Technologische Akzeptanz verschiedener Formen der Mediationsunterstützung in einem Verhandlungsexperiment

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Technology acceptance of different forms of mediation support in a negotiation experiment

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Abstract

The negotiation is the process we are dealing every day with. The quality of negotiation reflects on the better relationships, deliver lasting solutions, and avoiding future problems and conflicts. Therefore, negotiation support rises interest of managers, HRs, coaches and a lot of workers from different fields of business during last 50 years. Mediator, negotiation support system, tele-presence – that are different variations of the negotiation support.

This work is the part of the Integrative Social Robotics (ISR) project[1]. In the area of "Fairness and the modulation of social cognition," I analyze the role of fair proxies for negotiation and conflict management. The underlying assumption of my work is that fair proxies are increasing perceived fairness in communication by concealing physical attributes like gender, age, race, etc. The comprehensive experiment with 204 participants under 4 different conditions was conducted.

These four conditions included:

1) Control group, where negotiation was conducted without any mediation support between female and male negotiator.

2) Screen – where negotiation process had the mediation support with the use of the mediation system VienNA2 by male and female negotiator.

3) Human female/male mediator – the negotiation support was provided by male and female mediator to female and male negotiator.

4) Telenoid3 – the negotiation support was provided by male and female mediator in robot tele-presence to female and male negotiator.

The outcomes go through qualitative and quantitative analysis. Participants under the condition screen (using mediation system directly without mediation support) receive more trust and technology acceptance measures. However, condition with Telenoid Android presence achieves better results in agreements in comparison to human mediator and mediation support system conditions. The gender of human mediator or Telenoid operator doesn't significantly influence negotiation results.

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[1] Semper Ardens project founded by Carlsberg Foundation, hosted at Aarhus University Denmark

[2] Descriped in Chapter 3 under the subchapter – Experimental procedure

[3] The "Telenoid" is a tele-operated robot developed by ATR/Hiroshi Ishiguro Lab, Japan. It is a teleoperated communication device, i.e., it translates the voice and (some) 'body language' of a person (operator) located in a remote location to a second person (interlocutor) in the physical presence of the robot.

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Abstrakt

Täglich sind wir mit verschiedensten Verhandlungen konfrontiert. Die Qualität dieser spiegelt sich in besseren Beziehungen, guten und langlebigen Lösungen und der Vorbeugung zukünftiger Probleme und Konflikte wieder. Durch die zunehmende Wichtigkeit steigt die Nachfrage nach Unterstützung bei Verhandlungen bei Managern, HR Abteilungen, Coaches und Mitarbeitern aus den verschiedensten Bereichen schon seit 50 Jahren stetig an. Es gibt verschiedene Formen der Unterstützung: Mediatoren, Verhandlungsunterstützungssysteme, Telepräsenz.

Diese Masterarbeit ist Teil des „Integrative Social Robotics (ISR) project“[4] und analysiert die Rollen von fairen Proxies für Verhandlungen und Konfliktmanagement im Bereich „Fairness and the Modulation of social cognition“.Grundannahme meiner Arbeit ist, dass faire Stellvertreter die wahrgenommene Fairness in der Kommunikation erhöhen, indem sie physische Eigenschaften wie Geschlecht, Alter, Rasse oder ähnliches verbergen. Das umfassende Experiment wurde mit 204 Teilnehmern unter vier verschiedenen Bedingungen durchgeführt:

1) Kontrollgruppe, hier wurde die Verhandlung zwischen Frau und Mann ohne jede Unterstützung durchgeführt.

2) Screen, hier wurde das Meditationssystem VienNA[5] bei beiden Teilnehmern (männlich und weiblich) zur Hilfe genommen.

3) Menschlicher Mediator weiblich/männlich – die Probanden wurden sowohl von einem männlichen als einem weiblichen Mediator unterstützt.

4) Telenoid6, die Verhandlung wurde von einem Roboter begleitet, im Hintergrund waren sowohl ein männlicher als auch ein weiblicher Mediator mit dem Roboter verknüpft. Die Ergebnisse wurden sowohl qualitativ als auch quantitativ untersucht. Die Teilnehmer unter der Bedingung „Screen“ erhielten mehr Vertrauen und technologische Akzeptanz. Der Telenoid erzielte bessere Resultate bei Vereinbarungen als der menschliche Mediator oder das Mediationssystem. Das Geschlecht des Mediators hatte keine Signifikaten Auswirkung auf das Ergebnis der Verhandlungen.

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[4] Semper Ardens project founded by Carlsberg Foundation, hosted at Aarhus University Denmark

[5] Descriped in Chapter 3 under the subchapter – Experimental procedure

[6] Der "Telenoid" ist ein teleoperativer Roboter, der vom ATR/Hiroshi Ishiguro Lab, Japan, entwickelt wurde. Es handelt sich um ein teleoperiertes Kommunikationsgerät, d.h. es übersetzt die Stimme und „Körpersprache" einer Person, die sich nicht im gleichen Raum befindet, für eine zweite Person, die sich mit dem Roboter in einem Raum befindet.

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Chapter 1. Introduction

1.1. Motivation and problem statement

Negotiations are part of our daily lives. At work, people agree with clients on the terms of a contract or enter into an agreement with their supervisors on the salary after an interview about employment. At home people agree inside their families with partners and children, who will clean or cook today, who will read a fairy tale to the children today and how long children can watch cartoons. Politicians agree on important situations and make decisions that affect the lives of all people in the country. The main purpose of negotiations is to reach an agreement, especially in case of conflicting goals and preferences. If the goals, aspirations and preferences of one person coincide completely with the goals, preferences and aspirations of another person, there would be no conflict and no need to negotiate. In this case, the best result would be the same for both participants, so all they would have to do is define the result and put it into practice. This situation, this joint problem - would be nothing more than a problem of optimization, as the only incentive for both sides would be to find this optimal solution. Unfortunately, this is not the case in real life. Often people have different interests and preferences, and preferences when this happens, there is a need to create a method that will help to determine a result suitable for both sides. It is the negotiations that provide this mechanism.

Although negotiation is an important and daily activity, it doesn't mean that people are good at it, most people don't think it's the most pleasant thing to do. Complex negotiations are not easy: people come out of them emotionally depressed, confused or tired, which affects the decision making - most often naive, reckless and not consistent. In this condition, it is difficult for people to weigh in an impartial manner alternative solution, to reject misconceptions and not to give in to prejudices. Consequently, many people see the negotiations as a huge stress, which does not allow them to conduct them with the efficiency with which they could do it in principle (Shaheen et al. 2015).

To avoid unnecessary tension and stress, specially trained people enter into negotiations. In other words, a third party intervenes as a mediator to help resolving the conflict. Based on the results of the negotiations, the theory of mediation studied the mediator’s strategy, tactics, phases and communication patterns on the early stages of communication (Nicotera, 2009).

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According to James Wall (1993) the word “mediation” comes from the Latin root "mediare" – to halve. It means to step between two parties and solve their problem in Chinese and indicates manipulation in Arabic. For Westerners "mediation" is a procedure that is used increasingly for conflict resolution.

According to the Harvard Law School[7], there are various styles and types of mediation that are available to help to resolve conflict (mediation support):

Facilitative Mediation – the mediator tries to influence the negotiation procedure only indirectly by encouraging the involved parties to reach an agreement voluntarily, through a deep discussion.

Court-Mandated Mediation – this type of mediation can be either encouraged voluntarily or mandated by the court. As the term speaks for itself, it usually appears in the court practice when the mediator is ordered to reach a fast and efficient agreement between the conflict parties.

Evaluative Mediation – evaluative mediation is very common for court settings as well. However, in this case the role of mediators is usually attributed to lawyers. Their goal is to evaluate the situation from the legal point of view and to help the conflict parties to reach a (legally) fair agreement, they use suggestions and recommendations during the mediation process.

Transformative Mediation – transformation mediation is the most ambitious type in regard to the pursued outcome and the mediation process itself. It should help parties not only to reach an agreement per se but look at the negotiation through the prism of the opponent’s views and goals and therefore can lead to a deeper transformation of the involved conflict parties.

Med-Arb – this modus of mediation represents the combination of mediation and arbitration, where the parties agree beforehand, that the outcome of negotiations is going to be binding. Then the mediator enters the negotiations and tries to help parties to solve their issues and if he fails, the task is passed on arbitrator.

Arb-Med – the process by arb-med starts on contrary with arbitration when a neutral analyst hears out the conflict parties and writes an arbitration award - binding agreement. If the following mediation ends with an impasse, the arbitrator unseals and issues this award.

7 https://www.pon.harvard.edu/daily/mediation/types-mediation-choose-type-best-suited-conflict/, last accessed 21.06.2020

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E-mediation – this mediation type is very similar to the facilitative one but is delivered at a distance between the parties. It can be achieved by using technical means such as video conferencing services for example.

In my master thesis, E-mediation is the focus type of the mediation support.

Electronic support systems, that facilitate the negotiation process, have been developed by researchers in order to help people solve problems in negotiations. According to Druckman et al. (2012) electronic negotiation support (eNS) systems are computer systems that not only provide an electronic communication channel, but supplement it with additional support functions like: a decision support system for each negotiating party to improve decision quality and reach efficient agreements; communication and document support functions to improve communication quality and document handling; or behavioral support to increase flexibility and thereby the prospects of reaching an agreement in case of a stalemate.

Socio-emotional and communication problems are detrimental to successful negotiation, therefore researchers believe that the support functions described above can help mitigate the negative impact of cognitive biases and limitations. Empirical evidence from numerous experiments in negotiations over the past decade suggests that the mission to achieve better results through the negotiation support system has been only partially accomplished. Firstly, two main aspects of the results – efficiency (high quality of the agreement) and effectiveness (good prospects for reaching an agreement) are conflicting goals: aspects that have a positive impact on the quality of agreements, at the same time reducing the prospects for reaching an agreement at all. This phenomenon is widely known as the negotiator's dilemma, which has not yet been resolved properly using the existing systems. Conversely, studies on supporting post-settlement decision-making clearly show that most negotiators prefer to stick to the dominant result, which was achieved more by their own joint efforts than to accept the decision proposed by the system. Thus, to feel better with the outcome, they are willing to sacrifice their own and/or partner's economic value.

The problem statement is based on the fact, that differences in physical attributes, like gender, age, race, etc., between the mediator and the negotiators, can reduce perceived fairness and challenge neutrality of the mediator and the mediation process (Adrian et al. 2019). Therefore, motivation of this work is to show the involvement of integrative social robotics to facilitate mediation in conflict management. Seibt (2016) stated that "Social robots" are robotic devices that are designed to engage humans in

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social interactions, by presenting themselves—in appearance or behavior—as intelligent social agents.

The use of teleoperated android robots in mediation could improve perceived fairness by masking physical attributes. Therefore, the underlying assumption of the studies is "Dialogue by robotic proxy increases the perceived fairness of the facilitation of conflict negotiation processes: in domestic conflicts where the mediator's gender neutrality matters; and/or in work conflicts where the mediator's age (and gender) neutrality matters" (Seibt 2016: 9).

1.2. Aim of the work

Research question of the master thesis is "Do participants accept e-mediation via the Telenoid as a fair proxy in e-mediations and if yes, what are the perceived and actual effects on the mediation and negotiation process and outcome". The aim of this work leads to prove or regent the problem statement using different methodological approaches such as quantitative and qualitative analysis, mathematical techniques and outcomes from previous research articles. In order to answer the research questions of the master thesis and make conclusions for future work, quotative analysis of the data provided from VienNA system was made (see sub chapter 3.4. Materials). Qualitative analysis was used to understand participants point of view on the experiment through asking them open question before and after negotiation. Literature overview regarding project and history of social robotics in general was the ground of this master thesis work.

1.3. Master thesis as a part of the larger project Integrated Social Robotics

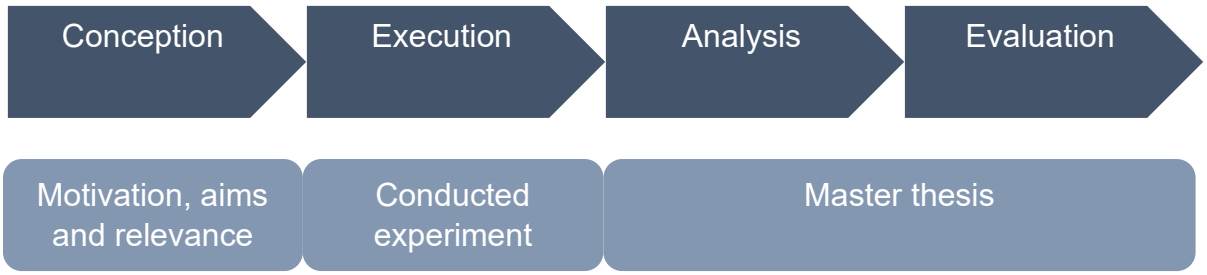

Figure 1: Master thesis as a part of Integrated Social Robotics project

As it shown in the figure 1, master thesis is covering two parts of the project phases: analysis and evaluation. Within the framework of this project, innovative research will be carried out in the field of integrative social robotics (ISR), a new approach that systematically combines research in the field of social robotics with studies in the field

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of social and cultural practices and values, which are carried out in the humanities (anthropology, ethics, value theory, research in the field of education, linguistics and communication, phenomenology, ontology, knowledge representation, epistemology) and the humanities and social sciences (psychology, cognitive science, sociology).

While the modern method of creating applications for social robotics first poses the question of what social robots can and should do, the ISR approach argues that applications of social robotics should be based on an understanding of what social robots can and should do.

The aim of the project is to introduce the ISR approach and demonstrate its viability and benefits at a theoretical and practical level. The project has two main objectives:

Objective 1: to elaborate in detail the new paradigm of the method of Integrative Social Robotics (ISR), a new approach to the development of normatively viable applications of social robotics, which transfers research in the field of Humanities/Human Sciences to studies of human-robot interaction, and vice versa.

Objective 2: demonstrate the viability and benefits of the ISR approach through its implementation, i.e. by creating and testing several new applications of social robotics, as well as by exploring some of the cognitive mechanisms underlying these applications.

Based on studies of socio-cultural values (factors of personal and social well-being), the project will develop applications in three main areas in which human-robot interaction can enhance the interaction that manifests itself or makes up such values.

In parallel with the development of these applications, it will be considered important general research issues in the field of social robotics:

Focus area A: Fairness and the modulation of social cognition. In this area, the question is being examined whether the physical construction of social robots (communication robots) can be systematically used to modulate implicit processes of social cognition (for example, by reducing perception bias), and whether these modules are transformed into more fair, joint and rational social interactions between people (via robotic proxy).

Focus area B: Authenticity and the regulation of emotional attachments. In this area, the question of whether and how to use the physical and software design of social robots to create meaningful social interactions without inappropriate emotional dependencies and moral obligations is explored.

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Focus area C: Self-realization and (moral and epistemic) autonomy. The goal of this focus area is to study whether, and if so, how, it is possible to use the physical and, especially, software design of social robotics to implement forms of communication that contribute to improving human understanding, i.e. forms of dialogue that are used in Western philosophical tradition to enhance existential orientation and the ability to make rational judgments; and (regulation of information density in the process of human-robot interaction).

These implementations of the ISR approach will be informed by, and informing, theoretical research on the descriptive tools and method of ISR:

Method area D examines whether and how HRI (Human-Robot Interaction Studies) can be transformed into a transdisciplinary research area with a wide interdisciplinary scope; these methodological studies will go hand in hand with laying the theoretical foundations for the development of a comprehensive theory of sociality.

The project has ten workflows associated with ten key hypotheses. The first seven of them investigate hypotheses related to the “focal areas of applications” of A, B, and C; other workflows are aimed at solving complex conceptual problems associated with the creation of a new method paradigm - the "method area (D)".

Focal Area A: Fairness and the modulation of social cognition

The first three hypotheses and related work processes in the focal area (A) explore the relationship between physical design and implicit social cognition. The idea of this research focus was formed during previous empirical studies of human interactions with the Telenoid robot, a telecommunication robot created by ATR/Hiroshi Ishiguro Lab, Japan. A Telenoid is a teleoperated communication device, i.e. it translates the voice and (some) "body language" of a person (operator) located in a remote place, to a second person (interlocutor) in the physical presence of the robot. This form of communication is new: it is carried out from a remote place, but "face to face" is a personal dialogue through a proxy.

“Ishiguro and his collaborators say the idea was to create a teleoperated robot (see figure 2), that could appear male or female, old or young, and that could be easily transported. The new design pushes the envelope of human-robot interaction, and Ishiguro is certainly not afraid of exploring the depths of the uncanny valley“[8]. One of the first researchers, who described this phenomenon of human perception is a Japanese professor of robotics, Masahiro Mori. By exploring interaction between

8 https://spectrum.ieee.org/automaton/robotics/humanoids/telenoid-r1-hiroshi-ishiguro-newest-and-strangest-android, last accessed 20.04.2020

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humans and different types of robots, human-like puppets and stuffed animals he comes to the conclusion, that by “climbing toward the goal of making robots appear like a human, our affinity for them increases until we come to a [uncanny] valley” (Mori 2012: 98). In other words, as soon as robots closely resemble real people, but move or are felt like artificial machines, humans tend to sense a disharmony of perception and experience the feeling of unease.

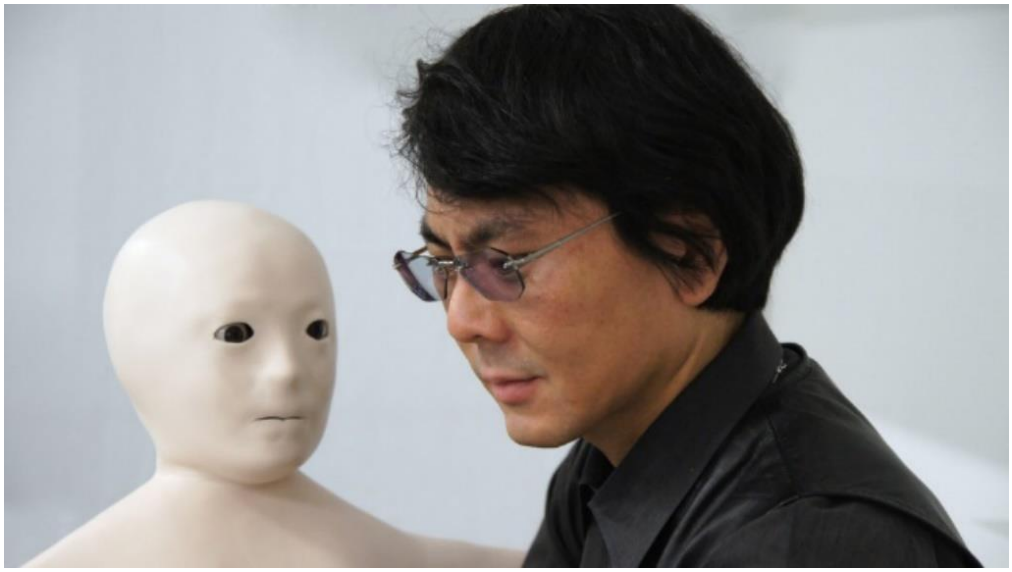

Figure 2: Dr. Hiroshi with his Telenoid[9]

It is assumed that dialogue through a robotic proxy reduces perception bias (gender, racial prejudices), strengthens tendencies for cooperation and facilitates the making of rational decisions. Workflow 1 will address first research hypothesis in Focus Area A, which pertains to the role of Fair Proxies for conflict management:

Dialogue by robotic proxy increases the perceived fairness of the facilitation of conflict negotiation process – (a) in domestic conflicts where the mediator’s gender neutrality matters; (b) in work conflicts where the mediator’s age (and gender) neutrality matters.

Dialogue by robotic proxy increases the perceived fairness of the facilitation of conflict negotiation processes—(a) in domestic conflicts where the mediator’s gender neutrality matters; (b) in work conflicts where the mediator’s age (and gender) neutrality matters (Seibt, 2016).

9 https://ars.electronica.art/futurelab/en/project/telenoid/, last accessed 20.04.2020

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1.4. Structure of the thesis

The work consists of five chapters, which sequentially narrate the emergence of the research area, scientific project, conducted experiment and analyses of the results of this experiment, that became a base of the current master thesis work.

Chapter 1 is giving a wide introduction, the motivation and the problem statement of the work, furthermore, brief overview on the project, which master thesis takes part in. Chapter 2 “State of art” gives detailed theoretical background of the problem statement, describes the importance of the mediation and negotiation in the modern life, history of robotics in general and social robotics in particular. In chapter 3 the methodological approach and materials overview can be found. Moreover, here the conducted experiment and its conditions are declared. Chapter 4 presents the outcomes from the analysis of empirical data. Chapter 5 provides conclusions and further steps. In the end of the work bibliography, appendix, lists of used figures and tables can be found.

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Chapter 2. State of art / Theoretical background

2.1. Negotiation

When one hears the word “negotiations”, the mind helpfully draws a picture of people sitting at the large table with serious faces. For the most people, as Broome (2009) puts it, process of peace making and official negotiations are closely tight together. History contains many vivid examples when the outcome of various negotiations decided the fate of the entire nations and defined the policy of states for centuries. In those days, diplomatic negotiators had great power and carried no less responsibility. No wonder that some influential schools of thoughts and analytical models on negotiation processes arose from conflict studies. As William Zartman (2019: 287), a famous conflict researcher, fairly points out, “[…] there is no authoritative theory of negotiation”, as he pleads for more behavioral and experimental research referring to Daniel Druckman (ebd.).

Negotiations are a phenomenon that haunts people everywhere, in all areas of the life. For example, hiring interviews, business correspondence, and even bargaining shoppers at the market – these are all special cases of negotiations that are subject of the same mechanisms. The basis of any negotiations is a desire to achieve one’s goals. Thus, the key idea is to force the opponent to accept needed point of view. In this regard Kersten (1993: 293) states that “[n]egotiation is characterized by argumentation, persuasion, and interaction, involving the comparison of goals and alternatives [and t]hese activities may cause a change of focus or preferences, shifts in strategy or the revision of negotiators beliefs”. Thanks to these and other considerations, cultural contexts became particularly important for negotiation processes and provided fertile ground for new social concepts, bringing such terms as face concerns and a conflict potential into the same discussion as Stella Ting-Toomey and her colleagues did. They proposed a theoretical model, according to which “[…] face is conceptualized as an individual’s claimed sense of positive image in a relational and network context” (Giri 2009: 534). This idea gained even a bigger importance especially in regard to the negotiations at the global market, where reliable partners and trust of customers are an important condition for successful business management. The one-time benefit from a random transaction could not compare with the profit received from a result of long-term partnerships.

The daily need for negotiations has led to the emergence of many techniques and strategies. Some of them allow to look at the negotiations from a completely new angle.

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For example, the Harvard school of negotiations, the key concept of which is the rejection of classical positional negotiations and the transition to a principled model. Williams (1993), as he analyses aggressive and cooperative (behavioral) patterns of attorneys argues, that effectiveness in the negotiation process does not solely depends on our concentration on the outcome, but on the process itself and the individual choice of the particular strategy. Intelligence agencies, on whose shoulders the burden of negotiating in critical situations is laying, also developed their own methods of persuasion. Many of them are based on techniques from psychology or neuro-linguistic programming and have been classified until recently[10].

Mastenbroek (1980) chose the four most interesting points on the understanding of negotiations. According to him negotiations are a set of tactics; rely on the ability to resolve a number of dilemmas; are a process organized in time; are a complex of various activities[11].

Therefore, negotiations are a complex process, where various techniques, rules, tricks and psychological influence are involved. A common phenomenon is when negotiations come to a deadlock as a conflict of interests of the parties occurs. In this case, mediation is one of the methods for resolving the disputes.

2.2. Mediation

Initially the term “mediation” was widely used in the law area, especially in the context of alternative dispute resolution also known as ADR. Broadbent (2009) defines ADR as the alternative of resolving the dispute instead of going to court. The process always involves a third party and, as Raiffa (1993: 14) points out, “[t]here are several types of third-party interventions that can help parties to reach agreements and more efficient agreements [where a] *facilitator* helps with the logistics in the proceedings of meetings [, a] mediator helps people to come to a voluntary agreement [and an] arbitrator tries to understand the issues on all sides and then imposes an agreement as a judge”. Despite of this attempt to draw a line between these roles, Raiffa (1993) concludes later, that during the negotiation process it is sometimes hard for the neutral analyst to understand which role he is currently taking.

As Wall and Dunne (2012) fairly notice, this problem of (self-)definition is related to the complexity of the process and to the variety of contexts in which mediation takes place

10 https://ovitta.com.ua/blog/business-talks-history/, last accessed 15.04.2020

11 https://gtmarket.ru/laboratory/basis/4626/4627, last accessed 15.04.2020

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and serves as a concept. This ubiquity plays not the last role that many researchers focus on the results of mediation in general and not on the mediation techniques (Wall et al. 2001). Wall tries to break this cycle and offers some precise techniques and features which can be useful in the mediation process. He points out, that "[the] paradigm in which the mediator operates consists of complex and interdependent relationships in which the parties assess and respond to the probable behaviours of agreement with several other" (Wall 1981: 160). In this net of interpersonal relationships neutrality remains a very important issue which means, as Altmaier (2009: 285) puts it, that "[…] the mediator will not gain personal favors from one of the parties for assisting with mediation". He carefully elaborates the agenda of communication between the parties, explains to them the technique of asking questions, develops a model of questions that will be put to each of the parties. This normally happens if the third-party counsels the negotiation from its beginning. In those cases, if mediator joins the negotiations after they have been started, he has to "identify the parties at conflict as well as their negotiators" (Wall 1981: 160). Setting up the negotiation and stabilizing it belongs to the task area of mediator as well (Wall 1981).

