ==
'TRUE']) # T.Test to compare baseline of Question of mindfulness groups with results of actual mindfulness exercise for standup

preparation_type_G09 = append(preparation_type_G09, tempqG09)
difference_of_means_G09 = append(difference_of_means_G09,  tempdiffG09)
p_value_mindful_G09 = append(p_value_mindful_G09, tmppvalueG09)
t_value_mindful_G09 = append(t_value_mindful_G09, tmptvalueG09)

tempqG09 = 'retro'
tempdiffG09 =   mean(subset(effectiveness$G09, effectiveness$Preparation_type == 'mindful' & effectiveness$Base_line == 'FALSE' &
Meeting_type == 'retro')) - mean(subset(effectiveness$G09, effectiveness$Preparation_type == 'mindful' & effectiveness$Base_line ==
'TRUE' )) # The mean of Question G09 of the difference of all the mindfulness teams when compared to the baseline for standup meetings.
tmppvalueG09 = ttestframeG09standup$p.value   # Extract the p-value from this test
tmptvalueG09 = ttestframeG09standup$statistic # Extract the t-value from this test

preparation_type_G09 = append(preparation_type_G09, tempqG09)
difference_of_means_G09 = append(difference_of_means_G09,  tempdiffG09)
p_value_mindful_G09 = append(p_value_mindful_G09, tmppvalueG09)
t_value_mindful_G09 = append(t_value_mindful_G09, tmptvalueG09)

diffmeansG09 = data.frame(preparation_type_G09, difference_of_means_G09, p_value_mindful_G09, t_value_mindful_G09)

diffmeansG09
write.csv(diffmeansG09, file = "diffmeansG09.csv")   # writing the results to CSV

#### standup versus retro ttest G10

preparation_type_G10 = c()
difference_of_means_G10 = c()
p_value_mindful_G10 = c()
t_value_mindful_G10 = c()

ttestframeG10standup =  t.test(effectiveness$G10[effectiveness$Preparation_type == "mindful" & effectiveness$Base_line == 'FALSE' &
effectiveness$Meeting_type == 'standup'], effectiveness$G10[effectiveness$Preparation_type == "mindful" & effectiveness$Base_line ==
'TRUE']) # T.Test to compare baseline of Question of mindfulness groups with results of actual mindfulness exercise for standup
```

```
tempqG10 = 'standup'
tempdiffG10 =   mean(subset(effectiveness$G10, effectiveness$Preparation_type == 'mindful' & effectiveness$Base_line == 'FALSE' &
Meeting_type == 'standup')) - mean(subset(effectiveness$G10, effectiveness$Preparation_type == 'mindful' & effectiveness$Base_line ==
'TRUE' )) # The mean of Question G10 of the difference of all the mindfulness teams when compared to the baseline for standup meetings.
tmppvalueG10 = ttestframeG10standup$p.value   # Extract the p-value from this test
tmptvalueG10 = ttestframeG10standup$statistic # Extract the t-value from this test

ttestframeG10standup =  t.test(effectiveness$G10[effectiveness$Preparation_type == "mindful" & effectiveness$Base_line == 'FALSE' &
effectiveness$Meeting_type == 'retro'], effectiveness$G10[effectiveness$Preparation_type == "mindful" & effectiveness$Base_line ==
'TRUE']) # T.Test to compare baseline of Question of mindfulness groups with results of actual mindfulness exercise for standup

preparation_type_G10 = append(preparation_type_G10, tempqG10)
difference_of_means_G10 = append(difference_of_means_G10,  tempdiffG10)
p_value_mindful_G10 = append(p_value_mindful_G10, tmppvalueG10)
t_value_mindful_G10 = append(t_value_mindful_G10, tmptvalueG10)

tempqG10 = 'retro'
tempdiffG10 =   mean(subset(effectiveness$G10, effectiveness$Preparation_type == 'mindful' & effectiveness$Base_line == 'FALSE' &
Meeting_type == 'retro')) - mean(subset(effectiveness$G10, effectiveness$Preparation_type == 'mindful' & effectiveness$Base_line ==
'TRUE' )) # The mean of Question G10 of the difference of all the mindfulness teams when compared to the baseline for standup meetings.
tmppvalueG10 = ttestframeG10standup$p.value   # Extract the p-value from this test
tmptvalueG10 = ttestframeG10standup$statistic # Extract the t-value from this test

preparation_type_G10 = append(preparation_type_G10, tempqG10)
difference_of_means_G10 = append(difference_of_means_G10,  tempdiffG10)
p_value_mindful_G10 = append(p_value_mindful_G10, tmppvalueG10)
t_value_mindful_G10 = append(t_value_mindful_G10, tmptvalueG10)

diffmeansG10 = data.frame(preparation_type_G10, difference_of_means_G10, p_value_mindful_G10, t_value_mindful_G10)

diffmeansG10
write.csv(diffmeansG10, file = "diffmeansG10.csv")   # writing the results to CSV