The mediator encourages the parties to analyze the conflict that has arisen between them. This is a very important step, since the final outcome, i.e. the agreement of the parties, depends on the priority and correctness of the questions posed by the mediator. Mediation helps to find a common solution that will satisfy all parties. Although as Bercovitch et al. (1991:9) notes, "[m]ediation outcomes may be perceived, and defined, very differently by the outside observer, the parties involved, the international community or the mediator him/herself". In this context, Wall (1981) also discusses different types of relationships that arise during the negotiation process and points out how sensitive the relationship between constituents and mediators can become, especially when they are linked by an employment agreement. Svensson (2019) provides mediators with a helpful notice referring to this problem. From the mediator' perspective, he discusses, the basic rationales lie somewhere between the costs and benefits for the mediator's engagement in the negotiation process and the costs and benefits of the potential agreement. And if the chances to reach an agreement get higher when mediator is invited the costs for his/her engagement are less important.

However, all these discrepancies can lead to the tensions and misunderstandings, so another task of mediator is to establish and restore confidence between the parties

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and to keep basic incentives for reaching consensus in mind (Svensson 2019). Druckman (2019) points out, that interpersonal context plays a very important role in the current research on mediation process. “Cognitive trust is grounded in an assessment of others’ competences, their behavioral patterns, and the likelihood that they will honor promises and commitments. Affective trust is grounded in the perceived values and intentions of an opposing negotiator. Individuals assess affective trust by gauging the extent to which others share their values and are working toward mutual benefit, their benevolence, and their integrity (Druckman 2019: 153). The mediator tries to explain to the parties how important it is to avoid aggression, using the technique of periodically clarifying the position of the parties, and points out the advantages of the agreement to be reached, not the mistakes of the opponent. Another technical feature of mediation is that the mediator conducts structured negotiations without unnecessary words and information. Using the technique of active listening and paraphrasing, the mediator helps the parties to clarify controversial points, clarify details, pay attention to important conditions.

If in the mediation process a positive result is achieved, in the future it will allow concluding amicable agreements or avoiding the stage of settling a dispute in court. However, some researchers distinguish between fully successful and partially successful mediation. “Mediation is defined as fully successful when it is given credit for making a great difference to or settling a dispute. It is partially successful when its efforts initiate negotiations and some dialogue between the parties” (Bercovitch et al. (1991:9). It should be also noted that parties with mediator involvement can come to non-standard decisions that they would not be able to make in everyday life. With the method of convergence of the parties’ positions they achieve positive success, since they are not limited in time and subject of their conversation, but free in their intentions and offers. Thus, the parties make non-standard decisions and ways to resolve the conflict and moreover, this option can form the basis of the mediation agreement, if conflict parties agree to do so.

2.3. Mediation support

There are a lot of different approaches that mediators use in order to resolve the conflict: facilitative, court-mandated, evaluative, transformative, med-arb, arb-med, e-

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mediation, to name but a few[12]. In my work I am concentrating on the last type of the mediation support in this list – e-mediation.

E-mediation is, as Someya (2019) fairly points out, the type of the mediation support when mediator is providing parties with the online service – electronic support system that helps parties to: improve decision quality and reach efficient agreement; improve quality and document handling; increase flexibility; increase the prospects of reaching an agreement in case of stalemate.

Electronic negotiation support (eNS) systems are facilitating negotiation processes in order to resolve negotiation problems. These computer systems provide electronic communication channel with additional support functions like decision support system, communication and document support function and behavioral support.

Researches consider these components to be helpful to mitigate the negative impact of cognitive prejudices and biases, socioemotional or communicational problems. The support condition I am investigating in my work is teleoperated negotiation support. Tele-presence is represented by the Telenoid Android which belongs to the kind of social robots.

2.4. History of robotics

Since the ancient times people were obsessed with the idea of creating something outstanding, incredible, magical, similar to the human being, but submissive. It can be called the great dream of the human race: an artificial and managed mind in the artificial body. The creatures described in myths and fairy tales were made using magic. Non-living objects were endowed with human qualities. In real life, magic did not work. However, the physics and mechanics did. The first developments that came to present time are dated back to the first – third century A.D. This is where the story of robots begins: with the first statues of gods with moving limbs and a head, found in Ancient Egypt, Babylon, China, an automatic sphere created by Archimedes, with the reflection of celestial bodies, that is shown on Figure 2[13], with written records on automatic systems of Heron of Alexandria for the sale of holy water and etc.

12 https://www.pon.harvard.edu/daily/mediation/types-mediation-choose-type-best-suited-conflict/, last accessed 15.04.2020

13 https://www.cs.drexel.edu/~crorres/Archimedes/Sphere/SphereIntro.html, last accessed 15.04.2020

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Figure 2: An automatic sphere with the reflection of celestial bodies[14]

Before the invention of electricity, in the Middle Ages, robots were large mechanical watches and automatic machines. Automaton (automaton, from the Greek αὐτόματον - acting of its own free will) or an automaton doll was an independently acting mechanism (or a set of mechanisms) that, using an internal device, performed a certain set of actions according to a strictly defined program without the direct participation of a person and imitated the shape and movement of a person or animal[15].The most popular were automatic clockworks and human figures that moved. One of the brightest examples is the project of Leonardo da Vinci – a mechanical knight dated by 1495 (see figure 3):

14 https://roboticsshop.ru/news/istoriya-robotov-ot-chertezha-da-vinchi-do-aiko-chihira, last accessed 15.04.2020

15 https://masterok.livejournal.com/2630361.html, last accessed 15.04.2020

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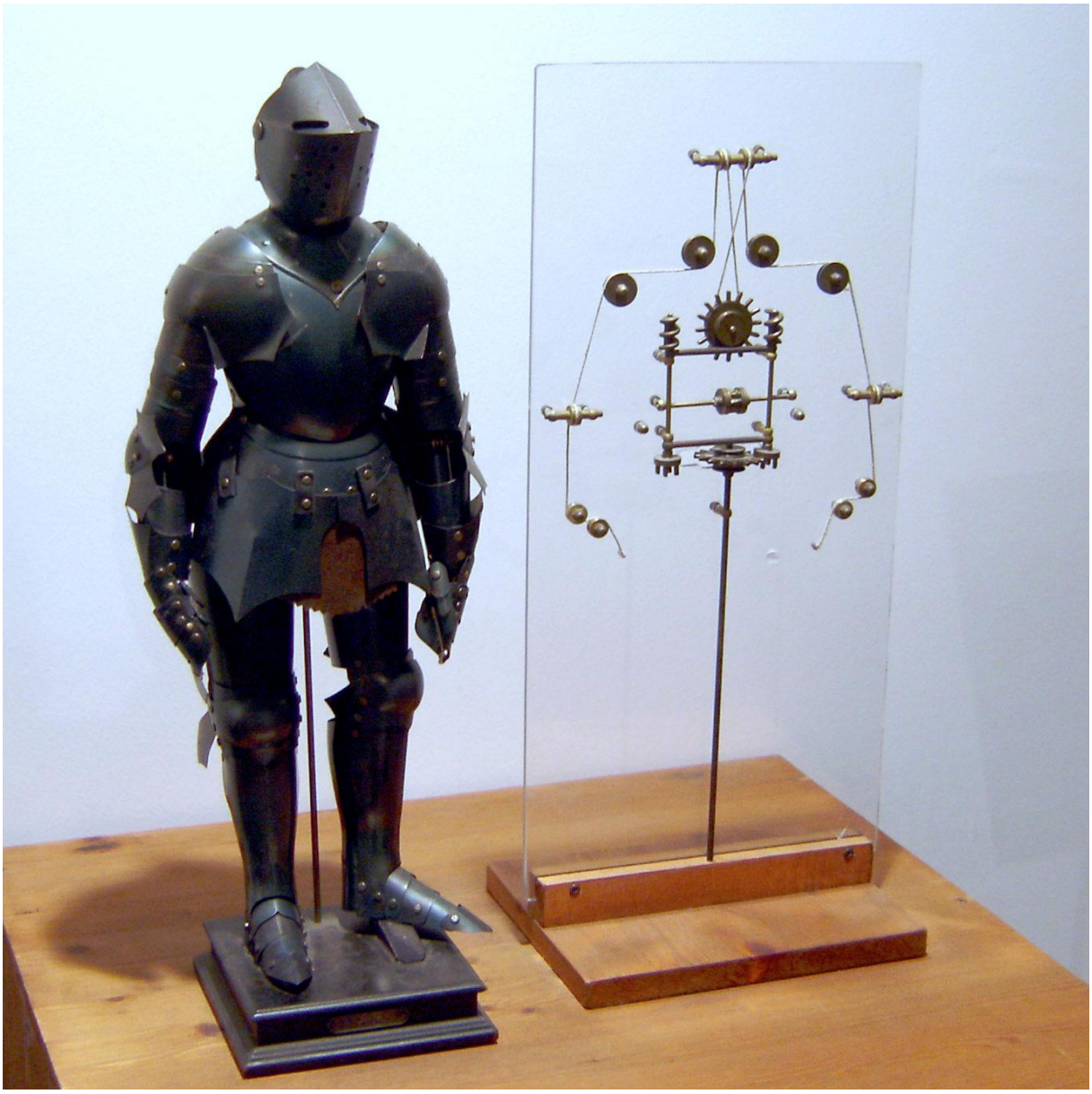

Figure 3: A mechanical knight by Leonardo da Vinci[16]

In the middle of 1700, the watchmakers Pierre-Jaquet Droz and his son Henri-Louis Jaquet-Droz developed automatic systems. One of such inventions was, for instance, “The writer”, an automaton - a programmable android in the image of a boy writer (see figure 4), capable of displaying words and sentences with up to 40 characters with a goose pen. Apart from their inventions these watchmakers left us some other heritage as well: the wide-spread and well-known today word "android" occurred from the merged initials of the second inventor.

16 https://www.researchgate.net/figure/Mechanical-Knight-A-humanoid-designed-by-Leonardo-da-Vinci-the-robot-can-move-through_fig1_304346489, last accesses 15.04.2020

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Figure 4: Automaton the writer[17]

After the emergence of electricity in the 20th century, production of the electric robots began. 1920 - 1930 could have been a success for robotics, but then the First World War and soon after the Second World War came. Robots were needed as a weapon, and all forces were thrown to come up with and produce weapons and protection. After the war, there was no time or resources to engage with robotics since all countries went into a long period of economic recovery. Therefore, the main task was to build up networks of industrial machines and automate them to achieve higher production rates at a short time. This time could be seen as the hour of birth of industrial robots, which were the main focus of robotics until 1980s.

17 https://www.qiio.de/anfaenge-der-automatisierung, last accessed 17.04.2020

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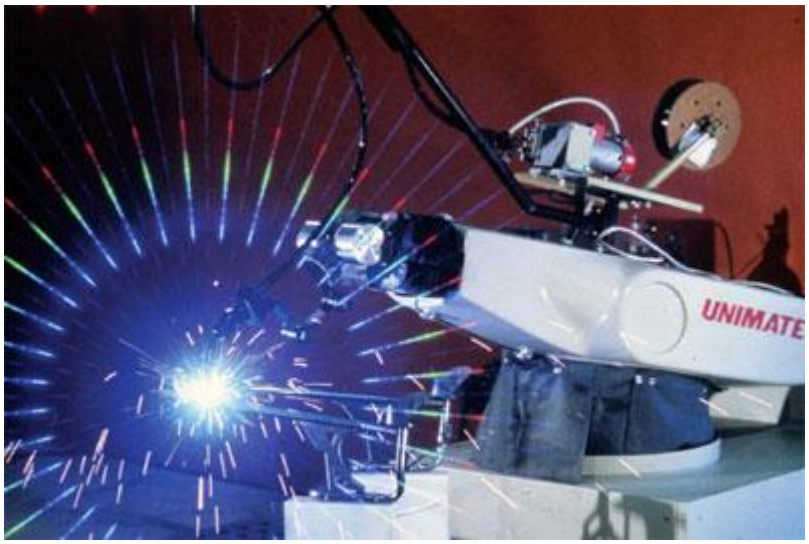

Figure 5: Unimate - the first industrial robot[18]

1956 at a cocktail party Joseph Engelberger, the Director of consolidated Controls Corporation, located in Connecticut, came into talking with inventor George Devol about Devol's latest device also known as Programme Article Transfer device. Being a great fan of Isaac Asimov Engelberger pointed on some similarities between this device and a robot. He got so interested and excited about this invention, that he offered Devol a financial support to develop the device and after nearly two years of intensive work, they produced a prototype - the Unimate #001 (see figure 5). For an extensive implementation of these prototype Engelberger focused on hazardous industry and already by 1961 the Unimate 1900 series became the first mass produced robotic arm, widely employed in diecasting processes[19].

It was the moment when the dream of human race, translated through the Greek myths, started slowly to become true. After 1980s robots entered different spheres of human life, getting closer and closer. At this point of time scientists applied new way thinking about the robotics. Why not to create something that will cook, clean, be the dog, wife, husband, friend all in all? Why not to create something with what people can communicate in familiar way – verbally? Therefore, at the beginning of 1990s robots were divided into two types: robots which were made to replace a person in some activity (cleaning, washing, repairing) and robots which were made to "replace" beloved ones – for example robot who looked like human or robot who looked like a dog. The conception of the last-mentioned robot was different, it was hard to call them

18 https://www.robotics.org/joseph-engelberger/unimate.cfm, last accessed 17.04.2020

19 https://www.robotics.org/joseph-engelberger/unimate.cfm, last accessed 17.04.2020

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“robots”, so it was decided to divide them in non-social robots (or robots) and social robots.

What is the difference between robots and social robots?

On the figures 6, 8, 10 are presented so called “non-social robots””: industrial robots and robot vacuum cleaner. On the figure 7 it is shown how the elderly person interacts with home automation robot Emox, the researchers are in the control room and direct the robot’s behavior. Female robot Sophia and robot dog-toy are presented on the figures 9 and 11 accordingly.

Figure 6: One of examples of an industrial robot[20]

Figure 7: The elderly person interacts with Emox[21]

Figure 8: Another example of industrial robot[22]

Figure 9: Female robot Sophia[23]

Figure 10: Robot vacuum[24]

Figure 11: Robot dog-toy[25]

20 https://www.automation.com/en-us/articles/2003-1/industrial-robots-with-image-processing-in-the-pho, last accessed 17.04.2020

21 https://news.cnrs.fr/articles/the-challenges-of-social-robotics, last accessed 17.04.2020

22 https://www.therobotreport.com/industrial-robots-sales-72-first-half-2019/, last accessed 17.04.2020

23 https://hothardware.com/news/saudi-arabia-sophia-robot-citizenship, last accessed 17.04.2020

24 https://www.amazon.de/Bissell-Staubsauger-Roboter-automatischer-Ladestation-Fernbedienung/dp/B07NZ7KMF5, last accessed 17.04.2020

25 https://www.electronicshub.org/best-robot-dog-toys/, last accessed 17.04.2020

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2.5. Social robotics

The category of social robots includes those robots that can understand a person and themselves in a social context. Scheutz (2012) writes, that in order to understand what social robots actually are, it is important to distinguish between social robots and related technologies. In order to do so, he concentrates on characteristics of industrial robots, computers and social robots. The great similarity of industrial robots and social robots are, according to Scheutz (2012), that they both are capable of initiating motion and thus exhibiting behavior, though the first ones are typically confined to the factories/ hospitals. Computers and social robots on the other hand enter people's homes and become part of daily routine, but "[social] robots can interact with their owners at various levels of sophistication, and they can even initiate and terminate those interactions on their own" (Scheutz 2012: 206). They are communicative, easily trained, and their behavior is as similar to human as possible. In social robotics the emphasis lies on integrating machines into social interactions and many developments have already been included in various areas of our lives, so every day there are more and more of them.

The role of the robots in the interactions with human according to the pioneer of the social robotics field Cynthia Breazeal (2002: 19) can be described either as "[…] embodied (the human interacts with a robot or an animated avatar) or disembodied (the human interacts through speech or text entered at a keyboard)". Scheutz (2012) distinguishes between industrial robots, computers and social robots.

Basically, we can define two bright categories of social robots, according to their functions and appearance:

A robot as an avatar: when, for example, for different reasons children cannot attend school, so they can send there their robot (avatar) which child completely controls from his/her home or for the meeting that has to be hold immediately – the manager also can appear in the room using his robot and control him from the different side of the earth.

A robot as a social partner is intended to be independent – makes decision, reacts on person, has own character, communicate with person as other person.

If one thinks properly about it, people are always trying to communicate with the electronic systems socially. After all, everyone can share an experience of arguing with the computer, persuading the car to move faster, ask different types of the equipment to work.

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Types of the interactions between person and robot: not social – physical interaction, waiting for performance of the functions; social – using semiotics systems (speech, gestures, facial expressions, emotions), status role structure, socio-cultural interface, autonomy. For example: social type of interaction: person comes to robot and say “Hi”. Robot replies “Hi”. Person says, “clean here”, robot replies “I do not want to”. Non-social type of interaction: Person comes to robot and hits or presses the button or makes a voice command – and robot starts to run the command (see figure 13 example of the robot that cleans after pets).

It is in human nature to strive to revitalize technology and to try to communicate in a social way. Thus, engineers began to wonder, if people already bring robots to their house, then which interface will be the most natural, the one that people are mostly used to? And the answer to it was the social interaction.[26][27][28].

To the main characteristics of “human social” robots belongs the ability to express and perceive emotions; communicate verbally; use natural communicative signals such as gestures and facial expressions; demonstrate personality and character; establish and/or maintain social relations; recognize and/or develop social competencies[29].

Breazeal and Scassellati (2002) see the imitation technique as a key concept for teaching robot social and human-like behavior. They argue, that it can be a power communication mechanism between humans and robots or between two robots and also imitation can be easily programmed. Social robotics are a rapidly developing field of the interdisciplinary studies with different researchers and scientists working on it. Engineers are investigating how robot should move in space, from which materials they should be made, which parameters to contain in order not to damage either themselves or people around. Programmers should develop a code and work on machine learning processes. Social scientists have to figure out how robots should look like, what they have to say or not, how they have to behave. Social robotics is facing three main fundamental questions (connected to the main point of the Social robotic project described in the Chapter 1 Introduction): how social robot should look like; how to enable interaction between robot and person the most comfortable and last but not least, legal and ethical sides of the social robotics.

26 https://robo-hunter.com/news/socialnie-roboti-i-prepyatstviya-na-puti-k-potrebitelskoi-realizacii, last accessed 17.04.2020

27 https://books.google.at/books?id=402dquhxSTQC&printsec=frontcover&redir_esc=y#v=onepage&q&f=false, last accessed 17.04.2020

28 https://www.coursera.org/learn/moy-drug-robot, last accessed 17.04.2020

29 https://www.youtube.com/watch?v=NzMrWiCHbPQ, last accessed 17.04.2020

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How social robots should look like

Appearance is very important for all humans. Depending on how one looks, it can make the other person to hug him/her or to run away. As robots are created mainly to be sold, producers of course consider the role of appearance as well. Should the robot look precisely like the human or still a little bit different?

Doctor Hiroshi Ishiguro, who has been selected as one of the top 100 geniuses alive in the world today by Synectics Survey of Contemporary Genius in 2007, holds on the opinion that robots have to be indistinguishable copy of the human[30]. In 2005, the scientist created an android girl, who replaced him a secretary[31]. Prof. Ishiguro has also developed many humanoids and androids, called Robovie, Repliee, Geminoid, Telenoid, and Elfoid. These robots have been reported many times by major media, such as Discovery channel, NHK, and BBC. He has also received the best humanoid award four times in RoboCup. Sometimes during the conference call his robot was talking in front of the web camera and participants on other side could not realize, that lecture they are listening to was conducting by twin copy of Prof. Ishiguro. Ishiguro's followers support him and say, that a robot should be an exact human copy and that it is an exciting experience to interact with this human copy in life. Although some of them admit, that it can look quite terrifying. So maybe to build an exact copy is not enough? Or maybe robot has to look like something fluffy, defenseless and cute as a toy, like one of the first social robots called Leonardo? These questions researchers and scientists raise in their studies on social robotics, on how a person reacts to a robot in the human, gigantic plastic thing or cute pet avatar.

Other important issue in this regard is the already shortly discussed above effect of uncanny valley – “the tendency for a robot to elicit negative emotional reactions when it closely resembles a human” (Waytz et al. 2010: 385). The routes of these phenomenon lie in our mind perception. As Waytz et al. (2012) discusses, all people in way their way to think about others stick to two basic dimensions: to the experience as the capacity to sense and feel and to the agency – the capacity to do and plan. Gray and Werner (2012) explore this idea even further and, after setting up few experiments, come to the conclusion, that the effect of uncanny valley, and more specifically the elicited feeling of unease, is more related to our experience dimension. As the authors ironically notice, “we are happy to have robots that do things, but not feel things” (Gray

30 http://www.speakersconnect.com/hiroshi-ishiguro-interactive-robots-future-life/, last accessed 17.04.2020

31 http://www.speakersconnect.com/hiroshi-ishiguro-interactive-robots-future-life/, last accessed 17.04.2020

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and Werner 2012: 129). These results open a new field for studies and discussions about how to enable interaction between robot and person the most comfortable. The questions that are raising in this area are also connected to whether robot should obey and follow everything person says or have a character with being able to disagree or argue; should it have some personality and many other communicational and ethical issues as well.

Law and ethic sides of the social robots

In March 1942 edition of Astounding Science Fiction Isaac Asimov introduced The Three Laws of Robotics in his short story “Runaround” (Robot series). The Three Laws are: 1. A robot may not injure a human being or, through inaction, allow a human being to come to harm. 2. A robot must obey the orders given to it by human beings, except where such orders would conflict with the First Law. 3. A robot must protect its own existence as long as such protection does not conflict with the First or Second Law.

Asimov also added a fourth, or zeroth law, preceding the others: 0. A robot may not harm humanity, or, by inaction, allow humanity to come to harm"[32].

How do deal with robots’ policeman, or military robots according to these Asimov’s laws? Are these three laws enough, or more needed? What if the robot hugs person but inactively break his/her bones? Or person beats up a robot? Is it a property of a person or something more? These questions, what rights robot will receive and what responsibility producer and robot has, raise many ethical and pragmatic issues and are now being investigated by lawyers.

1.6. Social robots today

There are four main groups of social robots today:

Service robots: today there are existed hotels where all stuff is represented by Androids. Almost in all spheres of life one can meet robot representatives, for example, in food industry, hotels, medicine, robot-firefighters, astronauts, surgeons etc.

Therapeutic robots – a special direction in the social robotics. These robots are used for therapy of mentally sick old people, children with autism etc. The old people with dementia, for example, are usually suffering from the loneliness, depressions, that in several cases can lead to suicides and to negative mental background. Robot Paro cannot move and talk, it is helpless, but it makes the heart-rending sounds of the baby

32 http://www.historyofinformation.com/detail.php?entryid=4108, last accessed 17.04.2020

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harp seal, which act directly on the nervous system, forced to hug the robot. The results are amazing, emotional health and mood are increasing drastically.

Therapeutic social robots can also help children with autism. Typically developed people are usually studying by repeating things after someone. Autistic mirror neurons are poorly developed; therefore, it is difficult for them to repeat after someone, and as a result - it is difficult for these children to learn and socialize. They do not really respond to people, however are good at communicating with animals. They are happy and open if they are surrounded by dolphins and horses (that is usual practice for autistic children as a therapy to relax), but the problem is, that these animals are not controllable. Consequently, children with Autism Spectrum Disorder (ASD) are seeking for other sources that can teach them in their manner. The therapeutic robots can be set up in the way for educating such children. Nowadays such studies and experiments are taking place in the UK and in Europe.

Robot-helpers and robot-companions – they are very emotional robots, who can recognize, distinguish and develop emotions. Usually robot-helpers are used in the shops for advertising or as friends at home, nannies, teachers.

Military technology – soldiers, most funded area of social robotics. There are several very careful written records about robot-soldiers, prepared to replace human on especially dangerous sites. They are jumping, moving, running and are able to work in the team.

Entertainment – dancers, actors, musicians, singers, models. These types of robots are highly popular in Japan. Robot-singers have world-tours and sold out for the year in advance, they have their own fan groups, several albums. Robot-musicians can play not only different instruments but also create new melodies as a team with other humans.

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Chapter 3. Materials and methods

In case to be able to make a proper conclusion after analyzing data from the experiment, I went through different research papers that mainly touch Integrative social robotics project and precisely – experiment at Aarhus university. Different topics were revised: the general usage of social robots in daily and business life, communication processes between robot and human, perception of robot's appearance, using robots in conflict management negotiations. Additionally, I investigated various literature sources to show different forms of mediation support, especially researches in e-mediation.

3.1. Quantitative analysis

All data from the negotiation experience was stored in a MySQL database. It consisted of different tables, for example, users, advices, questions, answers, etc. Each table had its unique identifier. Database had a whole number of participants, including some who only were testing the VienNA system. Therefore, the first step was to sort out the participants who were involved only in the conditions with mediator participation (human m/f mediator, Telenoid m/f mediator, screen). After sorting 102 male-female pairs were left. Using the unique ID number and hash key (see appendix 5) and quiring them in SQL master table was created. With the usage of all necessary data for the relevant participants it was possible to calculate all values needed for the analysis, diagnosis and the advice parts.

The analysis part is based on flexibility value. Druckman (2004: 481) stated that "By flexibility, we refer to movement from initial positions or the discovery of new solutions to the issues that divide disputants. This is a central concept in the literature on negotiation. Using mathematical calculations and box plots, flexibility of each group of the participants in the different conditions were displayed. To determine the difference of the flexibility in the different conditions T-test was used. The T-test is any statistical hypothesis test in which the test statistic follows a Student's t-distribution under the null hypothesis (Rasch et al. 2020).

The diagnosis part was showing negotiation result's grid, reflecting the phase that the participants have after first negotiation session (e.g., compromise, impasse, capitulation Sarah, capitulation Peter, asymmetric agreement Sarah, asymmetric agreement Peter, integrative agreement, no agreement Sarah, no agreement Peter). The instruments for this part were bar charts and pivot tables in Excel.

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The advice part was analyzed via Chi-square test. The term "chi-squared test," refers to certain types of statistical hypothesis tests that are valid to perform when the test statistic is chi-squared distributed under the null hypothesis[33]. This method helped to determine the difference in the results, that participants received under the different conditions.

3.2. Qualitative analysis

For better understanding of the participants behavior, feelings during the experiment, approach to the Telenoid I applied quantitative analysis to pre- and post- negotiation questionnaires. This analysis helped to reveal more information how participants perceived this experiment, whether they had previous experience with robots and how they think a social robot should look and perform. Pre- and post-questionnaires were done by using SPSS (Statistical Package for the Social Sciences)[34].

3.3. Experimental procedure

3.3.1. Negotiation case

The experiment was conducted mainly among the students at Aarhus University. 204 participants excluding the control group were divided– based on gender – into male-female pairs. Female participants received case A – under the name Sarah (see appendix 1.1) and male participants received case B – under the name Peter (see appendix 1.2) of the business case based on a de-merger of the company (see appendix 1).

The business case tells the story of the two owners of MED-Tech Inc., a nano-medical company specializing in drug research and development. The company was founded 15 years ago in 2002. Sarah and Peter share a patent for targeted drug delivery, so-called “Nanobots”. This means, that with the help of nano-particles, a drug is delivered exactly where it is needed in the body of a patient. The company has been thriving for the past 10 years and expanded its staff from 50 to 180 employees. MED-Tech Inc. is operating on a global market and the corporate language is English. Five years ago, the company moved into new facilities in a very prestigious research park.

During the past year tensions arose. Sarah and Peter could no longer agree on the focus of the research and development strategy of their company—while Peter wants

33 https://en.wikipedia.org/wiki/Chi-squared_test, last accessed 10.02.2020

34 https://www.ibm.com/products/spss-statistics, last accessed 03.05.2020

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to pursue a research line for a drug against Alzheimer's, Sarah sees much prospect in developing a new form of treatment for advanced diabetes. Both research lines would use the Nanobot technology, but the financial resources of MED-Tech Inc. are not sufficient to realize their projects without external investors. Moreover, the two research lines, and the associated goals for the company, are quite different.

The following issues turned out to be crucial and need to be resolved in a mutual agreement for the dissolution of the company:

1. The patent for the Nanobot technology is currently held by MED-Tech Inc. It has to be decided which of the successors of MED-Tech Inc. will be assigned the intellectual property rights, i.e., the patent for the Nanobot technology and/or licencing options.
2. The currently employed 180 highly skilled researchers and technicians are an extremely valuable resource for MED-Tech Inc. and certainly would be an asset for both, Sarah and Peter.
3. It has to be decided, who, if anyone, is going to stay in the current company facilities in the prestigious research park.
4. Similarly, the highly adaptable research and laboratory equipment is state-of-the-art and unique. It needs to be distributed among the new companies or sold. The equipment can be easily transported and/or used at any other facility.
5. Finally, it has to be clarified, who will be the legal successor of MED-Tech Inc., i.e. who is taking over the legal and financial responsibilities of the old company.

Every participant had 20 minutes to read and prepare the case. Then the participants were asked to fill out the baseline questionnaire (T1 – see appendix 2) on IPADS (approximately 10 minutes in total).

3.3.2. Participants

The main designations of participants are:

Negotiator – the name of every participant that took part in the experiment.

Mediator – person (female/male), that facilitates negotiation process.

Operator – mediator (female/male) represented by Telenoid Android.

The amount of the participants per each condition is shown in Table 1:

Table 1: Amount of the participant per each group

Participants	Female	Male	
Human	42	40	
Screen			42
Telenoid	36	44	

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3.3.3. VienNA system[35]

Solving a problem that has been the root of the dispute was the key goal for many mediators. The right diagnosis and the corresponding results affect the prospects for successful resolution. Diagnostics, analysis and advice determine the behavioral approach to mediation. The function of diagnosis consists of monitoring the course of the negotiations, which considers the stage at which the negotiation process is currently (e.g. progress in achieving a message or deadlock). Based on this information, a future course of retreat is designed. The analysis consists of finding the sources of the deadlock. This function uses information about areas of the negotiations where participants experience difficulties (e.g. high complexity of the problem, distrust). The advice composes from diagnostic and analysis results. They consist of developing advices that are based on the sources of the problem. Bringing negotiations to an agreement is the purpose of the advice. Together, the three functions were incorporated in an electronic negotiation support system (NSS) referred to as Negotiator Assistant (NA) (Druckman et al. 2002).

For electronic decision-making support, this behavioral approach to mediation (which focuses on the negotiation process) is appropriate. The support strengthens the three functions by speeding up online monitoring of the status of negotiations, facilitating source analysis and establishing connections between analysis and advice, as well as providing a tool for delivering advice to negotiators. The basis for the development of NA, a system for the implementation of the three functions of mediation, has been provided by technical developments in the field of persistent conversations, task-oriented collaboration, expert models, rule-based systems, and optimization models that search for integrative solutions. VienNA is the second-generation mediation support system, that is linked to an electronic NSS referred to as Negoisst (Druckman: 2013).

VienNA (Filzmoser, 2019) is an expert mediation system, that assumes tasks usually performed by a human mediator in face-to-face negotiations: analysis of the causes of impasse; diagnosis, by monitoring the progress of the negotiation towards or away from an agreement; advice to overcome impasses based on diagnosis and analysis.

These support functionalities strive to increase negotiators' flexibility, thereby elevating the possibility of reaching an agreement (see appendix 4).

35 with an explanation video http://info.tuwien.ac.at/simulation/style/images/video.mp4

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The system gathers information on the parties' flexibility with regard to the issues of dispute (please see the table 2: List of issue questions) and the negotiation process (please see table 3: List of process questions) by means of an electronic survey.

Table 2: List of issue questions

How large is the difference between Peter and Sarah on issue "Patent for the Nanobot Delivery"?
How complex is the issue "Patent for the Nanobot Delivery"?
Do you think there would be an attractive outcome on issue "Patent for the Nanobot Delivery" if Peter and Sarah are willing to compromise?
What is this fair outcome?
Is there an outcome that, while perhaps favoring one party more than the other, stands out as a plausible agreement?
What is it?
To what extent do you agree with the position taken by your counterpart on the issue "Patent for the Nanobot Delivery"?
To what extent are the values of Peter/Sarah at stake on the issue "Patent for the Nanobot Delivery"?
How attractive are the options for Peter/Sarah if you do not reach an agreement with your counterpart on the issue "Patent for the Nanobot Delivery"?
What will happen when negotiations fail?
How much loss do you risk by agreeing with your counterpart's offer on the issue "Patent for the Nanobot Delivery"?

Table 3: List of process questions

What is your general attitude towards negotiations?
How many concessions have you offered so far to your counterpart?
How often did you refer to rationality to justify your own position?
How often did you use threats or warnings to exert pressure on your counterpart?
How often did you repeat your positions to indicate your unwillingness to give in?
How often did you pretend to be flexible without actually giving in?
How often did you change your attitudes or positions to show flexibility?
Have you been discussing details and trade-offs considering individual priorities and needs?

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How often did you take the relationship between Sarah and Peter into consideration in your negotiation?
How often did you try to discover creative or new solutions to the problem?
How often did you appeal to justice or fairness in the negotiation?
Did you refer to guiding norms in the negotiation?
Have you been able to bring in your experience from previous negotiations?
What were the topics of these negotiations?
Do you perceive that the negotiation is following a logical pattern?
How much do you trust the representative of Peter/Sarah?
How much did world view differences between Peter and Sarah influence the negotiation?
What are these world view differences?

The diagnosis is drawn from a knowledge base generated by a meta-analysis of factors influencing negotiators' flexibility. The expert system calculates weighted flexibility scores for each party (depending on their answers to a standardized questionnaire implemented in VienNA) about the negotiation process, the negotiation issues and the perceived conflict. These flexibility scores are visualized in a "flexibility grid" as shown below (see figure 17). This analysis of the flexibility scores of both parties is the basis for the third function performed by the system – advice (function). Links to advice windows are provided for each source of conflict; the advice is tailored to the type of the problem that is identified. Overall, nine types of advice are available: approach, integrative agreements, options/flexibility, fairness/norms, conceptual framework, information exchange, differences, fractionation of issues, and linking/log-rolling. The mediation results are stored to present a history of past mediations (Filzmoser, 2019).

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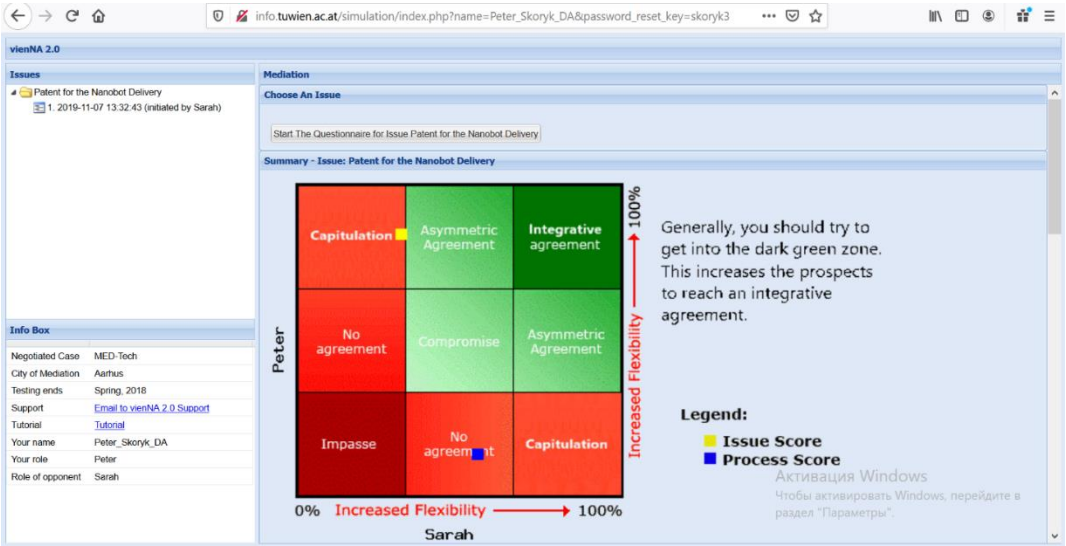

Figure 12: Flexibility grid screenshot from VienNA system[36]

The flexibility grid (see figure 17) is represented by coordinate axis with Sarah as X and Peter as Y axes. The coordinate axis is divided in 9 squares marked with red and green colors, approximately with the values 33%, 66% and 99% of flexibility score (do not mix up with flexibility value, as flexibility score is calculated based on the importance value of each answer and each question in the process and issue surveys). The goal of the negotiation is to reach the dark green zone as often as possible. Red statuses mean – negotiations are not successful:

Impasse – participants under the roles Peter and Sarah have flexibility scores less than 33%.

Capitulation Sarah – participants under the role Sarah have flexibility score between 66% and 99%, but participants under the role Peter have flexibility score between 0 and 33%.

Capitulation Peter – participants under the role Peter have flexibility score between 66% and 99%, but participants under the role Sarah have flexibility score between 0 and 33%.

No agreement Sarah – participants under the role Sarah have flexibility score between 33% and 66%, but participants under the role Peter have flexibility score between 0 and 33%.

No agreement Peter – participants under the role Peter have flexibility score between 33% and 66%, but participants under the role Sarah have flexibility score between 0 and 33%.

[36] Info.tuwien.ac.at/simulation/index.php

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Green statuses – means negotiations are successful:

Integrative agreement – participants under the role Sarah have flexibility score between 66% and 99% and participants under the role Peter have flexibility score between 66% and 99%.

Compromise – participants under the role Sarah have flexibility score between 33% and 66% and participants under the role Peter have flexibility score between 33% and 66%.

Asymmetric agreement Sarah – participants under the role Sarah have flexibility score between 66% and 99%, but participants under the role Peter have flexibility score between 33% and 66%.

Asymmetric agreement Peter – participants under the role Sarah have flexibility score between 33% and 66%, but participants under the role Peter have flexibility score between 66% and 99%.

3.3.4. Experimental design

After reading and preparing the case, the research assistant led the participants to the experimental room where they had negotiation sessions for the next 15 minutes. Afterwards the negotiation comes intervention, based on the three main conditions (plus control group). It means that the mediator is stepping in for the next 15 minutes. The mediator is supported by the e-mediation system VienNA. The participants are fulfilling issue and process questionnaires and receive diagnosis grid and advice after. The conditions differ in the way how participants are receiving information:

Group of negotiators, where the mediator was represented by male/female human (HFM – Human Female Mediator and Human Male Mediator – see the figure 14):

Figure 13: Schematic design of the negotiation with human female and male mediation support

This is a condition based on the VienNA system with human mediator participation. After reading and preparing the case, male-female pairs were led to the same room to negotiate the case. After 15 minutes, the research assistant navigated participants to different rooms where human mediator visited them in turn. The human mediator guided participants through questions of VienNA system, then showed them the

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diagnosis grid and read the advice. After this the participants returned to the previous room and re-negotiated the case.

Group of negotiators, where mediator where was represented by VienNA system (screen – see the figure 15):

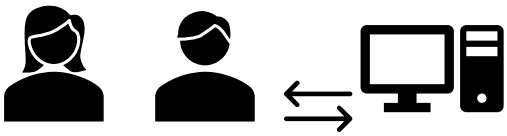

Figure 14: Schematic design of the negotiation with e-mediation support

This is a screen-based condition based on the VienNA system. After reading and preparing the case, male-female pairs were led to the same room to negotiate the case. In 15 minutes after research assistant led the participants to the different rooms where VienNA system was set up on the computer. The participants were instructed how to use it. They were told that the system would provide them advice based on the answers that participants fulfilled in the questionnaires of the system, received diagnosis grid and advice. Afterwards the participants who used the VienNA system were coming back to the previous room and re-negotiated the case based on the received advice from the system.

Group of negotiators, where the mediator was presented by a Telenoid Android with the human female/male operator (TFO – Telenoid Female Operator and TMO – Telenoid Male Operator, see figure 16):

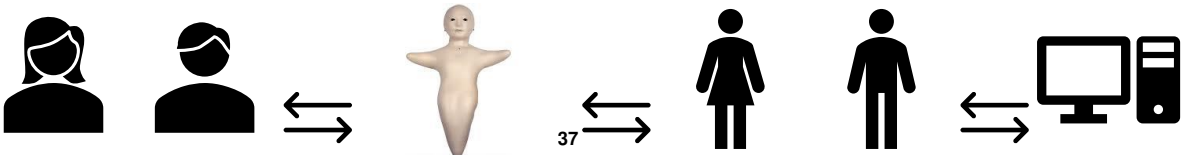

Figure 15: Schematic design of the negotiation with Telenoid male and female mediation support

This is a condition based on the VienNA system with the Telenoid facilitator. After reading and preparing the case, male-female pairs were led to the same room to negotiate the case. After 15 minutes, the research assistant navigated participants to two different rooms. There the participants were guided through the VienNA system via Telenoid operator (content was the same, but the participants only saw the flexibility grid in the end and were given the advice). Issue and process questions were read by the human operator from another room, his/her voice was transmitted via Telenoid (see

37 https://robots.ieee.org/robots/telenoid/ last accessed 04.05.2020

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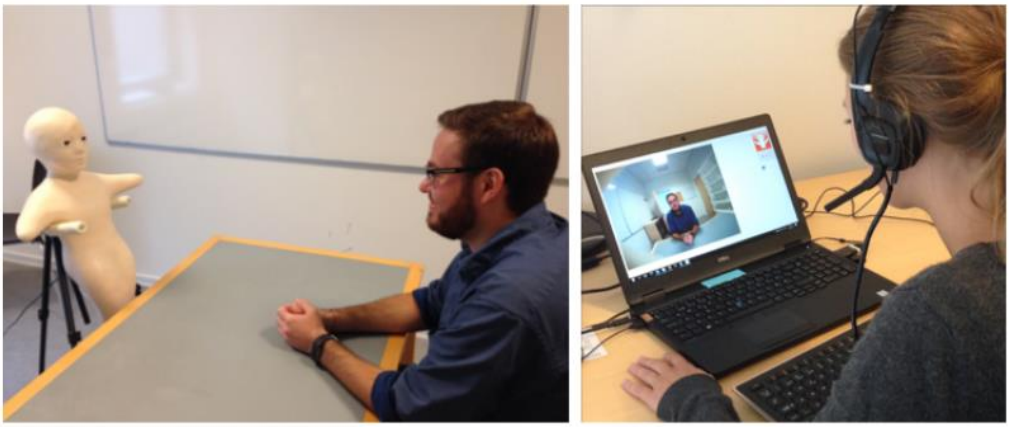
figure 17). After this, the participants returned to the previous room and re-negotiated the case.



Negotiator perspective Operator perspective

Figure 16: Negotiator and operator perspective in Telenoid facilitated negotiation (Seibt & Vestergaard, 2018)

There was also a condition with an unsupervised negotiation – the control group. The data received after this condition was not analysed in this work. After reading and preparing the case, male-female pairs were led to the same room to negotiate the case. Then they had to fulfil the agreement sheet. After 30 minutes, the negotiation phase ended, regardless of whether participants reached an agreement. If the agreement was reached before 30 minutes passed, the participants rang the bell to ask the research assistant to enter.

After re-negotiation of the case, the participant was asked to answer the post-experiment questionnaire (T2 – see appendix 3) described in the subchapter Materials on IPADS in the waiting room (duration approximately 15 minutes). Thereafter participants debriefed their experience. Part of them was invited to take part in the qualitative interview.

3.4. Materials

First received data which was received from the VienNA system were answers for the issue (please see tables 4-6) and process (see tables 7-11) questions.

Table 4: Issue questions with 3 options answers (rating principle)

Issue questions	Answers per participant		
How large is the difference between Peter and Sarah on issue "Patent for the Nanobot Delivery"?	Large **133**	Moderate **37**	Small **34**

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How complex is the issue "Patent for the Nanobot Delivery"?	Highly complex **73**	Moderately complex **84**	Not at all complex **47**
To what extent do you agree with the position taken by your counterpart on the issue "Patent for the Nanobot Delivery"?	Do not agree at all **20**	Fully agree **91**	Partly agree **93**
To what extent are the values of Peter/Sarah at stake on the issue "Patent for the Nanobot Delivery"?	Not appreciably **9**	To a great extent **140**	To some extent **55**
How attractive are the options for Peter/Sarah if you do not reach an agreement with your counterpart on the issue "Patent for the Nanobot Delivery"?	Not attractive **161**	Somewhat attractive **1**	Very attractive **2**
How much loss do you risk by agreeing with your counterpart's offer on the issue "Patent for the Nanobot Delivery"?	High loss **153**	Some loss **44**	Very little loss **7**
What will happen when negotiation fail?	No answer **85**	Deadlock, renegotiation is needed **36**	Another answer **83**

Table 5: Open question regarding attractive outcome on issue Patent for the Nanobot Delivery:

Do you think there would be an attractive outcome on issue "Patent for the Nanobot Delivery" if Peter and Sarah are willing to compromise?							
Yes **141**							No **63**
What is this fair outcome?							
No answer **55**	No specific outcome **9**	Shared patent ownership **4**	Other answer **33**	One gets patent, other one – license **14**	Peter gets the patent, Sarah – the license **12**	Sarah gets the patent, Peter – the license **14**	

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Table 6: Open issue question weather is there an outcome, that stands out as a plausible agreement

Is there an outcome that, while perhaps favoring one party more than the other, stands out as a plausible agreement?						
Yes **164**						No **40**
What is it?						
No answer **65**	Compromise **2**	Another answer **35**	One gets patent, other one – license **37**	Peter gets the patent, Sarah – the license **11**	Sarah gets the patent, Peter – the license **14**	

Table 7: Process questions with three options answers ("Never", "Occasionally", "Often")

Process questions	**Answers**		
	Never	Occasionally	Often
How often did you refer to rationality to justify your own position?	6	22	12
How often did you use threats or warnings to exert pressure on your counterpart?	33	7	0
How often did you repeat your positions to indicate your unwillingness to give in?	3	32	5
How often did you pretend to be flexible without actually giving in?	19	17	4
How often did you change your attitudes or positions to show flexibility?	11	23	6
How often did you take the relationship between Sarah and Peter into consideration in your negotiation?	77	66	21
How often did you try to discover creative or new solutions to the problem?	59	77	28
How often did you appeal to justice or fairness in the negotiation?	25	79	60
Did you refer to guiding norms in the negotiation?	56	86	22

Table 8: Process questions with "Yes" and "No" answers

Process questions	**Answers**	
	Yes	No

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Have you been discussing details and trade-offs considering individual priorities and needs?	130	34
Do you perceive that the negotiation is following a logical pattern?	162	42

Table 9: Other process questions

Questions	**Answers**		
What is your general attitude towards negotiations?	Negotiations are a matter of winning or losing **40**	Negotiations are joint problem solving processes **164**	
How many concessions have you offered so far to your counterpart?	Few concessions **15**	Many concessions **7**	Some concessions **18**
How much do you trust the representative of Peter/Sarah?	Not at all **10**	To some extent **93**	Very much **101**

Table 10: Open process question whether participant have been able to bring experience from their previous negotiations

Have you been able to bring in your experience from previous negotiations?					
Yes **109**					No **95**
What were the topics of these negotiations?					
No answer **46**	Family negotiations **11**	Negotiations during everyday's life **25**	Negotiation at work **9**	Other **18**	

Table 11: Process question regarding difference in the world view that influences Sarah and Peter's negotiations

How much did world view differences between Peter and Sarah influence the negotiation?					
To some extent **86**	Very much **63**				Not at all **55**
What are these world view difference?					
No answer **99**	Differences in research wishes **29**	No differences **5**	Other answer **64**	Personal experience, family background **7**	

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Based on thesde answers, results for the analysis function were made, explained and statistically sustained in the subchapter 4.2 Analysis. Used the flexibility values, that were calculated based on the weight of each answer and question, diagnosis outcomes were prepared in the subchapter 4.3. Moreover, grounded on the advice outcomes, chi-square-test was conducted to explain dependences and made a conclusion.

The pre-questionnaire consists of the questions that: refer to the participant's demographical background and education, etc.; asking, what do participants think about the upcoming negotiation, based on the information they received so far (demerger case), all questions are stored in the App.2. Result of the analysis of the pre-questionnaire in the subchapter 4.1.

Post-questionnaire consists of the questions that are covering the following topics: usefulness, ease of use, attitude towards mediation; satisfaction and attitude towards counterpart; questions about robot technology, ranking questions, general questions (all questions are stored in the App. 3).

The data available from the VienNA system was used to conduct analysis, diagnosis and advice results' part, that are presented in Chapter 4 Results. VienNA data model is presented in the App. 4 VienNA data model. Questions for pre-negotiation and post-negotiation questionnaires are reflected in the App.2 and App. 3 accordingly. Additionally, the outcomes of the re-negotiation were collected and analyzed in the subchapter 4.5. It describes, whether agreements were reached and with connections or links they have to the mediation support, that participants received.