#### standup versus retro ttest G11

preparation_type_G11 = c()
difference_of_means_G11 = c()
p_value_mindful_G11 = c()
t_value_mindful_G11 = c()

ttestframeG11standup =  t.test(effectiveness$G11[effectiveness$Preparation_type == "mindful" & effectiveness$Base_line == 'FALSE' &
effectiveness$Meeting_type == 'standup'], effectiveness$G11[effectiveness$Preparation_type == "mindful" & effectiveness$Base_line ==
'TRUE']) # T.Test to compare baseline of Question of mindfulness groups with results of actual mindfulness exercise for standup

tempqG11 = 'standup'
tempdiffG11 =   mean(subset(effectiveness$G11, effectiveness$Preparation_type == 'mindful' & effectiveness$Base_line == 'FALSE' &
Meeting_type == 'standup')) - mean(subset(effectiveness$G11, effectiveness$Preparation_type == 'mindful' & effectiveness$Base_line ==
'TRUE' )) # The mean of Question G11 of the difference of all the mindfulness teams when compared to the baseline for standup meetings.
tmppvalueG11 = ttestframeG11standup$p.value   # Extract the p-value from this test
tmptvalueG11 = ttestframeG11standup$statistic # Extract the t-value from this test

ttestframeG11standup =  t.test(effectiveness$G11[effectiveness$Preparation_type == "mindful" & effectiveness$Base_line == 'FALSE' &
effectiveness$Meeting_type == 'retro'], effectiveness$G11[effectiveness$Preparation_type == "mindful" & effectiveness$Base_line ==
'TRUE']) # T.Test to compare baseline of Question of mindfulness groups with results of actual mindfulness exercise for standup

preparation_type_G11 = append(preparation_type_G11, tempqG11)
difference_of_means_G11 = append(difference_of_means_G11,  tempdiffG11)
p_value_mindful_G11 = append(p_value_mindful_G11, tmppvalueG11)
t_value_mindful_G11 = append(t_value_mindful_G11, tmptvalueG11)

tempqG11 = 'retro'
tempdiffG11 =   mean(subset(effectiveness$G11, effectiveness$Preparation_type == 'mindful' & effectiveness$Base_line == 'FALSE' &
Meeting_type == 'retro')) - mean(subset(effectiveness$G11, effectiveness$Preparation_type == 'mindful' & effectiveness$Base_line ==
'TRUE' )) # The mean of Question G11 of the difference of all the mindfulness teams when compared to the baseline for standup meetings.
tmppvalueG11 = ttestframeG11standup$p.value   # Extract the p-value from this test
tmptvalueG11 = ttestframeG11standup$statistic # Extract the t-value from this test

preparation_type_G11 = append(preparation_type_G11, tempqG11)
difference_of_means_G11 = append(difference_of_means_G11,  tempdiffG11)
p_value_mindful_G11 = append(p_value_mindful_G11, tmppvalueG11)
t_value_mindful_G11 = append(t_value_mindful_G11, tmptvalueG11)
```

```
diffmeansG11 = data.frame(preparation_type_G11, difference_of_means_G11, p_value_mindful_G11, t_value_mindful_G11)

diffmeansG11
write.csv(diffmeansG11, file = "diffmeansG11.csv")   # writing the results to CSV