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Chapter 4. Results

4.1. Pre-questionnaire

According to the results of the pre-questionnaire in the figures 18-21 demographical situation among participants is shown. In the figure 18 the amount of female and male participant under the Telenoid operator, screen and human mediator is shown:

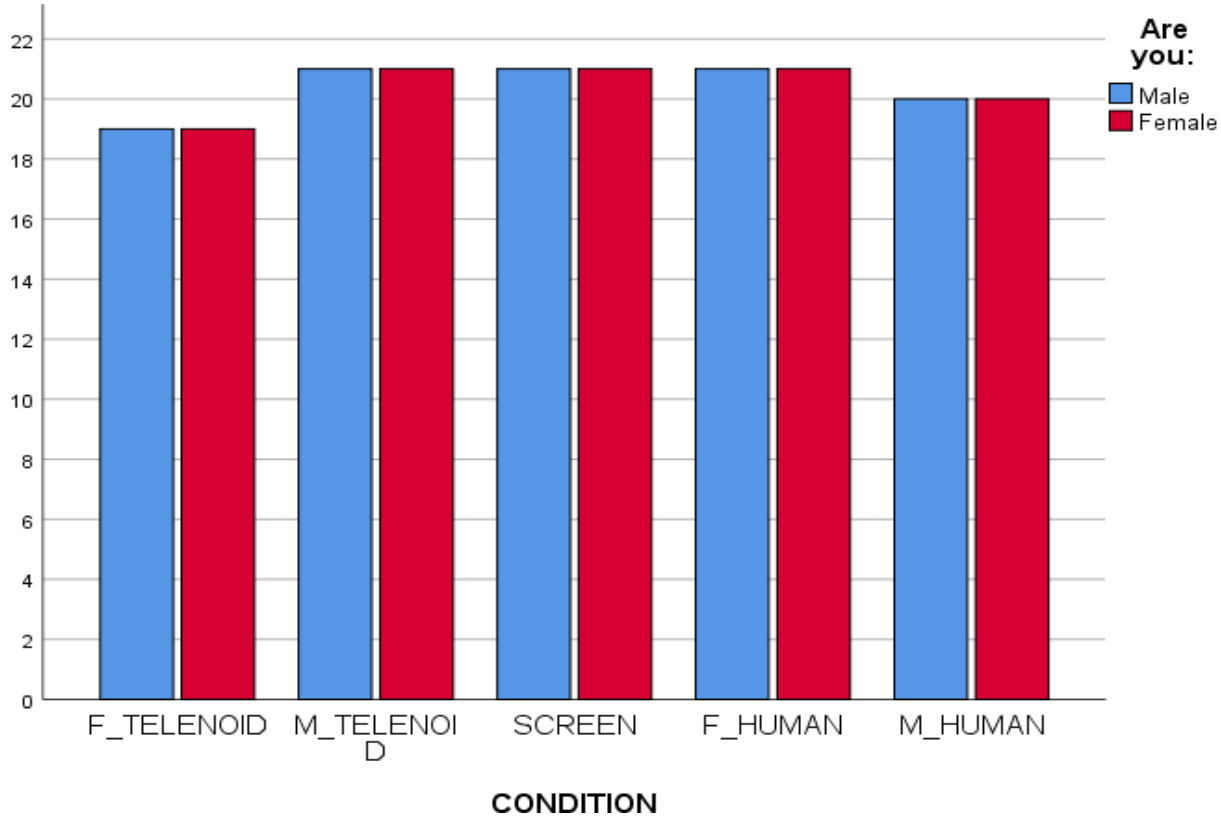

Figure 17: Male and female distribution under each of the conditions

In the figure 19 the year of born among participants can be found:

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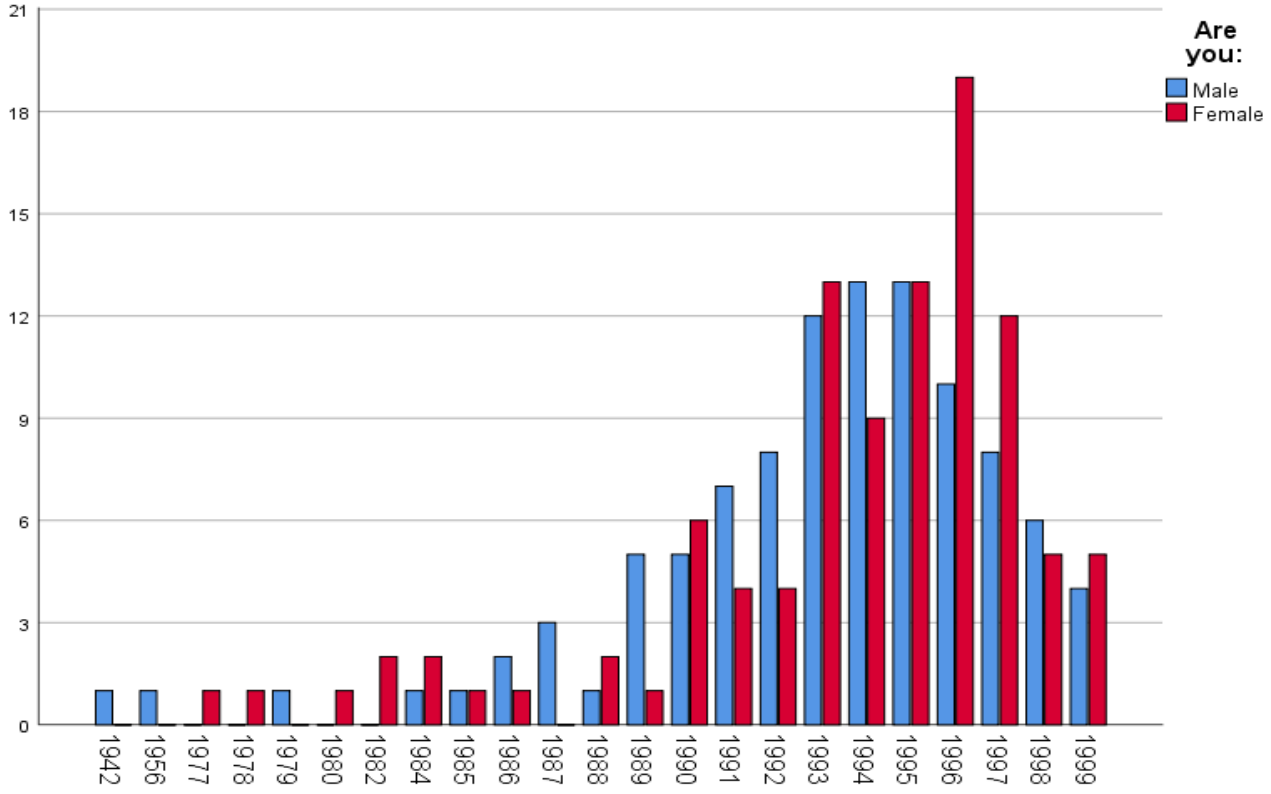

Figure 18: Year of born of male's and female's participants

Country of origin is presented in the figure 20, as it is visible, more than 38% of participants come from Denmark:

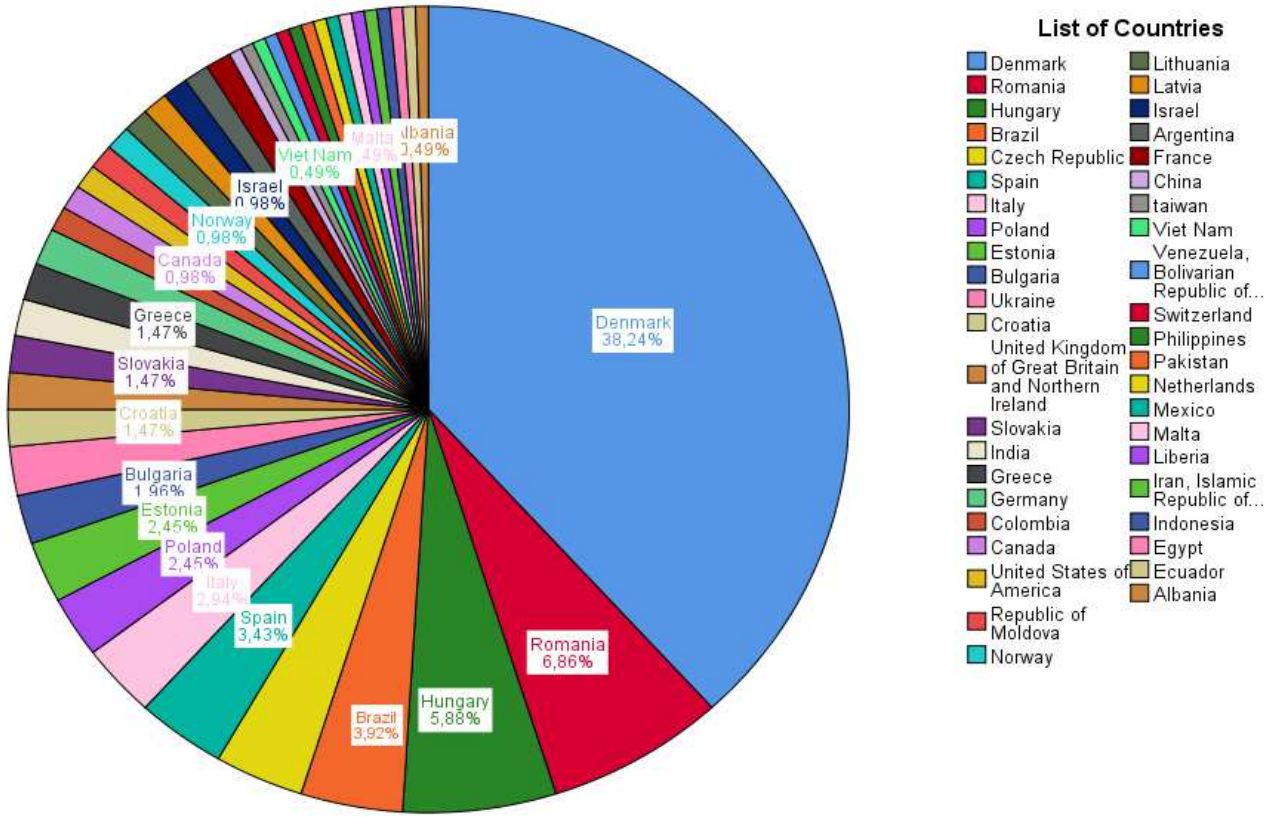

Figure 19: Country of origin among participants

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Overview of the current level of education among the participant is shown in the figure 21:

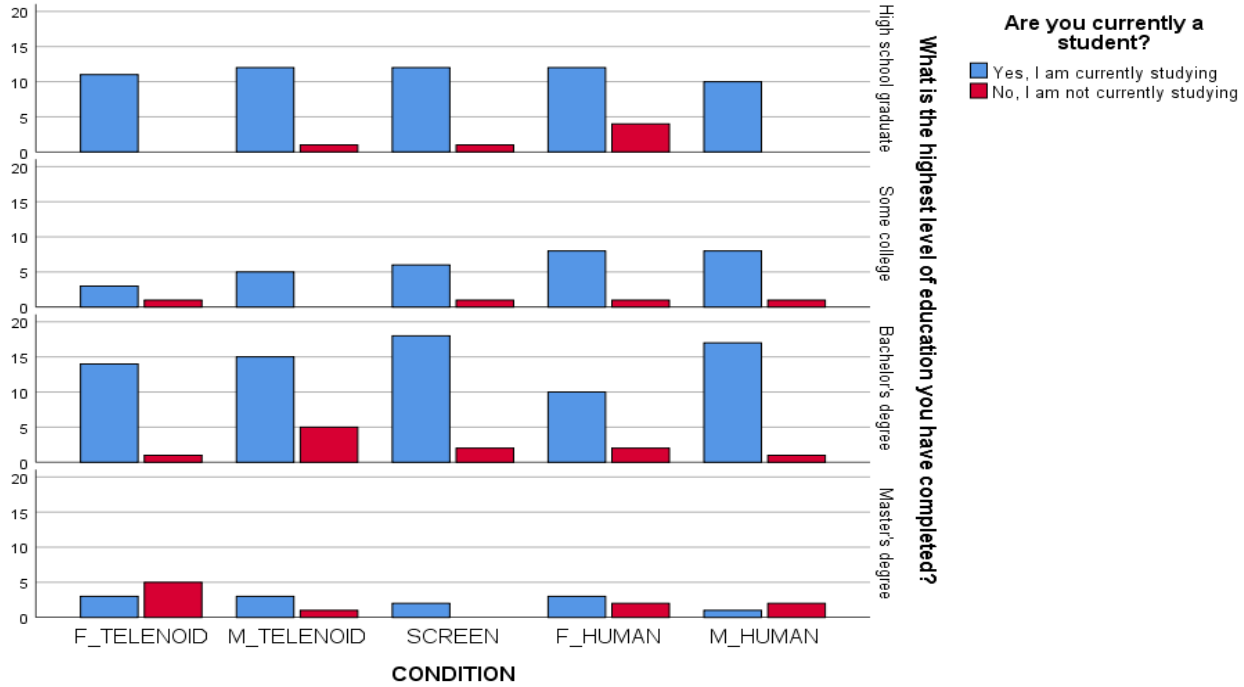

Figure 20: Level of education among participants

In the figure 22 answers regarding experience in the negotiation is shown. However, the level of previous experience in negotiation for participants is middle:

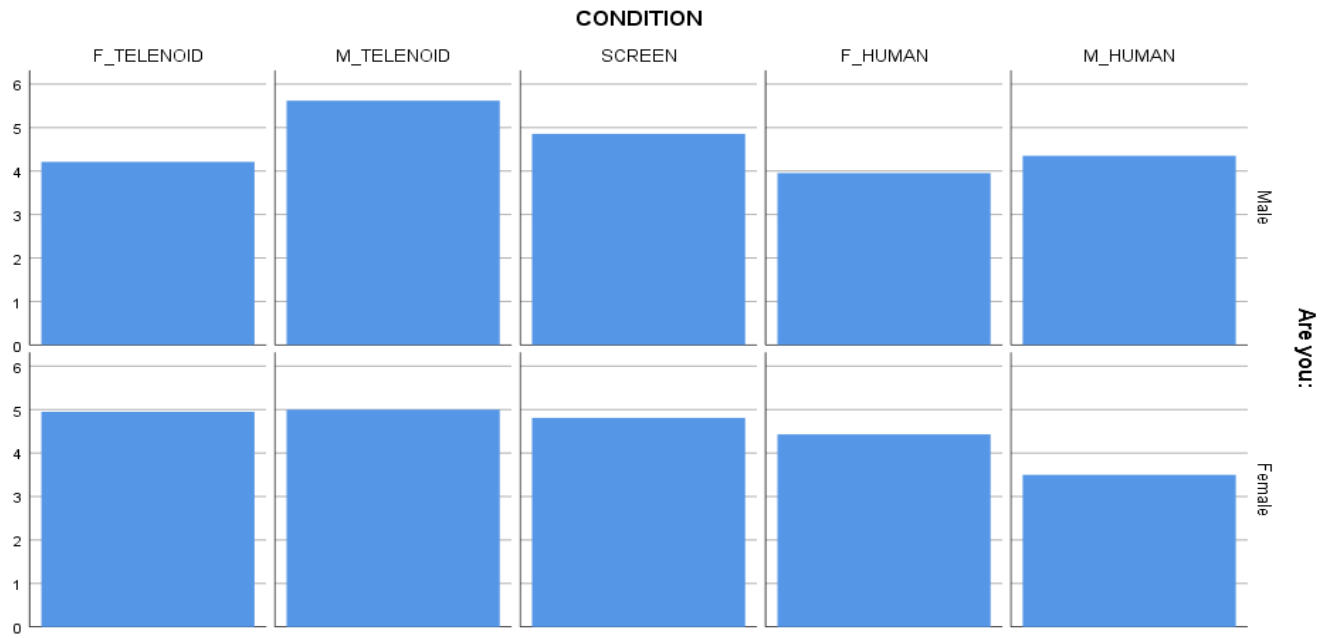

Figure 21: Level of negotiation among participants under different conditions and gender

Participants answered the question regarding their level if English, the results are shown in the figure 23. Male and female participants rated themselves with upper-intermediate level of proficiency in English:

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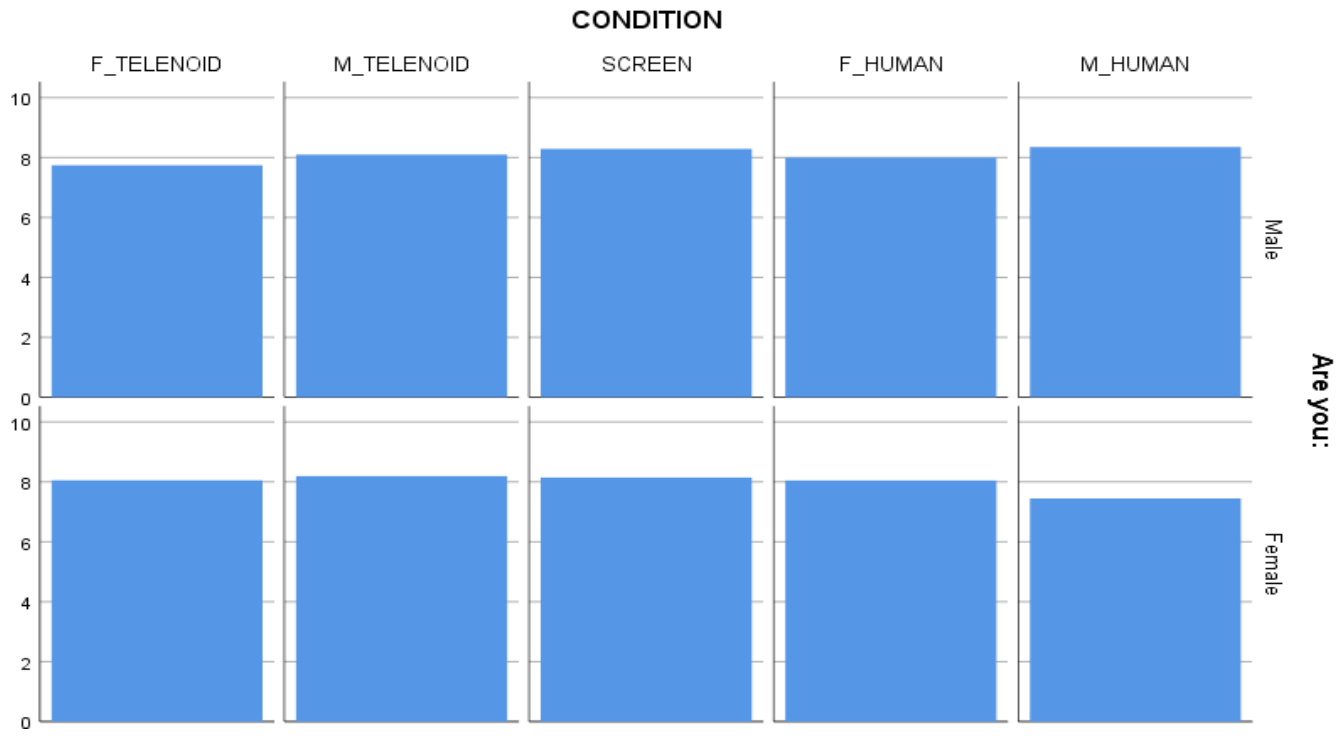

Figure 22: Level of proficiency in English among participants under different conditions and gender

4.2. Analysis

There are two types of questions that are represented in VienNA system:

Issues questions – questions that are connecting to the topics that are raise in the demerger case;

Process questions – questions that are connecting to the level of communication and approach towards negotiations.

Issue questions.

Outcome from the analysis of the issue and process questions is shown using box plots and further – analyzed with the T-test and Chi-quadrat test. As it was described in the chapter 3: materials and methods, analysis part is based on the flexibility value. Box plots were chosen as a best chart to visualize how the flexibility values are distributed.

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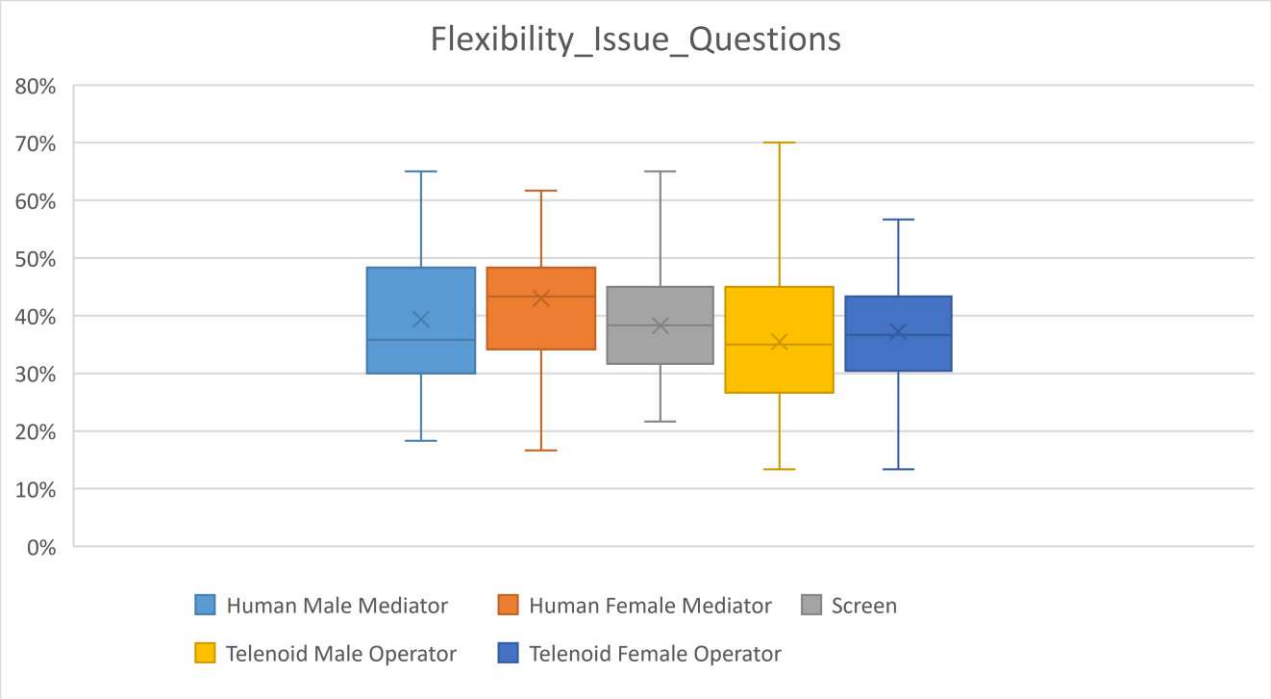

Figure 23: Flexibility value distribution per 5 conditions in issue questions

Figure 24 represents overview of the flexibility value among 5 conditions for issue questions in VienNA system. Even though participants in human male mediator and Telenoid male mediator conditions show high flexibility level (39% and 35%), the distribution of the answers is big (all flexibility values for the issue questions are reflected in the Table 12).

Table 12: Box plot information for issue questions

StatValues	Human Male Mediator	Human Female Mediator	Screen	Telenoid Male Operator	Telenoid Female Operator
Min	18%	17%	10%	13%	13%
Max	65%	95%	65%	70%	73%
Amount	40	42	42	44	36
Average	39%	43%	38%	35%	37%
StDev	0,12	0,14	0,11	0,12	0,12
Median	36%	43%	38%	35%	37%
Quartile 1	0,3	0,35	0,32	0,27	0,31
Quartile 3	0,48	0,48	0,45	0,45	0,43

With the relatively smaller flexibility values 38% for participants in screen condition and 37% for participants in Telenoid female condition, the answers are normally distributed, that means that more participants have the same opinion. Participants in the human female mediator condition have the highest flexibility value (43%) and relatively normal distribution, that means most of participants showed high results in performing steps towards agreement.

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According to the T-test for issue questions per condition (see table 13): participants under human female mediator condition has statistically significant difference in the flexibility value towards participants under Telenoid male mediator condition as p-value = 0.008; participants under human female mediator condition is close to has statistically significant difference in the flexibility value towards participants under Telenoid female operator condition as p-value = 0.052.

Table 13: T-test for issue questions per condition

Conditions	Human Female	Human Male	Screen	Telenoid Male
Human Female				
	-	-	-	-
Human Male	t = 1.2753			
	df = 78.803	-	-	-
	p = 0.2059			
Screen	t = 1.7526	t = 0.45114		
	df = 76.521	df = 78.254	-	-
	p = 0.08367	p = 0.6531		
Telenoid Male	t = 2.695	t = 1.513	t = 1.1449	
	df = 79.965	df = 81.138	df = 83.816	-
	p = 0.008576	p = 0.1342	p = 0.2555	
Telenoid Female	t = 1.9736	t = 0.78112	t = 0.38638	t = 0.67538
	df = 75.954	df = 73.273	df = 71.579	df = 74.913
	p = 0.05206	p = 0.4373	p = 0.7004	p = 0.5015

In the figures 25-29 flexibility value and distribution between answers per gender is shown. Under the screen condition (figure 25) female participants show less flexibility values, than male participant – 37% and 39% accordingly.

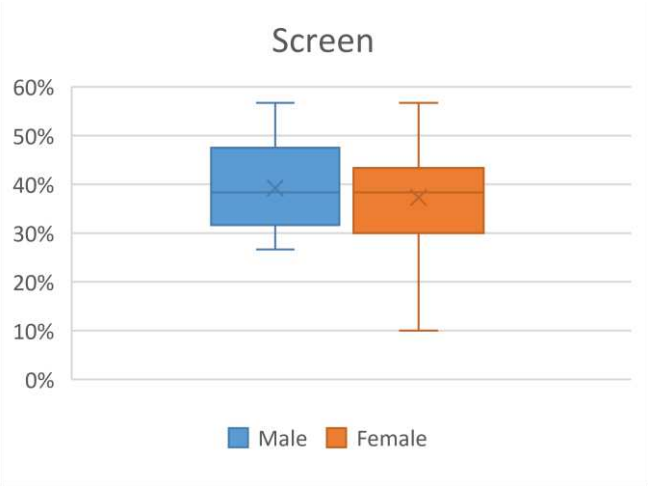

Figure 24: Answers distribution per gender in screen condition

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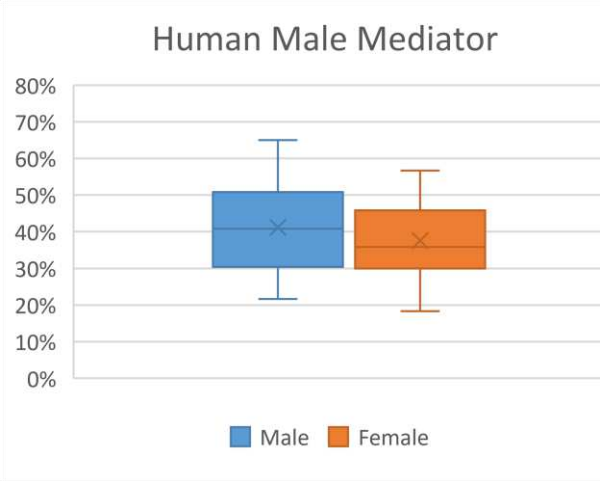

Figure 25: Answers distribution per gender in human male mediator condition

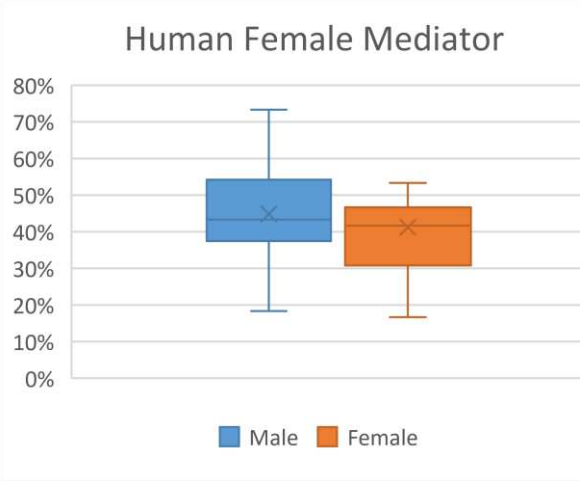

Figure 26: Answers distribution per gender in human female mediator condition

Male participants under human female mediator condition (figure 27) shows higher flexibility value than male participants under human male mediator condition (figure 26) – 45% and 41% accordingly. Moreover, answers distribution shows that in general participants have less variety of answers, so the opinions of male participants under the human female mediator condition have more in common. In general level of flexibility in human female mediator condition is higher for both genders than under the human male mediator condition.