##############################
# T.test S01 for act as usual divided per team

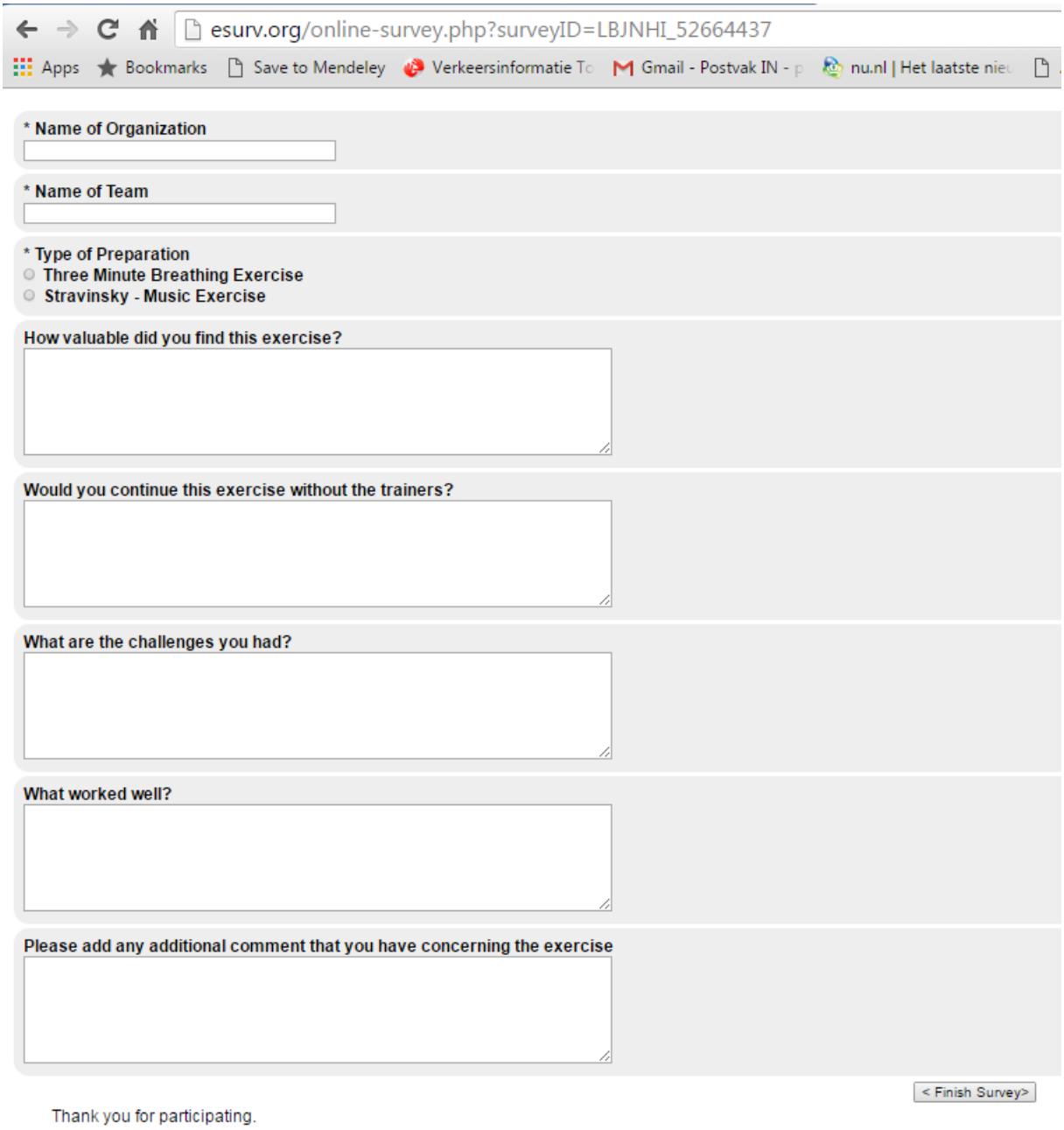
 t.test(effectiveness$S01[effectiveness$Preparation_type == "actasusual" & effectiveness$Base_line == 'FALSE' &
effectiveness$Meeting_type == 'standup' & effectiveness$Team == 'kaeru'], effectiveness$S01[effectiveness$Preparation_type ==
"actasusual" & effectiveness$Base_line == 'TRUE' & effectiveness$Team == 'kaeru']) # T.Test to compare baseline of Question S01 of
actasusualness groups with results of actual actasusualness exercise for the standup

##############################
# CRONBACHS ALPHA
library(psy)
library(psych)
retro = data.frame (effectiveness$R01, effectiveness$R02, effectiveness$R03, effectiveness$R04, effectiveness$R05, effectiveness$R06)
alpha(retro)
cronbach(retro)

standup = data.frame (effectiveness$S01, effectiveness$S02, effectiveness$S03, effectiveness$S04, effectiveness$S05)
alpha(standup)
cronbach(standup)

standup_minus_S01 = data.frame (effectiveness$S02, effectiveness$S03, effectiveness$S04, effectiveness$S05)
alpha(standup_minus_S01)
cronbach(standup_minus_S01)
```

Appendix 26 – Open Questionnaire Questions



Appendix 26: Open Questionnaire Questions