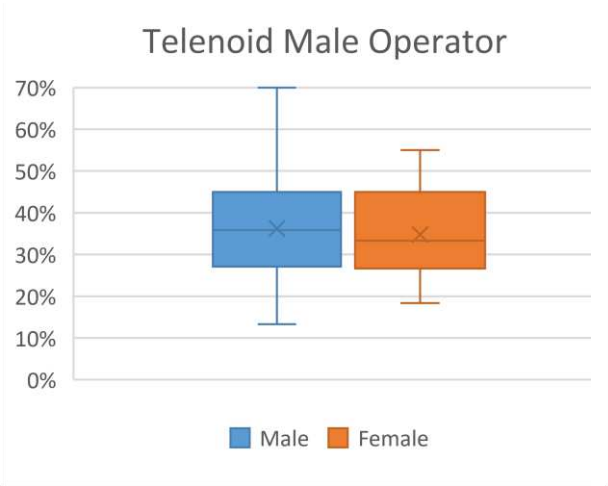

Figure 27: Answers distribution per gender in Telenoid male operator condition

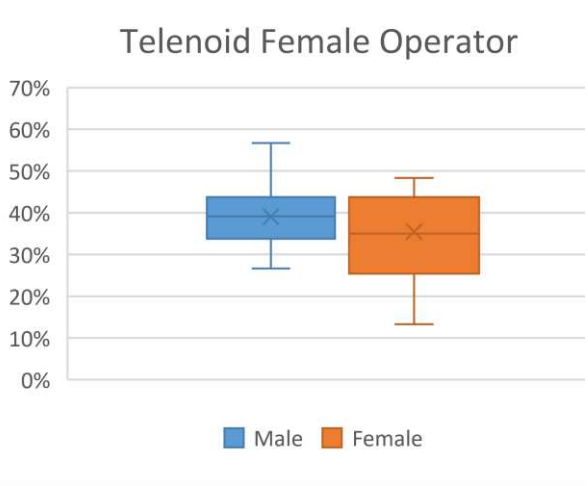

Figure 28: Answers distribution per gender in Telenoid female operator condition

According to the T-test (see table 14) there is no statistically significant difference in the flexibility value between participants under the role Sarah and Peter among all conditions (p-value is higher than 0.05).

Table 14: T-test for Sarah/Peter participants per condition (issue questions)

Conditions/Role	Peter	Sarah	P value
Human Female Mediator	0.4484127	0.4119048	0.4057

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Human Male Mediator	0.4116667	0.3758333	0.3429
Screen	0.3920635	0.3730159	0.5693
Telenoid Male Operator	0.3621212	0.3477273	0.6885
Telenoid Female Operator	0.3907407	0.3546296	0.3631

Participants under the role Sarah do not show any significant statistical difference in the flexibility value according to the T-test (see table 15).

Table 15: Results of the T-test for participants under the role Sarah per condition (issue questions)

Conditions	Human Female	Human Male	Screen	Telenoid Male
Human Female				
	-	-	-	-
Human Male	t = 0.85546			
	df = 35.888	-	-	-
	p = 0.398			
Screen	t = 0.88414	t = 0.076239		
	df = 38.263	df = 38.693	-	-
	p = 0.3821	p = 0.9396		
Telenoid Male	t = 1.5822	t = 0.85674	t = 0.7202	
	df = 34.069	df = 38.83	f = 38.418	-
	p = 0.1228	p = 0.3968	p = 0.4758	
Telenoid Female	t = 1.2046	t = 0.51553	t = 0.42766	t = 0.17482
	df = 36.932	df = 32.242	df = 34.686	df = 30.331
	p = 0.236	p = 0.6097	p = 0.6715	p = 0.8624

However, there is a statistically significant difference between participants under the role Peter in the human female mediator condition and Telenoid male condition (p-value = 0.03) according to the T-test (see table 16).

Table 16: Results of the T-test for participants under the role Peter per condition (issue questions)

Conditions	Human Female	Human Male	Screen	Telenoid Male
Human Female				
	-	-	-	-
Human Male	t = 0.94935			
	df = 38.777	-	-	-
	p = 0.3483			
Screen	t = 1.7393	t = 0.5845		
	df = 35.507	df = 33.043	-	-
	p = 0.09065	p = 0.5629		
Telenoid Male	t = 2.2205	t = 1.2443	t = 0.88806	
	df = 40.954	df = 39.928	df = 35.806	-
	p = 0.03198	p = 0.2206	p = 0.3804	
Telenoid Female	t = 1.6997	t = 0.59753	t = 0.047426	t = 0.81325
	df = 36.127	df = 34.226	df = 35.402	df = 36.735

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	p = 0.09778	p = 0.5541	p = 0.9624	p = 0.4213

Process questions.

Figure 30 represents overview of the flexibility value among 5 conditions for process questions in VienNA system.

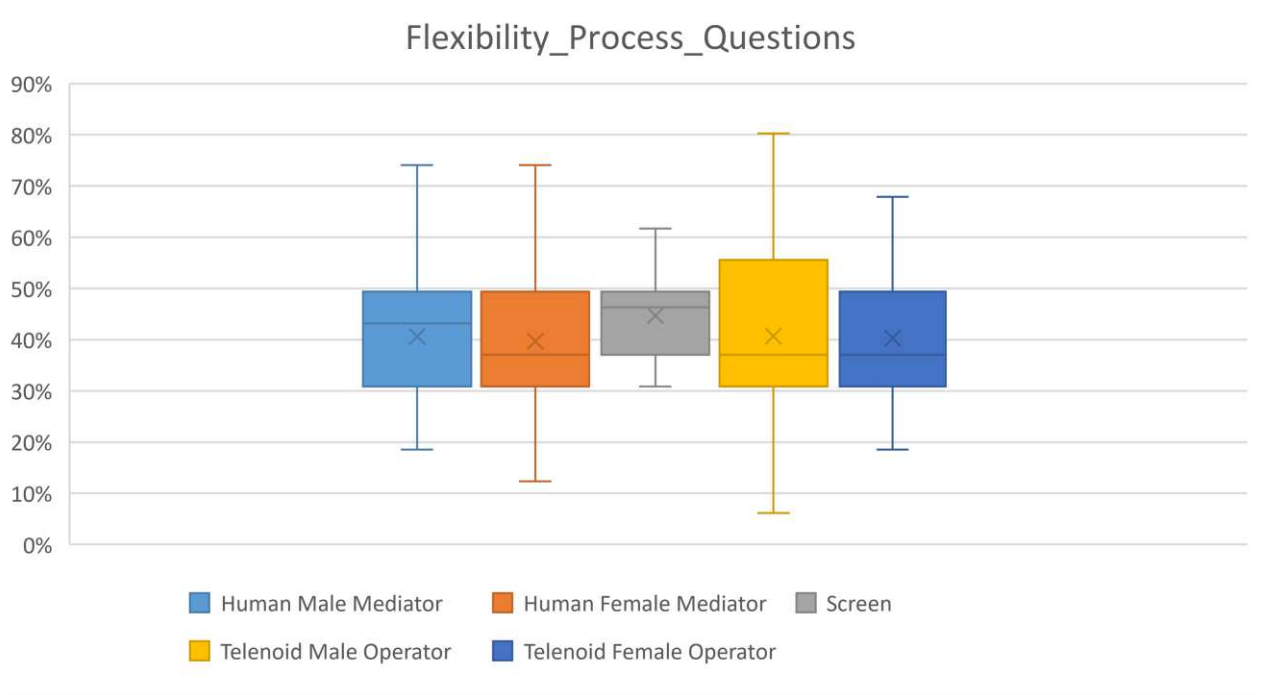

Figure 29: Flexibility value distribution per 5 conditions in process questions

The average flexibility value (Table 17) in the process questions are higher in comparison to issue questions with the minimum 40% and maximum 45% in the human female mediator and screen condition accordingly. According to the median value (Table 17) distribution of the answers in the screen condition and Telenoid male operator condition is relatively high (46% and 37% accordingly).

Table 17: Box plots information for process questions

StatValues	Human Male Mediator	Human Female Mediator	Screen	Telenoid Male Operator	Telenoid Female Operator
Min	19%	12%	31%	6%	19%
Max	74%	74%	68%	80%	68%
Amount	40	42	42	44	36
Average	41%	40%	45%	41%	40%
StDev	0,12	0,15	0,10	0,16	0,13
Median	43%	37%	46%	37%	37%
Quartile 1	0,31	0,31	0,37	0,31	0,31
Quartile 3	0,49	0,49	0,49	0,56	0,49

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According to the T-test for process questions per condition (see table 18) there is no statistically significant difference in the flexibility value among 5 mediation conditions.

Table 18: T-test for process questions per condition

Conditions	Human Female	Human Male	Screen	Telenoid Male
Human Female				
	-	-	-	-
Human Male	t = -0.30269			
	df = 77.285	-	-	-
	p = 0.7629			
Screen	t = -1.7757	t = -1.6674		
	df = 72.356	df = 77.195	-	-
	p=0.07999	p = 0.09948		
Telenoid Male	t = -0.29811	t = -0.032022	t = 1.3778	
	df = 83.968	df = 78.702	df = 73.487	-
	p = 0.7664	p = 0.9745	p = 0.1725	
Telenoid Female	t = -0.1905	t = 0.10034	t = 1.6072	t = -0.11846
	df = 75.918	df = 70.517	df = 65.309	df = 77.986
	p = 0.8494	p = 0.9204	p = 0.1128	p = 0.906

In the figures 31-35 flexibility value and distribution between answers per gender is shown.

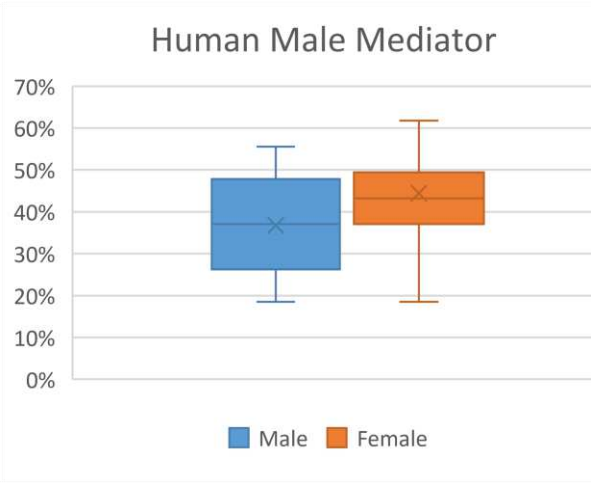

Figure 30: Answers distribution per gender in human male mediator condition

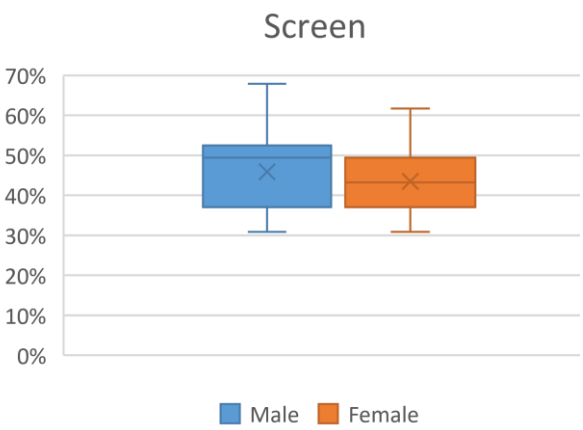

Figure 31: Answers distribution per gender in screen condition

According to the T-Test results (see table 19) participants under role Sarah and Peter have statistically significant difference in the flexibility value in the human male condition (p-value = 0.037).

Table 19: T-test for Sarah/Peter participants per condition (process questions)

Conditions/Role	Peter	Sarah	P value
Human Female	0.4174015	0.3762493	0.383

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Human Male	0.3672840	0.4444444	0.03779
Screen	0.4585538	0.4350382	0.4653
Telenoid Male	0.4124579	0.4012346	0.8203
Telenoid Female	0.4046639	0.4012346	0.9398

Furthermore, there is a statistically difference in the flexibility value (see table 20) for the participants under the role Peter between human male mediator and screen condition (p-value = 0.011).

Table 20: Results of the T-test for participants under the role Peter per condition (process questions)

Conditions	Human Female	Human Male	Screen	Telenoid Male
Human Female				
	-	-	-	-
Human Male	t = 1.1291			
	df = 34.655	-	-	-
	p = 0.2666			
Screen	t = -0.93625	t = -2.6525		
	df = 34.316	df = 38.869	-	-
	p = 0.3557	p = 0.01151		
Telenoid Male	t = 0.094822	t = -1.0177	t = 1.0488	
	df = 40.976	df = 36.072	df = 35.763	-
	p = 0.9249	p = 0.3156	p = 0.3013	
Telenoid Female	t = 0.25175	t = -0.8781	t = 1.2795	t = -0.15404
	df = 36.986	df = 31.424	df = 31.076	df = 37.927
	p = 0.8026	p = 0.3866	p = 0.2102	p = 0.8784

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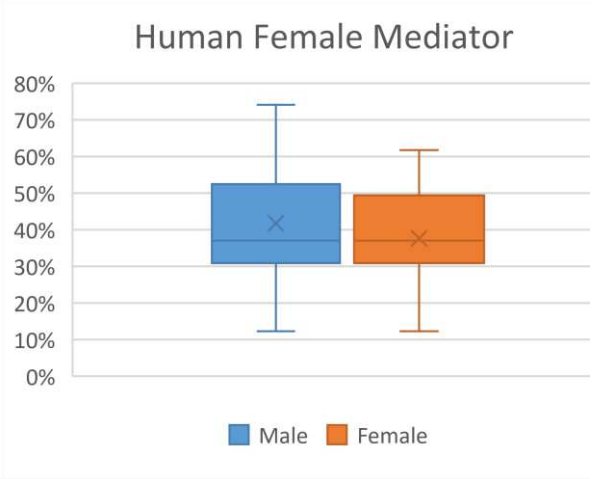

Figure 32: Answers distribution per gender in Human female mediator condition

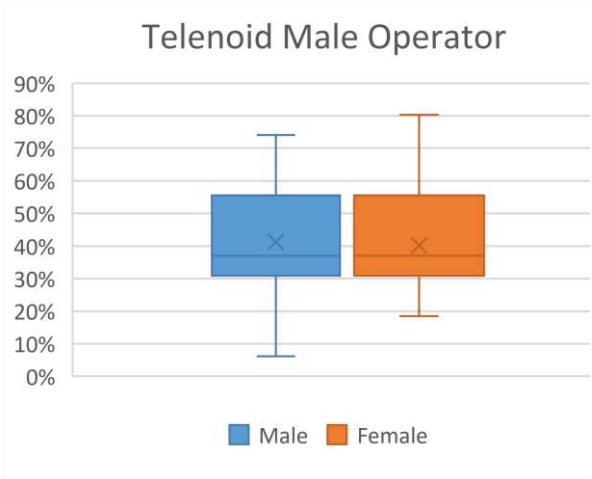

Figure 33: Answers distribution per gender in Telenoid male operator condition

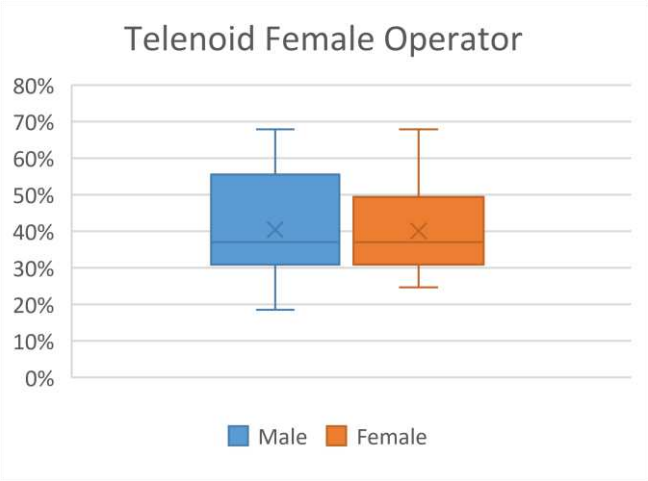

Figure 34: Answers distribution per gender in Telenoid female operator condition

Participants under the role Sarah show the same outcome in the process questions as in the issue questions – there is no significant statistical difference in the flexibility value according to the T-test (see table 21). For all conditions distribution between answers is relatively smaller for participants under role Sarah which means, that these participants are more consistent in their answers.

Table 21: Results of the T-test for participants under the role Sarah per condition (process questions)

Conditions	Human Female	Human Male	Screen	Telenoid Male
Human Female				
	-	-	-	-
Human Male	t = -1.7675			
	df = 38.815	-	-	-
	p = 0.085			
Screen	t = -1.6569	t = 0.28132		

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	df = 36.809	df = 37.021	-	-
	p = 0.106	p = 0.78		
Telenoid Male	t = -0.57835	t = 1.0402	t = 0.87406	
	df = 40.574	df = 38.888	df = 35.782	-
	p = 0.5662	p = 0.3046	p = 0.3879	
Telenoid Female	t = -0.61643	t = 1.115	t = 0.94774	t = -2.4463e-09
	df = 36.706	df = 35.118	df = 32.242	df = 37.993
	p = 0.5414	p = 0.2724	p = 0.3503	p = 1

4.3. Diagnosis

As was described above, the second task in VienNA system, that usually performed by a human mediator in face-to face negotiations, is diagnosis – monitor of the progress of the negotiation towards or away from an agreement.

Diagnosis: issue questions.

In the figure 36 diagnosis for negotiation status per condition (issue questions) is shown. On the right-side of the table possible statuses are presented. The most common status for all conditions is compromise. In the condition human female mediator and Telenoid Female Operator the status of impasse is reached less times than in the condition human male mediator and Telenoid male operator. As a hypothesis it can be assumed that female mediators receive more trust from the participants. In 4 out 5 conditions status of no agreement for Peter is reached more often that status of no agreement for Sarah.

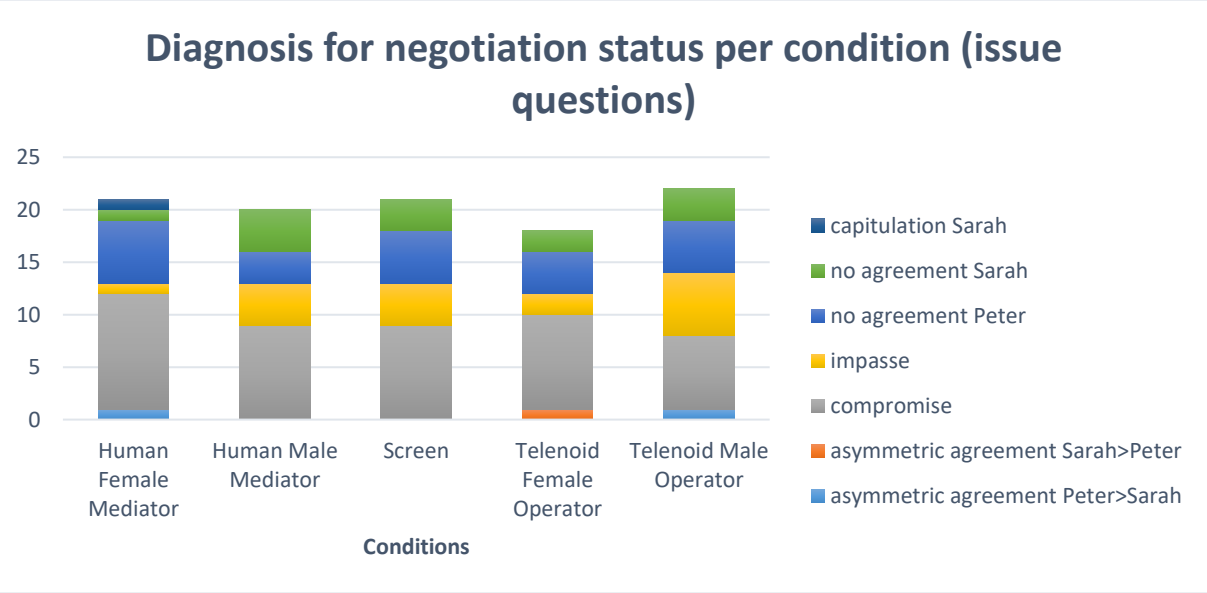

Figure 35: Diagnosis for negotiation status per condition (overview – issue questions)

More granular data is represented in the table 22, where each case per condition, is shown.

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Table 22: Negotiation statuses for issue questions per condition (number of cases)

Negotiation Status	Conditions				
(issue questions)	Human male mediator	Human female mediator	Screen	Telenoid male operator	Telenoid female operator
Impasse	4	1	4	6	2
No agreement Peter	3	6	5	5	4
No agreement Sarah	4	1	3	3	2
Capitulation Sarah		1			
Asymmetric agreement Peter>Sarah		1		1	
Asymmetric agreement Sarah>Peter					1
Compromise	9	11	9	7	9

Unfortunately, integrative agreement is not reached in any condition. Overall 54 pairs of participants reach red area on the flexibility grid and 48 pairs of participants reach green area, which means that distribution for positive and negative outcome is 50/50. Figure 37 represents graphically the sums from the table 14, thus the amount of times each status is reached:

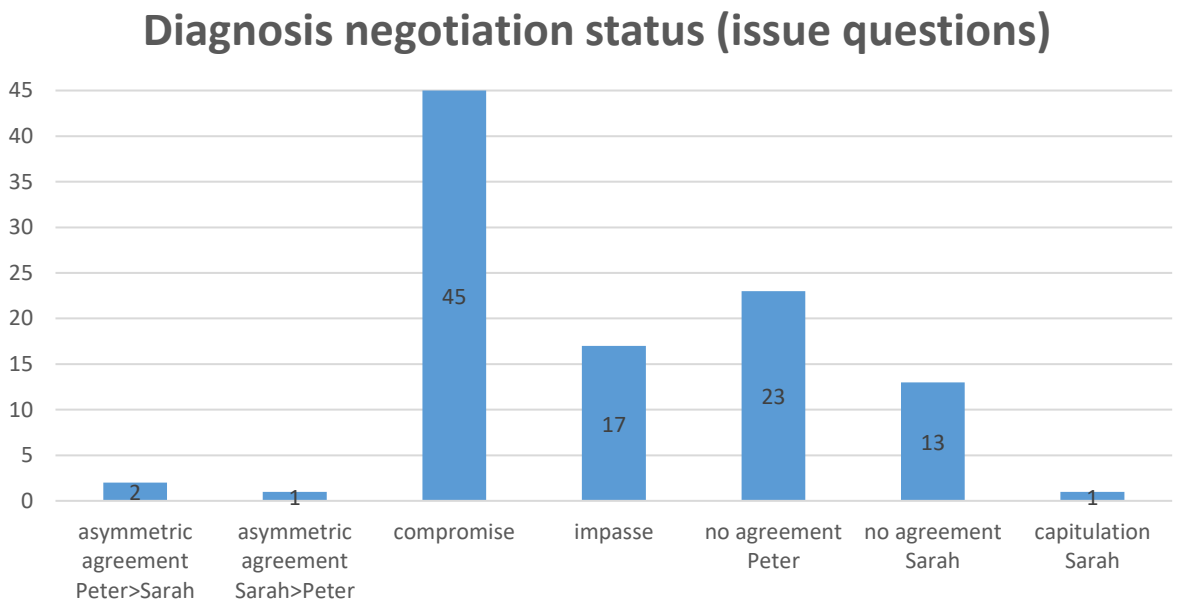

Figure 36: Diagnosis for negotiation status per agreement (overview – issue questions)

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Diagnosis: process questions.

In the figure 38 diagnosis for negotiation status per condition (process questions) is shown. On the right-side of the table possible statuses are presented. Compromise is still the most common status and has the same number of pairs of participants who reach it (40) as for issue questions. However, the number of pairs of participants who end up their negotiation in the status impasse is much lover (8 in comparison to 17 in the figure 41 for issue questions). In addition, there are more asymmetric agreements (6 in comparison to 3 in the figure 41 for issue questions).

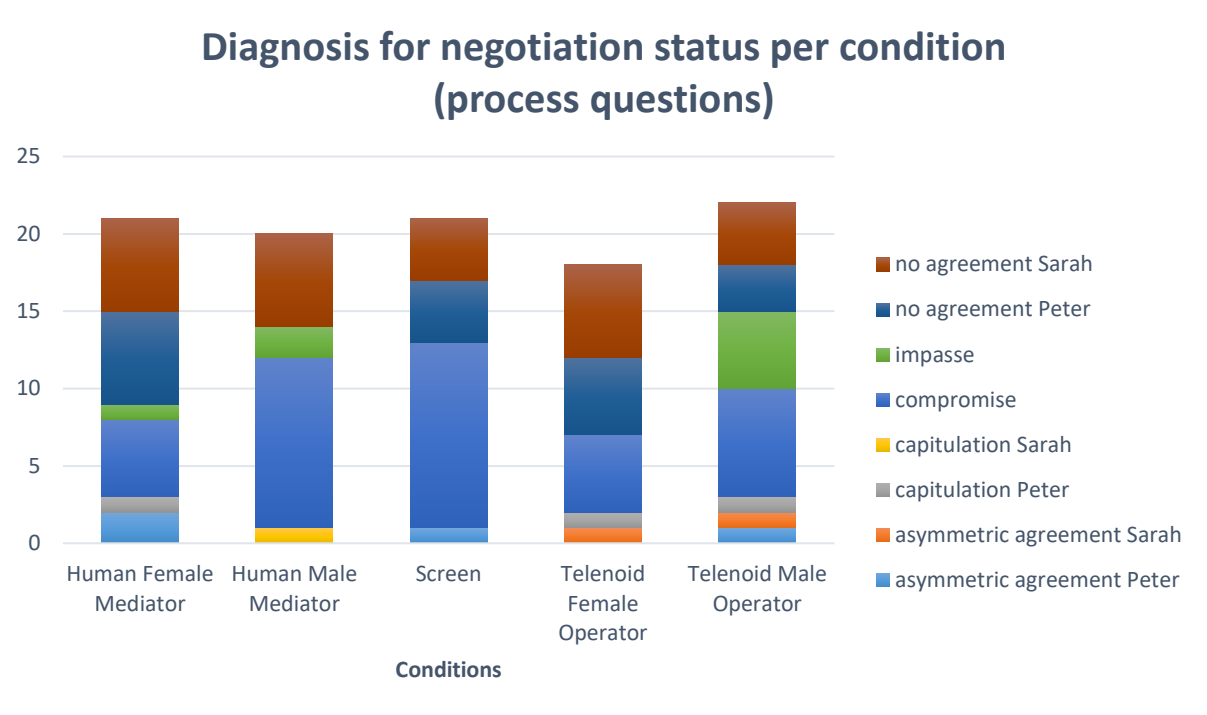

Figure 37: Diagnosis for negotiation status per condition (overview – process questions)

More granular data is represented in the table 23, where each case per condition, is shown.

Table 23: Negotiation statuses for process questions per condition (number of cases)

Negotiation Status	**Conditions**				
(Process questions)	Human male mediator	Human female mediator	Screen	Telenoid male operator	Telenoid female operator
Impasse	2	1		5	
No agreement Peter		6	4	3	5
No agreement Sarah	6	6	4	4	6
Capitulation Peter		1		1	1

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Asymmetric agreement Peter>Sarah		2	1	1	
Asymmetric agreement Sarah>Peter				1	1
Compromise	11	5	12	7	5
Capitulation Sarah	1				

Unfortunately, integrative agreement is not reached in any condition again. Overall 56 pairs of participants reach red area on the flexibility grid and 46 pairs of participants reach green area. Figure 39 represents graphically the sums from the table 23, thus the amount of times each status is reached:

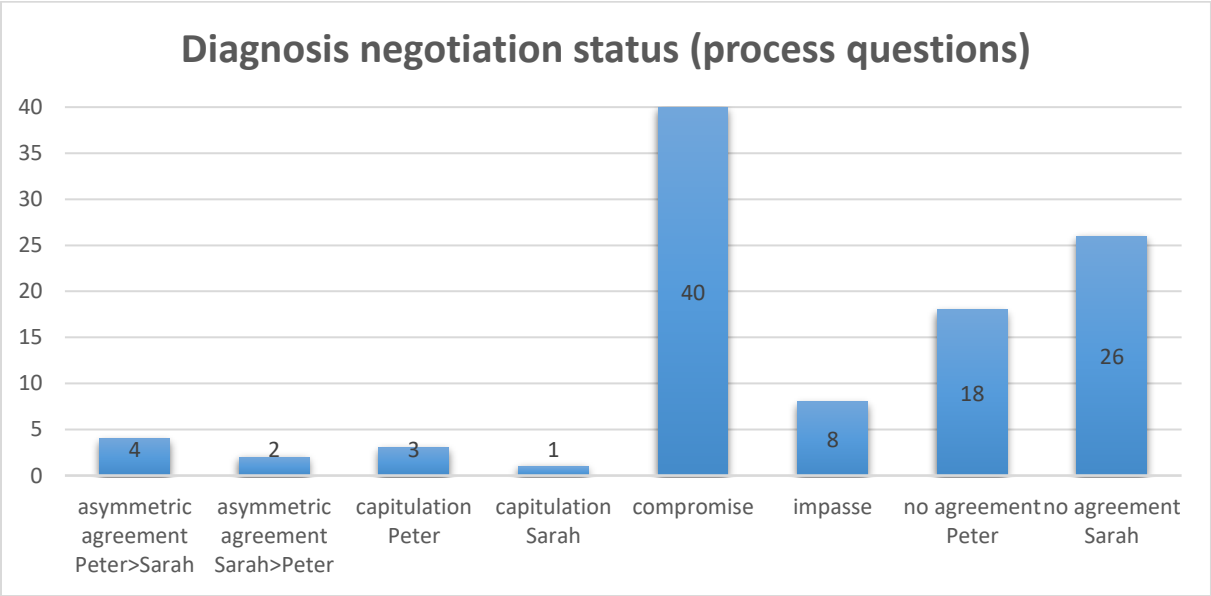

Figure 38: Diagnosis for negotiation status per agreement (overview – process questions)

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4.4. Advice

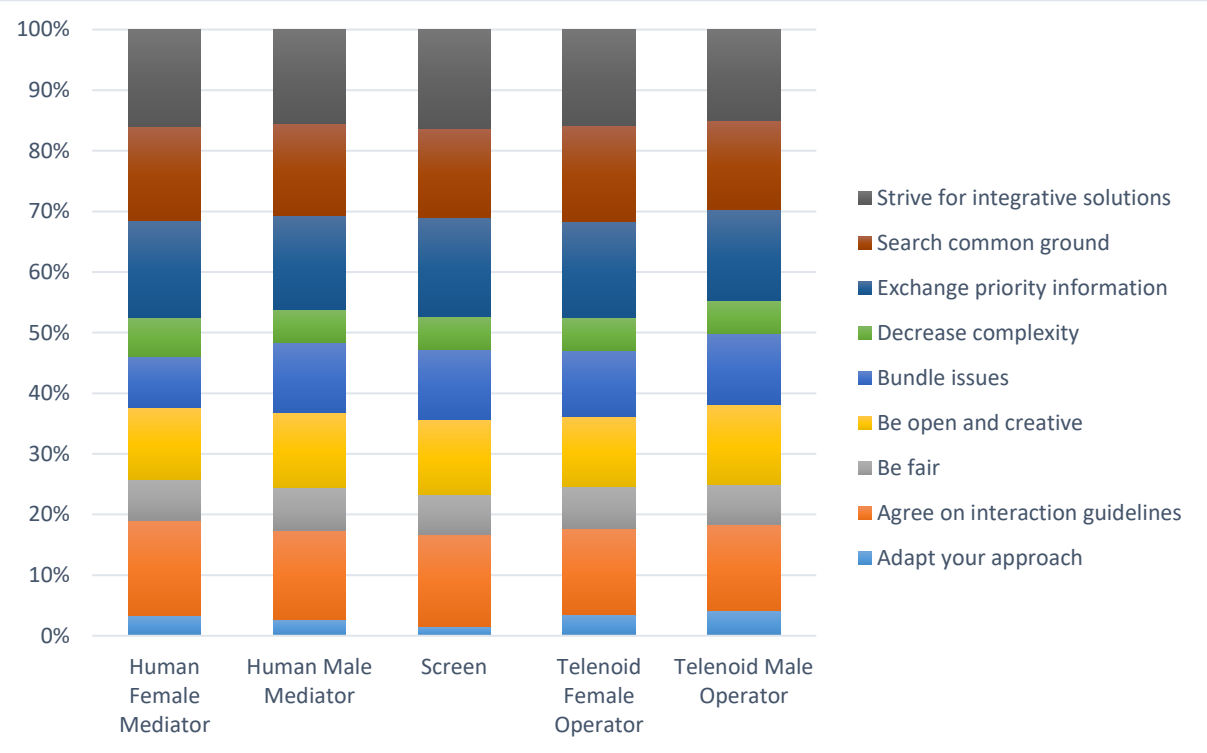

Figure 39: Advice overview per condition

In the figure 40 there are advices represented that are given after analysis of the issue and processes surveys, diagnosis of the negotiation statuses in the VienNA system. As it is shown, the distribution of advices is quite similar for each condition. Detailed overview of advices (the name and explanation can be found in the App. 4), that participants in each condition received, are represented in the figures 46-54. According to the Chi-square test (table 24) there is no significant differences in the number of advices that participants receive under each condition. P-value = 1 several times, that means all 204 participants receive advice 1 Exchange priority information and advice 5 strive for integrative solution.

Table 24: Chi-square test results for advice outcome

Advices per role		
Advices	Advice name	Chi square test
Advice 1	Exchange priority information	x^2 = 0
		df = 4
		p = 1
Advice 2	Search common ground	x^2 = 6.4067
		df = 4
		p = 0.1708
Advice 3	Decrease complexity	x^2 = 0.6234
		df = 4
		p = 0.9604

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Advice 4	Bundle issues	x^2 = 7.638
		df = 4
		p = 0.1058
Advice 5	Strive for integrative solutions	x^2 = 0
		df = 4
		p = 1
Advice 6	Agree on interaction guidelines	x^2 = 3.0267
		df = 4
		p = 0.5534
Advice 7	Be open and creative	x^2 = 4.2424
		df = 4
		p = 0.3742
Advice 8	Adapt your approach	x^2 = 4.7065
		df = 4
		p = 0.3188
Advice 9	Be fair	x^2 = 0.20429
		df = 4,
		p = 0.9951

According to the figure 41 all participants under all conditions received advice 1 about exchanging priority information, that means, all participants showed the need to show priority information and talk about prior needs.

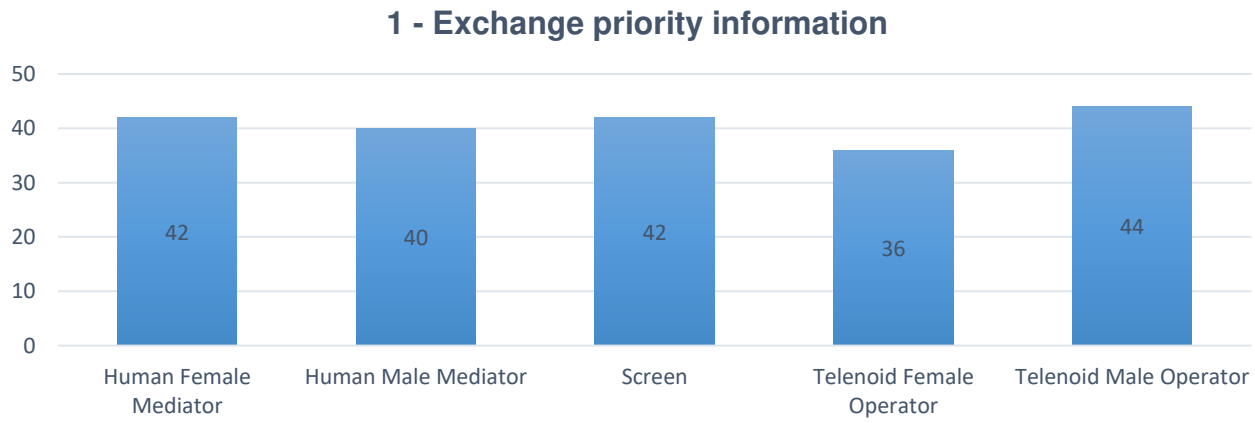

Figure 40: Advice 1 – Exchange priority information

In the figure 42 the number of participants who received advice 2 “Search common ground” is shown. Almost all participants showed the need to shift focus from the conflict areas to the things they have in common.

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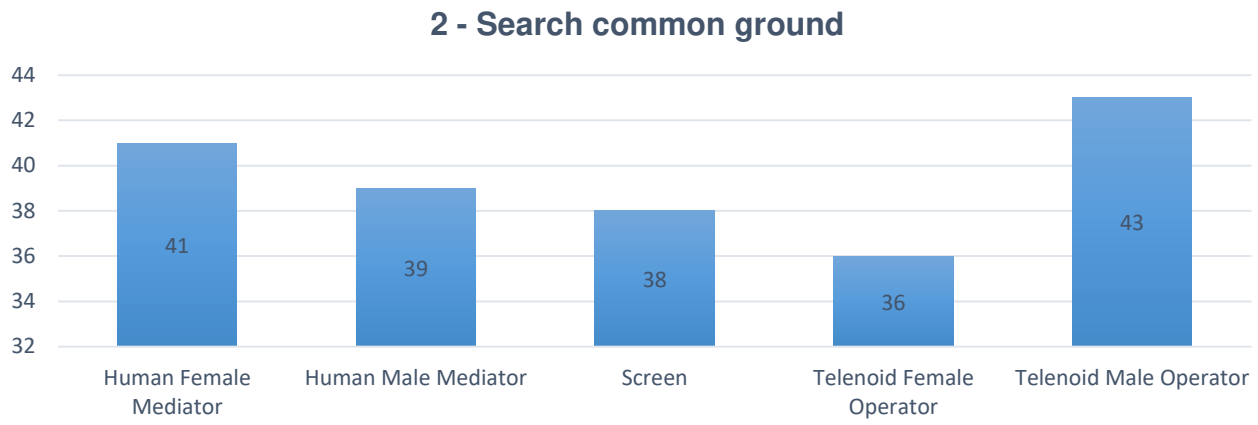

Figure 41: Advice 2 – Search common ground

Less than third of participants under each condition sought for a need for quick wins and solving issue that can be resolved first in comparison to solving big issue first – content of the advice 3 “Decrease complexity” (see figure 43).

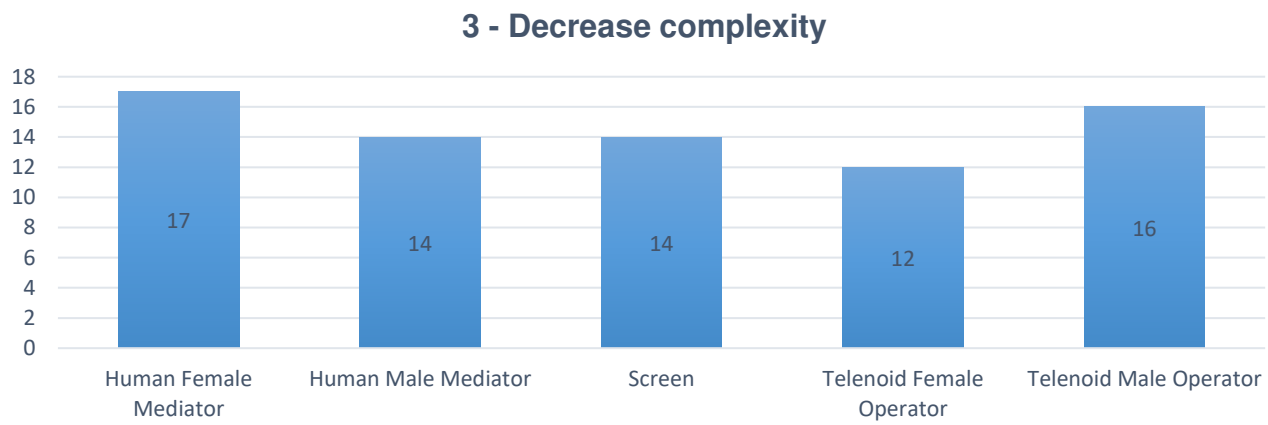

Figure 42: Advice 3 – Decrease complexity

More than a half of participant under each condition received bundle issue (see figure 44) advice that recommends negotiating about the needs in so called “packages” – together. For example, the issues of employees, facilities, and equipment can be regarded as a bundle of assets needed for production.

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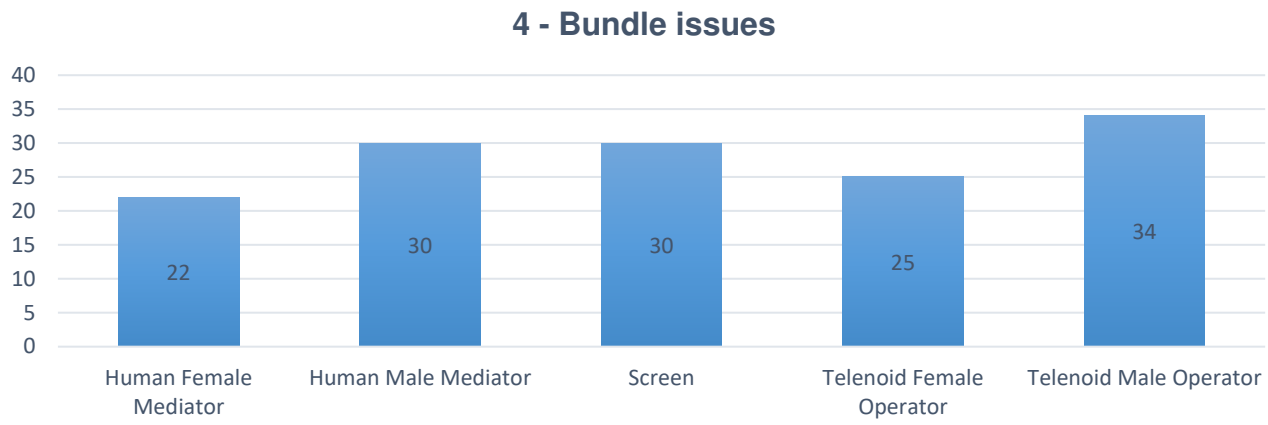

Figure 43: Advice 4 – Bundle issues

The same as advice 1, everyone received advice 5 – strive for integrative solutions (see figure 45) – look for common ground rather than the divisions that have hindered the talks to this point. Unfortunately, integrative solution was not reached under any condition.

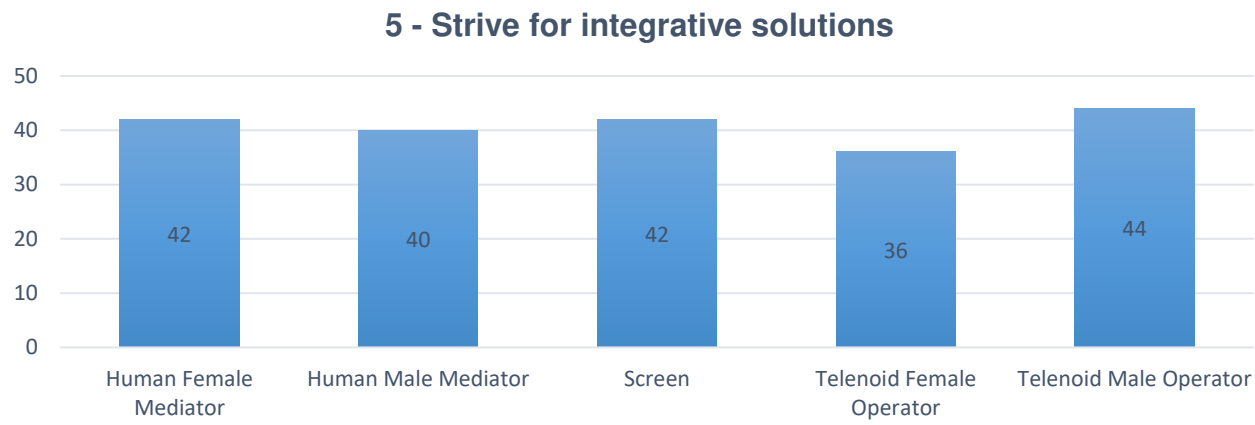

Figure 44: Advice 5 – Strive for integrative solutions

In the figure 46 we can see that again almost all participants under each condition receive advice 6 “Agree on interaction guidelines”. This advice is provided in order to let people discuss the way of the negotiation. Research has shown that agreement on broad principles may facilitate bargaining on specific issues.

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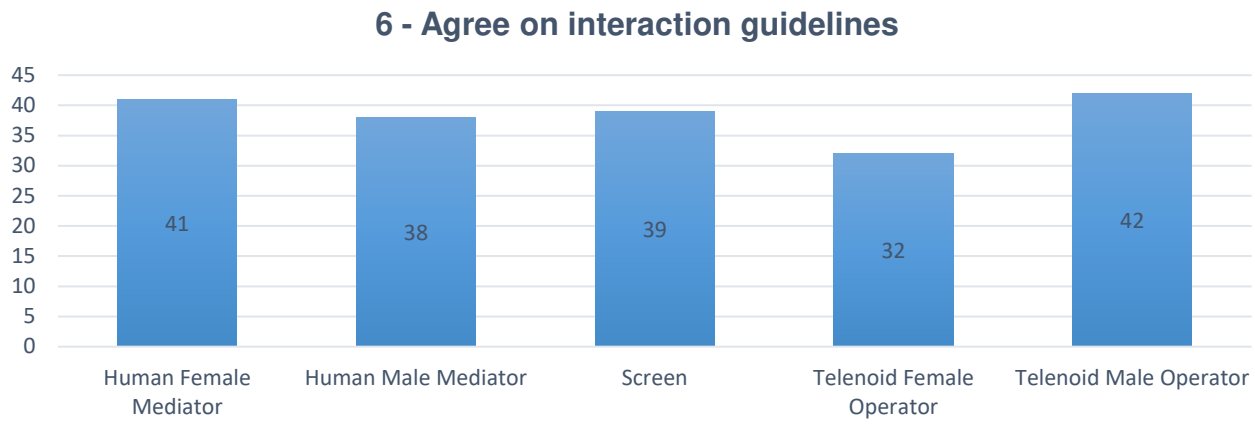

Figure 45: Advice 6 – Agree on interaction guidelines

More than a half of participants (see figure 47) under each condition showed need in being open and creative (advice 7). It means, that there is a demand to consider new options not yet discussed, initiate a discussion of creative solutions and suggest new way of framing the problem.

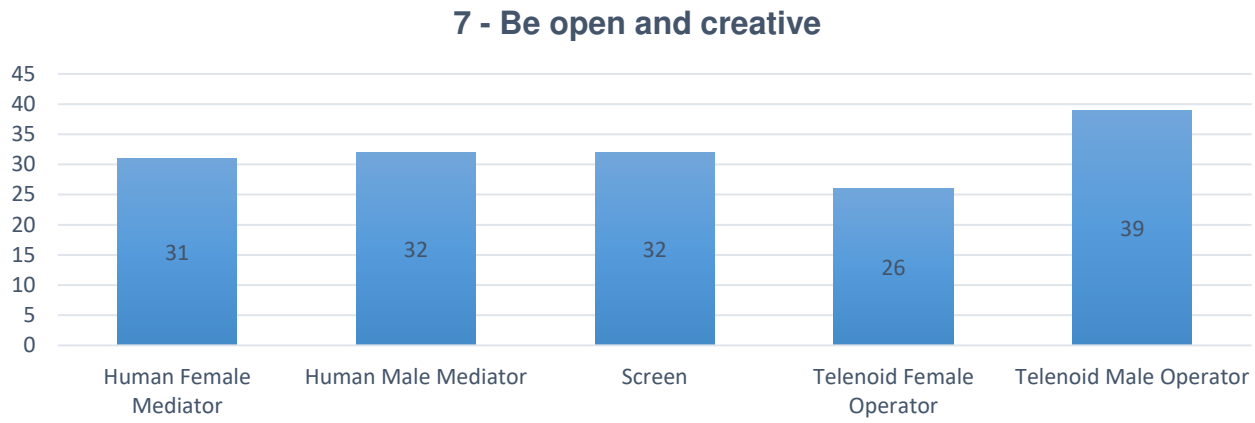

Figure 46: Advice 7 – Be open and creative

Less than 25% of participants under each condition received advice 8 “Adapt your approach” (see figure 48). Conclusion that participants were already friendly and empathic can be made.

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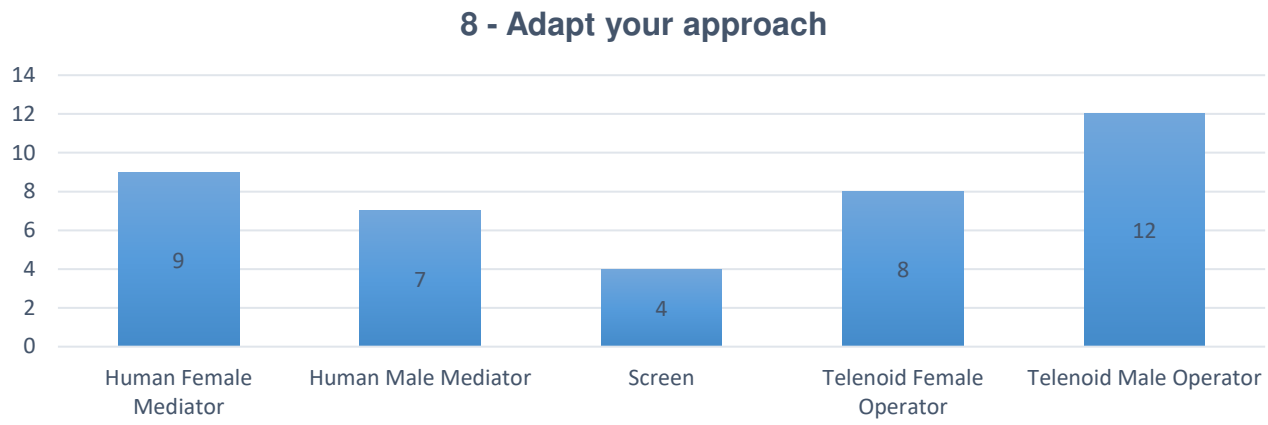

Figure 47: Advice 8 – Adapt your approach

Another conclusion can be made out of the figure 49 – participants discussed what the fairness means to them and their counterpart. As less than half of the participants under each condition received the advice 9 “Be fair”.

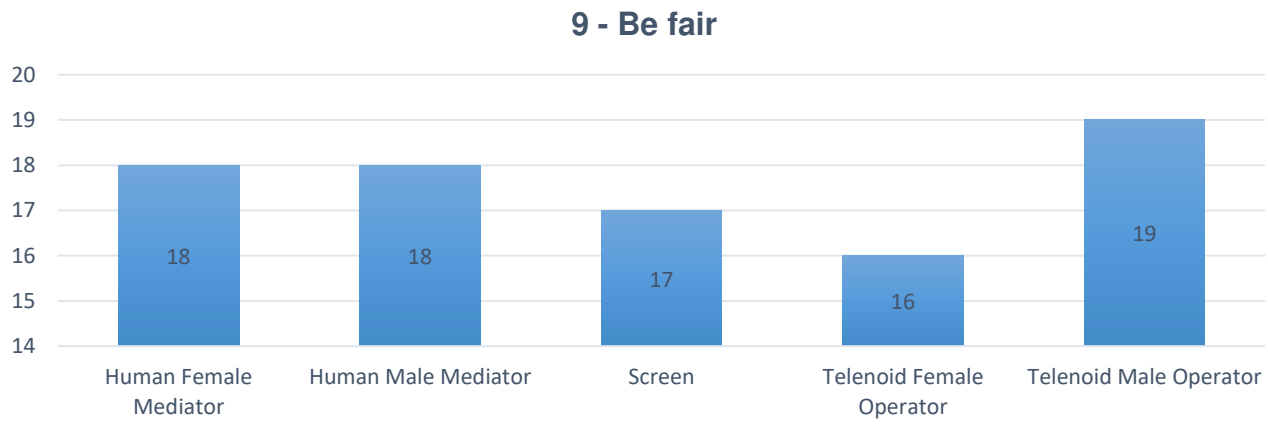

Figure 48: Advice 9 – Be fair

4.5. Agreements

This chapter describes the outcome of renegotiations, the last step of the negotiation process in the experiment. There are three outcome values – no agreement, when both counterparts did not reach any agreements, distributive agreement, which means reached agreement on the five issues (distribute patent, employees, equipment, building and liabilities) and integrative agreement, which means reached agreement on the most conflicting issue – Nanobot patent. In the figure 50 overview of the outcome values per condition is shown.

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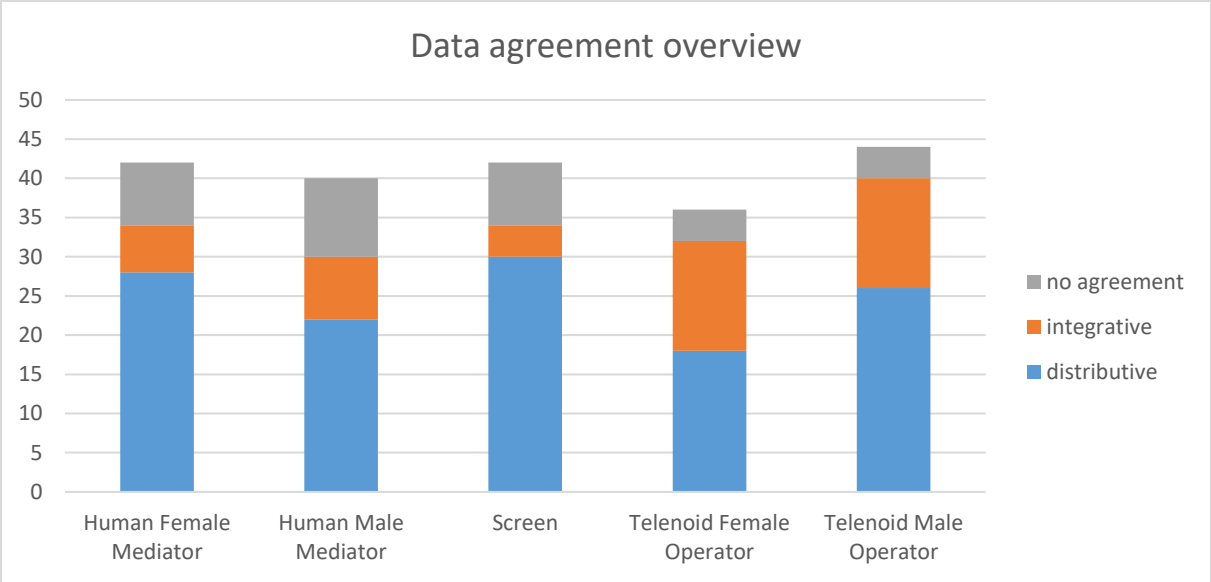

Figure 49: Overview of agreements in the end of negotiations

In total participant under all conditions reached the agreement 5 times more often, than participants who did not reach the agreement at all. According to the T-test (see table 25) there is no significant difference in the distribution of the agreement values under all conditions (p-value = 0.29).

Table 25: Overview of outcomes of negotiations (agreement and no agreement) per condition and T-test result

Conditions	agreement	no agreement	Grand Total
Human Female Mediator	34	8	42
Human Male Mediator	30	10	40
Screen	34	8	42
Telenoid Female Operator	32	4	36
Telenoid Male Operator	40	4	44
Grand Total	**170**	**34**	**204**
X-squared = 4.961, df = 4, p-value = 0.2913			

From the 170 participants who reached an agreement, third reached integrative agreement and others – distributive agreement. Table 26 represents the distribution of the integrative and distributive agreements. T-test shows, that there is significant difference in the distribution of the agreements between conditions (p-value = 0.02).

Table 26: Overview of agreements (integrative and distributive) per condition and T-test result

Conditions	distributive	integrative	Grand Total
Human Female Mediator	28	6	34
Human Male Mediator	22	8	30
Screen	30	4	34
Telenoid Female Operator	18	14	32

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Telenoid Male Operator	26	14	40
Grand Total	**124**	**46**	**170**
X-squared = 11.353, df = 4, p-value = 0.02287			

Tables 27-34 show agreement distribution under each condition in the details. According to the T-test (see table 27) there is no significant difference in outcomes (agreement and no agreement) distribution under the human male and female mediator condition (p-value = 0.7). Furthermore, there is also no significant difference in the agreements (integrative and distributive agreement) distribution as p-value = 0.57 (see table 28). However, participants under human female mediator conditions reached the agreement more often than participants under human male mediator condition, and participants under human male mediator reached integrative agreement more often, than participants under human female mediator condition.

Table 27: Outcomes human female vs human male mediator

	agreement	**no agreement**
female	34	8
male	30	10
X-squared = 0.14749, df = 1, p-value = 0.7009		

Table 28: Agreements human female vs human male mediator

	distributive	**integrative**
female	28	6
male	22	8
X-squared = 0.32269, df = 1, p-value = 0.57		

The same situation was faced in the Telenoid male and female operator conditions – there is neither significant difference in the outcome's distribution, nor significant difference in the agreement's distribution: p-value = 1 and p-value = 0.6 accordingly (see table 29 and table 30).

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Table 29: Outcomes Telenoid female vs Telenoid male operator

	agreement	no agreement
Telenoid female operator	32	4
Telenoid male operator	40	4
X-squared = 1.2102e-30, df = 1, p-value = 1		

Table 30: Agreements Telenoid female vs Telenoid male operator

	distributive	integrative
Telenoid female operator	18	14
Telenoid male operator	26	14
X-squared = 0.26372, df = 1, p-value = 0.6076		

Even though there is no significant difference in the outcome's distribution and significant difference in the agreement's distribution under the human mediator and Telenoid operator conditions (p-value = 0.06 and p-value = 0.05 accordingly), numerically, under the Telenoid operator conditions positive outcome (agreement) and specifically integrative agreement was reached more often, than the same indicators under human mediator conditions (see table 31 and table 32).

Table 31: Outcomes human mediator vs Telenoid operator conditions

	agreement	no agreement
Human	64	18
Telenoid	72	8
X-squared = 3.4515, df = 1, p-value = 0.06319		

Table 32: Agreements human mediator vs Telenoid operator conditions

	distributive	integrative
Human	50	14
Telenoid	44	28
X-squared = 3.8324, df = 1, p-value = 0.05027		

According to the T-test there is no significant difference in the outcomes under the Telenoid operator conditions and other conditions – p-value = 0.06 (see table 33). However, there is a significant difference in the agreements' distribution between Telenoid operators and other conditions (see table 34) – p-value = 0.005, which means that integrative agreement was reached more often by the participants under the Telenoid operator conditions, than by the participants under rest conditions.

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Table 33: Outcomes Telenoid operators vs rest conditions

	agreement	no agreement
Telenoid	72	8
Rest	98	26
X-squared = 3.459, df = 1, p-value = 0.06291		

Table 34: Agreements Telenoid operators vs rest conditions

	distributive	integrative
Telenoid	44	28
Rest	80	18
X-squared = 7.847, df = 1, p-value = 0.005091		

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Chapter 5. Discussion and conclusion

5.1. Conclusion of the outcomes

This work described the experiment conducted as a part of ISR project, where the underlying assumption was stated as a question wheatear dialogue by robotic proxy increases the perceived fairness of the facilitation of conflict negotiation process: in domestic conflicts where mediator's gender neutrality matters; and/or in work conflicts where the mediator's age (and gender) neutrality matters (Seibt 2016: 9). Evaluation of the data received after experiment showed that the dialogue by robotic proxy (Telenoid) doesn't significantly increase the perceived fairness of the facilitation of conflict negotiation processes. Furthermore, agreements outcome and integrative agreements differ between conditions and there is no significant difference in the agreement's outcome between male and female operators and male and female mediators. However, there is higher agreement rate and more integrative agreements of Telenoid condition in general compared to the other conditions. In the end, communicating via system (screen condition) show slightly higher flexibility than communication with a human male or female mediator.

Therefore, the answer for research question of the master thesis "Do participants accept e-mediation via the Telenoid as a fair proxy in e-mediations and if yes, what are the perceived and actual effects on the mediation and negotiation process and outcome?" is – e-mediation via Telenoid did not show significant difference in the perceives, thus participants evaluated it on the same level of fair proxy as human mediator. Furthermore, experiment showed that e-mediation without human mediator and Telenoid operator was perceived on the higher level of unbiased.

5.2. Limitations and future work.

Any experiments in human communication will always be subjective, in my opinion. As there are over 7 billion people in the world with a unique set of DNAs, that is, a set of chromosomes. This leads to unique capacities, reactions and the ability to perceive the formation. Even more complex interrelationships between people arise in an area of life such as communication. As mentioned in the introduction, this activity accompanies us every day, most people are given the ability to speak and this is how we understand each other. There are many nuances in this field: different continents, countries, language, culture, religion, education, traditions and even superstitions. Therefore, one of the limitations of the experiment, which was conducted, is that most

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of the participants were 1) Danes, 2) students. The data obtained in such a sample are very difficult to extrapolate firstly to another country, and secondly to areas of work or life of people who, for example, are over 30. Because if we talk about the importance of this experiment and the applicability of the results of this experiment in the future, it will most often be used by older people. It should also be noted that the level of prejudice in young people is much lower than in the age group, for example, 35-45 years. In the last few years, movements of equality, tolerance and protest against violence have been very well-publicized, especially in Europe, which teaches young people to treat different aspects of prejudice much more tolerantly. Another fact that needs to be taken into account is familiar with technology. Again, technical progress and the presence of robotics and robots in daily life are not as challenging for the young participants (As for the question of the perception of the robot as a mediator). Although it should be noted that still the results showed that the trust in the robot mediator and the human has no significant differences, statistically. That is, the conclusion is that the robot is not something strange, but the trust is still not higher that trust to the human. One more limitation connects to the humanoid robot that was chosen. The humanoid is a robot that looks like a human being. The Telenoid looks like a small child with cooled hands and feet. Furthermore, the robot's face is a prototype of an Asian man. Which wouldn't be controversial, because its developer is Japanese. But for Europeans, it may seem a little frightening or even repulsive. Therefore, repeated or similar experiments should be carried out on other tele-operated robots.

The next important conclusion is, in my opinion, that these experiments are worth continuing. The sphere of discussion, education, sphere of personnel management needs these developments not only from the side of automatization of some processes with the help of Telenoid, but also from the point of view of data collection about people's reaction to robots, which may also give some new knowledge to other sciences, for example, sociology and psychology. The integrative social robotics project carries a huge layer of issues that are important for science and for industry in general. The study of communication between a robot and a person leads not only to the question of how humans perceive the robot, but also to the question of human rights and the robot in such communication. For example, data protection, ethical principles and, after all, legal responsibility. After all these aspects have been studied and knowledge has been increased, this topic will become more than just a scientific and research activity. In my opinion, in a few decades' time, the science of robots and

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their interaction with people will become similar subject as math at school. This knowledge is already in great demand and people need to master this information, because in Europe robots are not yet as at home as in Japan, for example, thus knowledge in this field is very important and necessary. Many myths and awakenings have to be dispelled. Furthermore, the fact that robots are already in our lives is accepted.

The next steps described in the subchapter 1.3 will be taken. The result of the master thesis work will be counted together with other outcomes of the focus area A: Fairness and the modulation of social cognition, where the relationship between physical design and implicit social cognition is explored.

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Appendix

App. 1. Demerger case

MED Tech, Inc. Public Information

This information is public and provided to you and your counterpart.

Sarah and Peter are the two owners of MED-Tech Inc., a nano-medical company specializing in drug research and development. The company was founded 15 years ago in 2002. Sarah and Peter share a patent for targeted drug delivery, so-called “Nanobots” (see figure 51). This means, that with the help of nano-particles, a drug is delivered exactly where it is needed in the body of a patient. The company has been thriving for the past 10 years and expanded its staff from 50 to 180 employees. MED-Tech Inc. is operating on a global market and the corporate language is English. Five years ago, the company moved into new facilities in a very prestigious research park.

During the past year tensions arose. Sarah and Peter could no longer agree on the focus of the research and development strategy of their company—while Peter wants to pursue a research line for a drug against Alzheimer’s, Sarah sees much prospect in developing a new form of treatment for advanced diabetes. Both research lines would use the Nanobot technology, but the financial resources of MED-Tech Inc. are not sufficient to realize their projects without external investors! Moreover, the two research lines, and the associated goals for the company, are quite different. The drug against Alzheimer’s is generic, will benefit about 6 million patients worldwide, and, since it is highly effective, will yield high returns on the market. The treatment for diabetes will benefit about 30 million people worldwide, but the effects are moderate, and so are the expected returns on the market.

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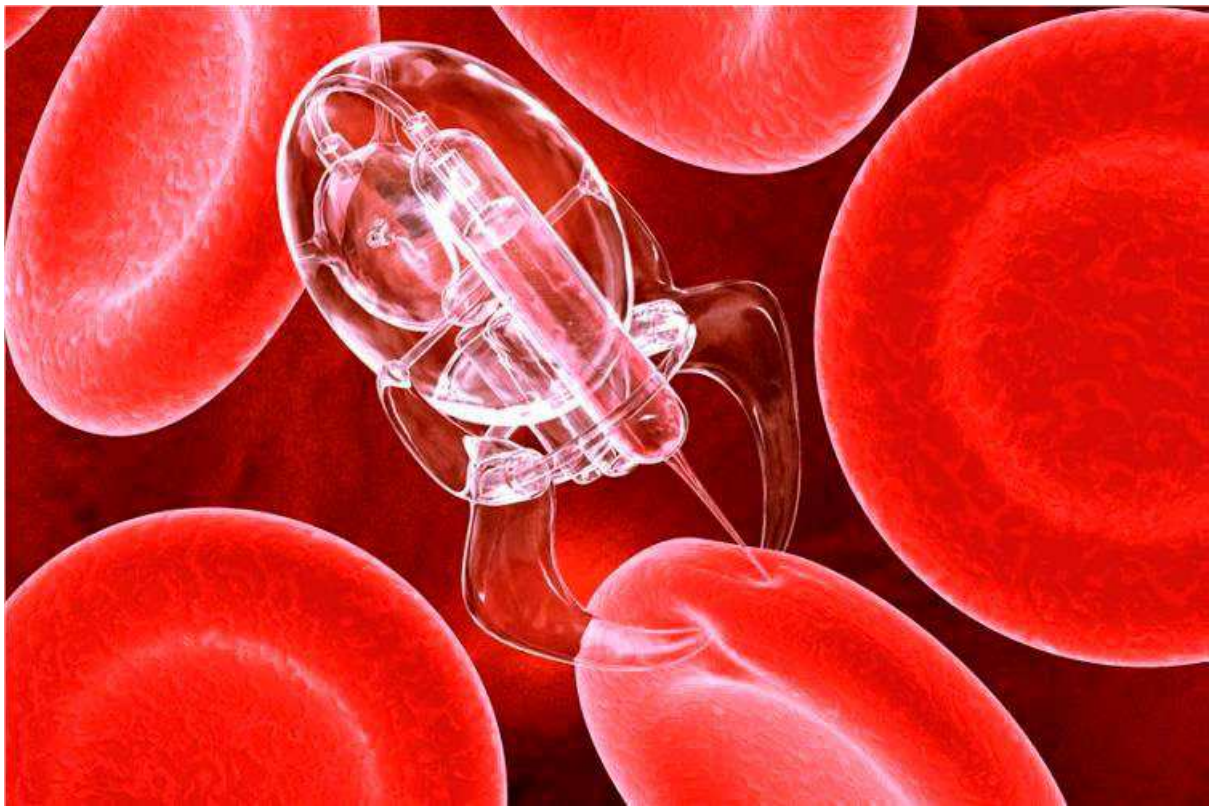

Figure 50: Nanobot delivering medication to cells

MED-Tech Inc. is committed to particularly strict ethical principles and this is also of crucial relevance to the management and employees of this company. At their last strategy meeting with the management team, both Sarah and Peter have argued that the research line they each envisage is the socially most responsible to make use of the Nanobot technology. Since then, there have been extensive discussions among the management and the employees concerning the future strategy of MED-Tech Inc. Unfortunately, there has been no progress towards a consensus between Sarah and Peter. They have decided to evaluate the option of a demerger of their company. The following issues turned out to be crucial and need to be resolved in a mutual agreement for the dissolution of the company:

1. The patent for the Nanobot technology is currently held by MED-Tech Inc. It has to be decided which of the successors of MED-Tech Inc. will be assigned the intellectual property rights, i.e., the patent for the Nanobot technology and/or licencing options. Licencing provides only very restricted rights. It just permits the owner of the licence to use the Nanobot technology as currently implemented. This means that you are not allowed make any changes to the technology. You also cannot develop it further or adapt it to different contexts. In contrast, ownership of the patent implies the possibility

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to change the technology and adapt it to other contexts. Furthermore, you can issue licences to other companies and of course you can sell the patent.

2. The currently employed 180 highly skilled researchers and technicians are an extremely valuable resource for MED-Tech Inc. and certainly would be an asset for both, Sarah and Peter. In order not to cannibalize each other's human resources, it would be necessary to divide the staff between the two new companies (i.e. who is allowed to offer jobs to existing staff).

3. It has to be decided, who, if anyone, is going to stay in the current company facilities in the prestigious research park.

4. Similarly, the highly adaptable research and laboratory equipment is state-of-the-art and unique. It needs to be distributed among the new companies or sold. The equipment can be easily transported and/or used at any other facility.

5. Finally, it has to be clarified, who will be the legal successor of MED-Tech Inc., i.e. who is taking over the legal and financial responsibilities of the old company.

In about 15 minutes, there will be a meeting of representatives of Sarah and Peter to negotiate these five issues. Since the previous discussions have proved to be very difficult, Sarah and Peter have also arranged a mediation to facilitate these negotiations.

App. 1.1. Case Sarah

Private Information for Sarah's representative

This information is provided only to you. Feel free to share any information but do not hand over this sheet to your counterpart.

You are a friend of Sarah. She has asked you to represent her in this very important and difficult matter. Although Sarah respects Peter, she finds it more and more difficult to discuss the demerger with Peter because they have been struggling with it for such a long time without progress. Sarah has provided you with the following private information.

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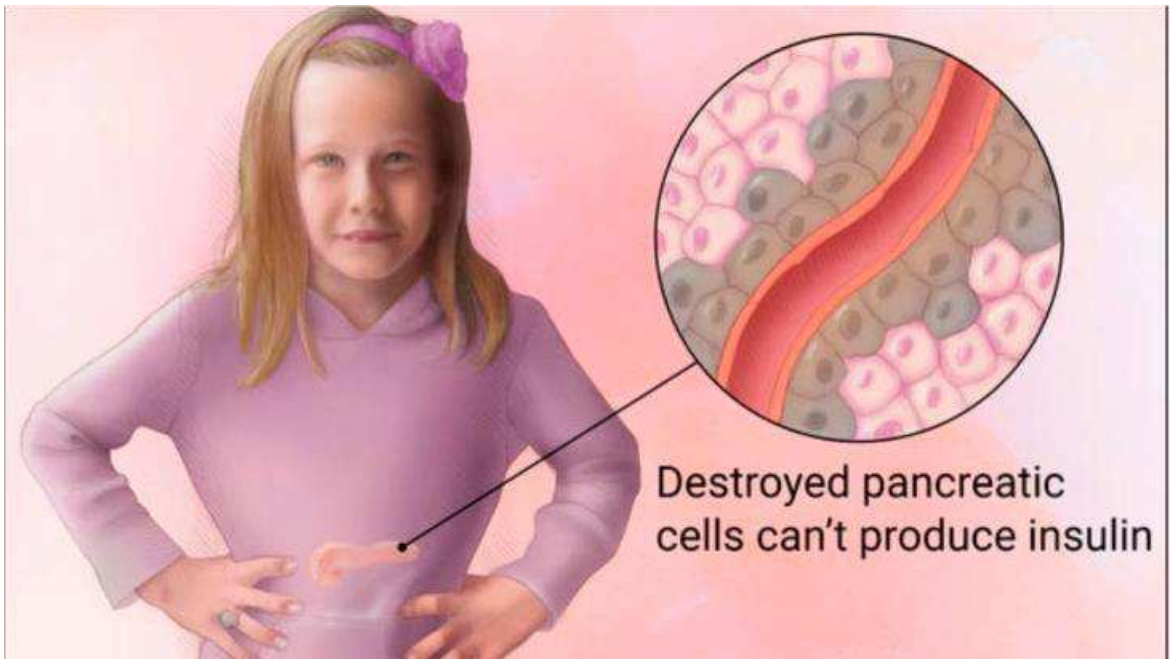

Figure 51: Picture of the girl with the destroyed pancreatic cells

As a student, Sarah worked for a welfare organization which was working with children suffering from severe diabetes. The organization provided information for parents and children about all kinds of issues with regards to the disease like diet plans, handling of medication, but also provided spaces and time for children where they can play with other children and forget for a couple of moments their own disease. Sarah's interaction with these children has deeply impacted her and created the wish to develop a cure for the disease. As life goes, it happened that now diabetes is running in her own family and she is directly affected by this disease. Therefore, apart from economic and scientific arguments, Sarah prefers to further develop the Nanobot technology to a diabetes treatment (see figure 52) for ethical reasons to benefit society and particularly young children suffering from the disease.

Despite the unfortunate developments of MED-Tech Inc., Sarah found a very attractive potential new partner for her research line in diabetes. The Diabetes Department of Myosotis Inc., a large multinational pharma company, has voiced serious intentions to invest in the development and research of a Nanobot technology for diabetes drugs. The company is willing to find a joint venture with Sarah to develop the technology. The head of the Diabetes department of Myositis Inc. has claimed, that the Myosotis Inc. is only willing to invest their money when the patent is transferred from MED-Tech Inc. to the new joint venture. The conversations with Myosotis Inc. have developed confidentially in order not to endanger Sarah's position in the demerger negotiation with her current partner Peter. However, there are rumors in the

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company that Peter is looking for, and some say even has already found, an external partner for his Alzheimer's research line.

What happens if you do not reach an agreement today (see figure 53 emphasizing the importance of the urgent decision)?

If no agreement can be reached on all open issues, Sarah and Peter will keep the joint ownership of MED-Tech Inc. and the demerger has to be postponed to a later point in time. Taking the already spread rumors among employees into account and considering the dissatisfaction among the shareholders with the current situation, a procrastination of the demerger would be only a very poor option for Sarah. It would mean, that MED-Tech Inc. would not have the necessary investments for a new research line and neither Sarah nor Peter could realize their projects. Therefore, Sarah has given you full authority to finalize an agreement today, if you can reach consensus on all issues with the representative of Peter.

Figure 52: Photo of the boy represent suffering from the diabetes

Please note that although an agreement would be preferable for Sarah, she also made very clear, that you do not have to reach an agreement no matter what the cost!

You need to think through all the possibilities!

The following is a description from Sarah of what is important to her and why. Please note, the larger the bubbles, the better for her. You can directly compare the size of the bubbles within and across the issues.

Patent for the Nanobot Delivery: 16 years ago, Sarah has approached her study colleague Peter with the idea to find a company to commercialize her idea on Nanobots in the pharmaceutical industry. Peter was immediately convinced	1.Own patent exclusively 2.Own patent & give license to Peter

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about her idea and with joint efforts, this idea has developed to a prospering company. Therefore, Sarah feels morally entitled to get the patent for the Nanobot technology. She is aware that just licencing the technology provides only very restricted rights as it means that the licensee is not allowed to make any changes to the technology. Thus, for her planned Diabetes project, a license would not be sufficient. In contrast, the ownership of the patent implies the possibility to develop the technology further, to issue a license or to sell the patent. Sarah therefore wants to have patent exclusively, since she would like to go her own ways. Nevertheless, owning the patent and offering a license to Peter would also be a feasible option to her; although this would mean that she has to deal with Peter in the future. Moreover, the head of the Diabetes department of Myositis Inc. has voiced that the patent is the prerequisite for the envisaged joint venture. In case Sarah does not get the patent exclusively, Myosotis Inc. will withdraw their offer for a joint venture.	3.Receive license from Peter 4.Sarah holds patent exclusively 5.Patent is sold to a third party
Employees: The diabetes research project requires in the short run at least 80 researchers and technicians. However, within a reasonable timeframe the new joint venture would appreciate to integrate all 180 employees of MED Tech Inc. because of the specific know-how and experience of MED-Tech Inc. staff.	180 Employees 160 Employees 140 Employees 120 Employees 100 Employees 80 Employees
Building: Sarah would prefer to stay in the building since she cherishes the proximity to potential customers and suppliers in the science park, moreover, Myosotis Inc. has a subsidiary there. If neither Sarah nor Peter stays in the building the recovery of the original condition of the building would cause additional costs.	Sarah stays Peter stays Give it up
Laboratory Equipment: Although the highly adaptable high-end laboratory equipment could be used in your new research line, the diabetes research can be realized also	Sarah keeps it Peter keeps it Sell equipment

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with cheaper standard equipment. Sarah thinks, that if there is a need for concessions, the laboratory equipment could be sacrificed. Selling the used equipment would gain only a small portion of its operative value.	
Legal & financial responsibilities: With regard to the potential future legal and financial responsibilities of MED Tech Inc., Sarah thinks it would be fair to assign them to Peter's new company since he was more involved in running the company.	Peter takes them Sarah takes them

App.1.2. Case Peter

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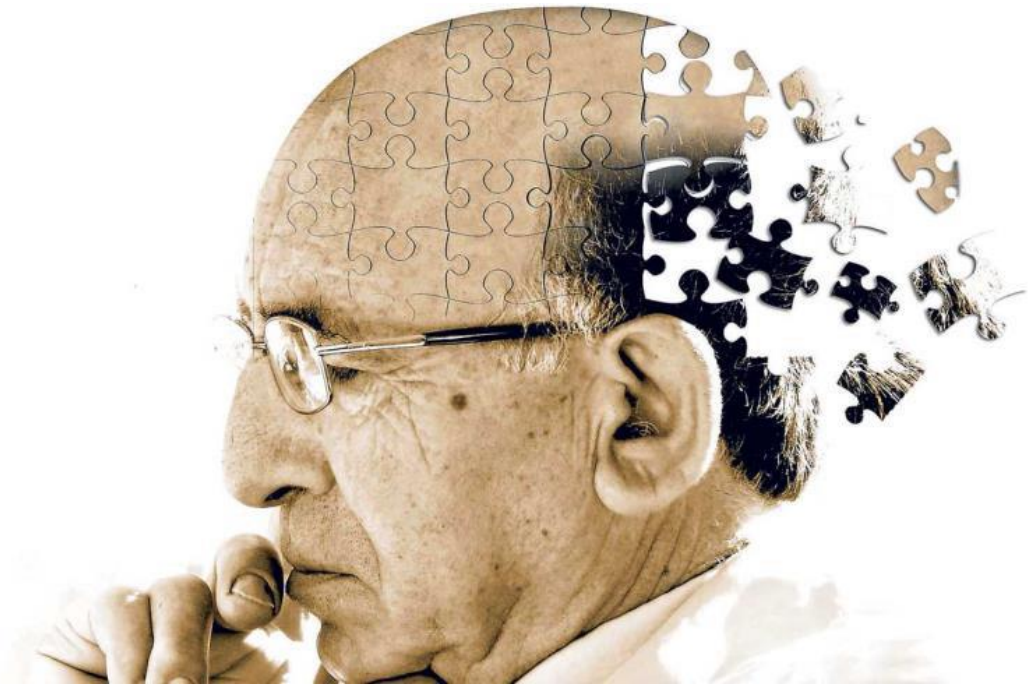

Figure 53: Old man represents people with Alzheimer

You are a friend of Peter. He has asked you to represent him in this very important and difficult matter. Although Peter respects Sarah, he finds it more and more difficult to discuss the demerger with Sarah because they have been struggling for such a long time with it without progress. Peter has provided you with the following private information.

During civil services, Peter has worked for one year in a home for elderly people. During this time, he has realized how strongly people and their relatives suffer when

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they are confronted with the diagnosis Alzheimer's (see figure 54 and figure 55). This experience has deeply impacted his thinking and created a wish to find a cure for this disease. As life goes, it happened that he has been diagnosed to carry a substantial risk of suffering from Alzheimer's in the future. Therefore, besides scientific and economic reasons, Peter prefers to further develop the Nanobot technology to an Alzheimer's treatment to benefit the people suffering from this devastating disease.

Just as the problems of the future direction of MED-Tech Inc. emerged, a former colleague of Peter, now Head of the Alzheimer's department of Myosotis Inc., has approached him. Myosotis Inc. is large international pharmaceutical company and a key player in the treatment of brain diseases. They made him a very attractive offer for a joint venture. They claimed, however, that Myosotis Inc. is only willing to invest their money when the patent is transferred from MED-Tech Inc. to the new joint venture. The informal conversations with the head of the Alzheimer's Department of Myosotis Inc. have developed to quite an extent, however, Peter has kept them strictly confidential in order not to endanger his position in the demerger negotiation with Sarah. Nevertheless, Peter heard rumors that Sarah has already found a potential partner for her diabetes research line.

What happens if you don not reach an agreement today?

If no agreement can be reached on all open issues, Sarah and Peter will keep the joint ownership of MED-Tech Inc. and the demerger has to be postponed to a later point in time. Taking the already spread rumors among employees into account and considering the dissatisfaction among the shareholders with the current situation, a procrastination of the demerger would be only a very poor option for Peter. It would mean, that MED-Tech Inc. would not have the necessary investments for a new research line and neither Peter nor Sarah could realize their projects. Therefore, Peter has given you full authority to finalize an agreement today, if you can reach consensus on all issues with the representative of Sarah.

Please note that although an agreement would be preferable for Peter, he also made very clear, that you do not have to reach an agreement no matter what the cost.

You need to think through all the possibilities!

The following is a description from Peter of what is important to him and why. Please note, the larger the bubbles, the better for him. You can directly compare the size of the bubbles within and across the issues.

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Figure 54: Photo of the son and father represent problems of the old people

Patent for the Nanobot Delivery: 16 years ago, Sarah has approached Peter with the idea to find a company to commercialize the Nanobot technology in the pharmaceutical industry. Peter was immediately convinced about this idea and worked hard to get the company running. He has worked day and night contacting customers and suppliers, networking, acquiring funding and so on. Therefore, he feels morally entitled to get the patent for the Nanobot technology. Peter is aware that just licencing the technology provides only very restricted rights as it means that the licensee is not allowed to make any changes to the technology. Thus, for his planned Alzheimer's project, a license would not be sufficient. In contrast, the ownership of the patent implies the possibility to develop the technology further, to issue a license or to sell the patent. Peter therefore would prefer to have the patent	1.Own patent exclusively 2.Own patent & give license to Sarah 3.Receive license from Sarah 4.Sarah holds patent exclusively 5.Patent is sold to a third party

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exclusively, since he would like to go his own ways. Nevertheless, owning the patent and offering a license to Sarah would be also a feasible option to him, although this would mean that he has to deal with Sarah in the future. Moreover, the head of the Alzheimer's Department of Myosotis Inc. has voiced that the patent is the prerequisite for the envisaged joint venture. In case Peter does not get the patent exclusively, Myosotis Inc. will withdraw their offer for a joint venture.	
Employees: The Alzheimer's research project requires in the short run at least 80 researchers and technicians. Myosotis Inc. is well equipped with specialists in the field. However, within a reasonable timeframe the new joint venture would also be possible to integrate all 180 employees of MED-Tech Inc.	180 Employees 160 Employees 140 Employees 120 Employees 100 Employees 80 Employees
Building: Peter would prefer to stay in the building since he is living very close to the premises which would ease his work-life integration. If neither Peter nor Sarah stay in the building the recovery of the original condition of the building would cause additional costs.	Peter stays Sarah stays Give it up
Laboratory Equipment: The highly adaptable high-end laboratory equipment would be very valuable for the Alzheimer`s research line, since Myosotis Inc. does not have comparable equipment. Selling the used equipment would gain only a small portion of its operative value.	Peter keeps it Sarah keeps it Sell equipment
Legal & Financial Responsibilities: Although Peter is confident that potential legal and financial responsibilities of MED-Tech Inc. will be no risk, he prefers to assign them to Sarah's company.	Sarah takes them Peter takes them

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App. 2. T 1 Pre-negotiation questionnaire

Pre-Negotiation Questionnaire INSOR Experiments

The following questions refer to your demographical background and education, etc.

Demographics & User Characteristics:

1. What year were you born? (Year)
2. What is your gender (M/F)?
3. In which country were you born? (Country)?
4. Are you currently a student (studying) (Y/N)?
5. What is the highest level of education you have completed? (List: none up to masters/post.grad)?
6. What is/was your field of study? (LIST - whether Q5 is displayed depend on answer to Q4)
7. How do you rate your proficiency in English? ('poor' to 'excellent')?
8. How do you rate your experience in negotiating? ('poor' to 'excellent')?
9. I have gained experience in negotiations in the following areas:

- Job/University
- Family/Friends
- Social institutions (e.g. volunteer work)
- I have no experience with negotiation

10. How would you describe your overall attitude towards technology? (very negative) 1 2 3 4 5 6 7 8 9 10 (very positive).

Based on the information you have so far, what do you think about the upcoming negotiation.

11. How easy or difficult was it to understand the case? (extremely easy - extremely difficult)?
12. How friendly do you expect the negotiations to be? (very friendly -very hostile)?
13. How successful do you expect yourself to be in the negotiation? (not successful - very successful)?

In general, what do you think about the nature of human beings:

14. Most people inwardly dislike putting themselves out to help other people.
15. Most people will use somewhat unfair means to gain profit or an advantage rather than lose it.
16. No one cares much what happens to you.

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17. I think most people would lie in order to get ahead.

18. I commonly wonder what hidden reasons another person may have for doing something nice for me.

App. 3. T 2 Post-negotiation questionnaire

The following questions address the mediation you had during negotiations (screen, human, Telenoid):

Usefulness:

1. The questions posed in the mediation helped me to become aware of aspects of the negotiation I had not thought about before.
2. The questions posed in the mediation helped me to reflect on the most conflicting negotiation issue.
3. The questions posed in the mediation helped me to reflect on the negotiation process.
4. The flexibility grid enhanced my understanding of the conflict situation.
5. The flexibility grid helped me to identify the level of flexibility in the negotiation.
6. The flexibility grid allowed me to make projections of the possible outcome of negotiations.
7. The advice proposed in the mediation helped me to address the problems of the negotiation.
8. The advice proposed in the mediation helped me to resolve the conflict.
9. The advice proposed in the mediation helped me to break impasses.
10. The mediation led to a favorable agreement.
11. The mediation led to a fair agreement.
12. The mediation helped to increase trust in the other party during the negotiation.
13. The mediation helped to understand the other's party position.
14. The mediation improved the problem-solving process.
15. The mediation improved the level of objectivity in the negotiation.
16. The mediation helped to reduce the conflict intensity.

Ease of Use:

17. The mediation I had was confusing.
18. The mediation I had was frustration.
19. The interaction during the mediation required a lot of my mental efforts.
20. The mediation was rigid and inflexible.

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Attitude towards mediation:

21. I would use this type of mediation for business conflicts.
22. I would use this type of mediation for family conflicts.
23. This type of mediation is a viable method to solve conflicts.
24. I would recommend this type of mediation to others.

The following questions address to all negotiation conditions:

Satisfaction and Attitude towards counterpart:

25. I am satisfied with my performance in the negotiation.
26. I had control over the negotiation process.
27. I was confident in engaging in my tasks.
28. I was effective in accomplishing my tasks.
29. I represented my role adequately.
30. I am satisfied with the results that I achieved.
31. I am satisfied with the results as compared to my expectations.
32. I am satisfied with the results when considering my initial objectives.
33. I am satisfied with the results as they are favorable for me.
34. My counterpart listened to my concerns.
35. The relationship with my counterpart has not been harmed through this negotiation.
36. My counterpart was sincere.
37. I enjoyed negotiating with my counterpart.

Please consider the extent to which you regard the following aspects of your negotiation as being fair:

38. How fair was your negotiating opponent? (extremely fair – extremely unfair)

39. How fair was the mediator? (extremely fair – extremely unfair) – *applicable for human and Telenoid conditions only*

40. How fair was the negotiation process? (extremely fair – extremely unfair)
41. How fair were the following aspects of the negotiation:

- Preparation time (extremely fair – extremely unfair)
- Role assignments (extremely fair – extremely unfair)
- Negotiation time (extremely fair – extremely unfair)
- Mediator time (extremely fair – extremely unfair) – *applicable for human and Telenoid conditions only*

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- Timing of mediator intervention (extremely fair – extremely unfair) – *applicable for human and Telenoid conditions only*
- De-briefing (extremely fair – extremely unfair)

42. How fair was the outcome that resulted from the negotiation?

43. Were the issue weightings fair? (in terms of the relative importance of the issues)

Please answer the following questions concerning the Telenoid (condition only) in the mediation:

44. If you have to assign a gender to the Telenoid would you then describe it as (options: male/female/ neither or both).

45. What do you base your choice on (free text)?

46. Please indicate how masculine you think the Telenoid is (slider 0 being the least masculine- 10 most masculine).

47. Please indicate how feminine you think the Telenoid is (slider 0 being the least feminine -10 most feminine).

48. Please tick the boxes of the tasks that you think the Telenoid could most appropriately undertake (LIST tasks such as teacher, receptionist, counsellor, host etc.)

Please answer the following questions about robot technology

49. Please indicate the degree to which the picture corresponds to your idea of a robot

(not at all) 1 2 3 4 5 6 7 8 9 10 (very much)

50. Please indicate the degree to which the picture corresponds to your idea of a robot:

(not at all) 1 2 3 4 5 6 7 8 9 10 (very much)

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51. Please indicate the degree to which the picture corresponds to your idea of a robot:

(not at all) 1 2 3 4 5 6 7 8 9 10 (very much)

52. Please indicate the degree to which the picture corresponds to your idea of a robot:

(not at all) 1 2 3 4 5 6 7 8 9 10 (very much)

53. Which robot would you imagine taking home with you (please tick the appropriate box)?

54. Describe in three words your first impression of the Telenoid in the picture.

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The following questions are about the Telenoid - what you believe it is, and how you believe it would be to interact with it. You can answer "not at all", "to a small degree", "to some degree" or "very much".

55. Do you believe that the Telenoid can feel sad?
56. Do you believe that the Telenoid can be happy?
57. Do you believe that the Telenoid can have hobbies and interests?
58. Do you believe that the Telenoid can feel pain?
59. Do you think that the Telenoid can wish for something?
60. Do you believe that the Telenoid has a sense of justice?
61. You know who you are. Do you think the Telenoid knows who it is?
62. Do you think that the Telenoid can understand a joke?
63. Do you believe that the Telenoid can understand how you feel?
64. Do you think that you would help fulfil the Telenoid's wish, if it asked you to (e.g. take it with you on holiday)?
65. Do you think that it matters how people treat robots?
66. Do you think that you would feel sorry for the Telenoid if you saw others being evil to it (e.g. kick it or speak badly to it)?
67. Do you think that you will trust what the Telenoid tells you?
68. Do you believe that the Telenoid will give you the best possible advice?
69. Do you think that you could give an order to a Telenoid?
70. Do you think that the Telenoid gives correct information, and that it always gives the same answer to a specific question (e.g. the ingredients for meat sauce)?
71. Do you think that you would take the Telenoid's advice on choice of medication?
72. If you owned a Telenoid, would you consider giving it a human name?
73. Do you think that you would take the Telenoid's advice on personal finances (e.g. choice of pension fund)?
74. Do you believe that the Telenoid would be able to recognize you, if it had met you more than once?
75. Do you think that you would like to spend time with the Telenoid (e.g. play Ludo, chit-chat, learn a new language, or cook)?
76. Do you think that you would confide personal information (e.g. your innermost emotions) to the Telenoid?
77. If you had the Telenoid at home, would you store it in a broom cupboard?
78. Would you feel embarrassed if other people saw you hugging the Telenoid?

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79. Do you think that you would feel insecure being with the Telenoid, if it were more intelligent than you?

80. Do you think you would be annoyed, if the Telenoid cut you off during a conversation?

81. Do you think that you will be afraid of the Telenoid?

Please answer the following questions from a scale ranging from "very unlikely" to "highly likely:

82. Would you name an everyday object (such as a television)?

83. Do you ever blame your computer for being uncooperative?

84. Do you believe that sometimes your computer sabotages your actions on purpose?

85. Do you find it understandable when people treat their car as if it were human, i.e. by giving it a name and referring to it as 'reliable' and 'helpful'?

86. Do you tend to feel grateful towards a technological object (your car, your computer, your mobile) if it has rescued from a dangerous or difficult situation?

87. Would you ever believe that a mountain (such as Mount Everest) would set off a series of avalanches on mountain climbers if they disturb the peace of the mountain?

88. Do you believe that a tree can feel pain?

89. Do you believe that an insect has a soul that you need to respect?

Finally, we would like you to provide answers to the following general questions:

Female:

90. At work/university, being a woman is important to me.

91. I currently feel connected to other women at work/university.

92. At work/university, I feel part of the group of women.

93. I identify with other women at work/university.

Male:

94. At work/university, being a man is important to me.

95. I currently feel connected to other men at work/university.

96. At work/university, I feel part of the group of men.

97. I identify with other men at work/university.

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App. 4. VienNA model

After login in the system – issue questionnaire is started. On the table 35 issue question model is shown: main questions, possible answers to these questions, popped up questions (usually open, so with a text box for typing). Furthermore, the most important definitions are underlined and provided with the explanation when one hovers over them (shown under column “Comment”).

Table 35: Issue questions in the VienNA system

№	Issue question	Answer	Popped Q	Answer 2	Comment
Q1	How large is the difference between Peter and Sarah on issue "Patent for the Nanobot Delivery"?	large			
		moderate			
		very small			
Q2	How complex is the issue "Patent for the Nanobot Delivery"?	high complex			Here, complexity refers to dimensions of the issue. E.g. are there very many possible solution alternatives to consider or only a few? How different are these solution alternatives?
		moderately complex			
		not at all complex			
Q3	Do you think there would be an attractive outcome on issue "Patent for the Nanobot Delivery" if Peter and Sarah are willing to compromise?	yes	What is the fair outcome?	Text	A compromise means that all parties to a negotiation are willing to give in.
		no			
Q4	Is there an outcome that, while perhaps favoring one party more than the other, stands out as a plausible agreement?	yes	What is it?	Text	
		no			
Q5	To what extent do you agree with the position taken by your counterpart on the issue "Patent for the Nanobot Delivery"?	fully agree			Understand the counterpart's position.
		partly agree			
		do not agree at all			
Q6	To what extent are the values of Peter/Sarah at stake on the issue "Patent for the Nanobot Delivery"?	to a great extent			
		to some extent			
		not appreciable			
Q7	How attractive are the options for Peter/Sarah if you do not reach an agreement with your counterpart on the issue "Patent for the Nanobot Delivery"?	very attractive			Refers to the best outside option, i.e. best alternative to negotiated agreement (BATNA). The BATNA helps negotiators to consider possible
		somewhat attractive			
		not attractive			

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					alternatives in case a negotiation fails. It provides a baseline for negotiators how much they could give in.
Q8	What will happen when negotiations fail?	Text			
Q9	How much loss do you risk by agreeing with your counterpart's offer on the issue "Patent for the Nanobot Delivery"?	high loss			Possible loss does not only refer to monetary values but could also include e.g. relationship, reputation, ideational values.
		some loss			
		very little loss			

Process questionnaire has a fork depending on the answer to the first question “What is your general attitude towards negotiations?”. The first fork for answer 1 “Negotiations are a matter of winning or losing” is shown in the table 36:

Table 36: First fork of answers and questions for process questionnaire

№	Process questions	Answer	Comment
Q1	What is your general attitude towards negotiations?	A1: Negotiations are a matter of winning or losing	
A1 Q2	How many concessions have you offered so far to your counterpart?	few concessions	A concession is a proposed solution which improves the counterpart's position while worsening yours.
		some concessions	
		many concessions	
A1 Q3	How often did you refer to rationality to justify your own position?	often	Appeal to reason.
		occasionally	
		never	
A1 Q4	How often did you use threats or warnings to exert pressure on your counterpart?	often	
		occasionally	
		never	
A1 Q5	How often did you repeat your positions to indicate your unwillingness to give in?	often	
		occasionally	
		never	
A1 Q6	How often did you pretend to be flexible without actually giving in?	often	
		occasionally	
		never	
A1 Q7	How often did you change your attitudes or positions to show flexibility?	often	
		occasionally	
		never	

The first fork for answer 2 “Negotiations are joint problem solving processes.” is shown in the table 37:

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Table 37: Second fork of answers and questions for process questionnaire

№	Process questions	Answer	Comment
Q1	What is your general attitude towards negotiations?	A2: Negotiations are joint problem solving processes.	
A2 Q2	Have you been discussing details and trade-offs considering individual priorities and needs ?	yes	Trade-offs between priorities consider the different importance of issues to negotiators as well as between negotiators. Needs consider the reasons "why" something is important.
		no	
A2 Q3	How often did you take the relationship between Sarah and Peter into consideration in your negotiation?	often	
		occasionally	
		never	
A2 Q4	How often did you try to discover creative or new solutions to the problem?	often	
		occasionally	
		never	
A2 Q5	How often did you appeal to justice or fairness in the negotiation?	often	
		occasionally	
		never	
A2 Q6	Did you refer to guiding norms in the negotiation?	often	Guiding norms are for instance equality of negotiators, to split the difference between positions etc.
		occasionally	
		never	

In the table 38 rest of the process questions are shown:

Table 38: Process questions – the end of the fork

№	Process question	Answer	Popped Q	Answer 2	Comment
Q8	Have you been able to bring in your experience from previous negotiations?	yes	What were the topics of these negotiations?	Text	Negotiation experience can be collected in any situation where you have to consolidate diverging interests (e.g. business, private life, salary negotiations, etc.)
		no			
Q9	Do you perceive that the negotiation is following a logical pattern?	yes			A logical pattern would be e.g. first, introducing each other, then talking about needs and interests before starting to offer concessions, etc.
		no			
Q10	How much do you trust the representative of Peter/Sarah?	very much			
		to some extent			
		not at all			

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Q11	How much did world view differences between Peter and Sarah influence the negotiation?	very much			Your fundamental assumptions about how the world is or should be.
		to some extent			
		not at all			
Q12	What are these world view differences?	text			

After questionnaires are filled out, diagnosis grid and advices are provided. Below the name and explanation for possible 9 advices are presented:

Advice 1. Exchange priority information:

“Talk about your own needs and provide priority information: for example, release information about the importance of the different issues (e.g. patent, employees, laboratory equipment, etc.). Which issues are more important to you and why? Tell your counterpart why you took certain positions in the negotiation.

Ask for priority information and needs of your counterpart: for example, ask your counterpart for information about his/her priorities with regard to different issues (e.g. patent, employees, laboratory equipment, etc.). Which issues are more important to him/her and why? Try to find out and understand why your partner is taking certain positions in the negotiation.”

Advice 2. Search common ground:

“Discuss what you have in common instead of focusing only on areas of conflict: for example, emphasize your mutual desire to innovate and develop new technologies that will improve the chances of curing each disease. This larger shared goal should always be kept in mind when resolving differences on particular issues.

Talk about solutions and avoid discussing values: the goal in this negotiation is to generate a plan for working separately. While being aware of differences between the two of you on values, try your best to steer clear of debating those differences during the negotiation. Such debates often reflect stereotypes that sidetrack the talks and arouse emotions that could damage relations and end the negotiations. Focus your attention primarily on ideas that address the different preferences expressed on key issues.”

Advice 3. Decrease complexity:

“Divide the large, complex issues into component parts and address them separately. For example, with regard to the patent, you could consider general aspects or consequences of your decisions: e.g. you could agree on whether to keep or sell the

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patent in principle (irrespective of who would get it), and you could agree also whether or not licensing is a viable option (again irrespective of who would own the patent). After you have decided these questions, you can try to find a composite solution for the whole issue. This shifts the focus away from the difficult-to-resolve big issues to those features of each issue that can be resolved.

Search for quick wins: research shows that early agreements on less important issues can pave the way to agreements on the more difficult issues. Thus, concentrate on the issue that has shown the most progress in closing the gap before turning to the issues on which little movement has occurred. Negotiate the easy (or less important) items first and move on to hard (or more important) items later."

Advice 4. Bundle issues:

"Bundle issues together in packages: for example, the issues of employees, facilities, and equipment can be regarded as a bundle of assets needed for production. It may be easier to negotiate these issues as a package rather than one-at-a-time. Issues which are related each other or share similar features could be combined and considered simultaneously.

Exploit differences in interests (= logrolling): for example, a seller offers to deliver faster for a higher price, which is beneficial for a buyer who needs the goods urgently and therefore is willing to pay more (win-win move). Give in on issues which are less important to you to achieve better outcomes on issues of higher priority to you. If this principle is adhered to by both parties, then win-win moves are possible."

Advice 5. Strive for integrative solutions:

"It is important to strive for agreements that address both Sarah and Peter's interests. Each of your top priorities should be satisfied by the agreement. To achieve this, you will need to get an accurate picture of Sarah's (Peter's) interests so that you can identify more and less compatible areas.

Look for common ground rather than the divisions that have hindered the talks to this point. This kind of problem solving is referred to as integrative bargaining. The agreement is then an integration of both of your interests. It will take creativity to realize both of your most important concerns.

To illustrate the idea of an integrative agreement, think of the popular 'orange example': A mother finds her two daughters arguing about who will receive the last orange in the household. To settle the dispute the mother renders the Salomonic judgement to cut the orange in half. After some time, the mother inspects what her two daughters do

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with their parts of the fruit and finds one squeezing the juice of her half while the other one uses the peel of her half to bake a cake. Certainly, there would have been a more integrative solution."

Advice 6. Agree on interaction guidelines:

"Discuss how you will negotiate: research has shown that agreement on broad principles may facilitate bargaining on specific issues. For example, a general agreement would be to keep the most valuable resources (building, laboratory equipment) instead of selling them. The details of distribution can be solved afterwards. If you have not discussed guiding principles yet, it is wise to do so now. A frequently used principle is, for example, to search for a general agreement before specifying details about issues.

Strive to maintain a harmonious relationship: for example, the principle of friendly separation could be accepted as a basis for decisions on the issues. Keep in mind that a good relationship that emphasizes trust is the basis for reaching and implementing an agreement."

Advice 7. Be open and creative:

"Consider new options not yet discussed: for example, try to figure out how many employees are needed to accomplish the drug research for Alzeimers or the new form of treatment for diabetes. You may discover that different types of training or a different number of laboratory technologists are needed. Another discussion may revolve around issues of cost sharing in acquiring equipment that would be of use to both of you.

Initiate a discussion of creative solutions. Suggest a new way of framing the problem: for example, instead of remaining in the frame of a demerger, reframe the negotiation as the beginning of a new relationship. This could lead to new projects of mutual interest. Are there any positive aspects to what was thought to be a negatively framed issue (Consider, for example, the difference between "the glass is half full" vs. "the glass is half empty.")

If you started out taking a firm approach, be more open now: for example, show that you are willing to consider other options on the issue scales, not only those that are close to your desired outcome. Ask questions, listen to your counterpart, and exchange priority information."

Advice 8. Adapt your approach:

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Build rapport by friendliness and empathy: for example, compliment your counterpart on being well prepared or on stating clear arguments for his or her positions on the issues. Remember to be authentic in the way you flatter. Do not convey the impression that your gestures are tactical moves intended to extract concessions from your opponent.

Separate the person from the position: direct your anger at the issues (showing a sincere belief) or the process (urging progress), not as personal attacks. Remind your counterpart that you are both responsible professionals representing your interests. As professionals, you should be able to carve out a mutually-acceptable agreement. Show respect for your counterpart even though you have differences on the issues. Be authentic as well when you are angry. It is OK to express disappointment when appropriate. Allow face saving: allow your counterpart to make mistakes and avoid making them feel foolish."

Advice 9. Be fair:

Discuss what "fairness" means to you and your counterpart: you may suggest, first, an exchange about how each of you defines fairness. Then, using these definitions, ask what a fair agreement might be. For example, what outcomes on all the issues would be considered fair? These might consist of compromises on some issues (50:50 splits) and alternating between each negotiator's preferred position on other issues (one stays in the building; the other one keeps the equipment).

Aim for an agreement that is fair for both sides. Agree on and adhere to universal guiding norms for fairness. For example, suppose you have to divide three apples between two children (5 and 15 years). The principle of equality would lead to a division of an apple and a half for each child (fairness here means that each child gets the same). The principle of equity would lead to a division of two to one (fairness here considers that the older child needs more apples to satisfy his or her hunger than the younger one). Examples are the principles of equality vs. equity. Try to form your arguments rationally, in terms of these norms."

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