

**The effect of error prevention and error management strategy on levels of affective,
motivational, cognitive and behavioural variables of negotiators in a virtual reality
suicide negotiation**

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Abstract

This study aimed to examine whether the error handling strategies error management and error prevention influenced the levels of worry, stress, self-efficacy, on-task and negative self-related off-task thoughts and the performance of negotiators in suicide negotiations. Participants watched a video to learn about suicide negotiations and the Behavioural Influence Stairway Model (BISM). Further, the participants were randomly assigned to two groups, each learning a different error handling strategy (error prevention or error management). They then applied this knowledge in a Virtual Reality (VR) crisis negotiation simulation with a suicidal person in crisis (PiC). There were 41 participants who participated in the study. The results unexpectedly showed that those in the error management group experienced higher levels of worry and stress prior to the negotiation than those in the error prevention group. Further, contradictory to previous research and what was expected, there were no differences found between the groups for all other dependent variables. These findings provide a basis on which future research can build upon since error handling strategies may have a different effect in crisis negotiations than previous research has shown in other areas. For practice the results may suggest that training for negotiations should also take error handling strategies into account since they are shown to possibly have a direct impact on stress and worry of negotiators.

Introduction

In Poughkeepsie, New York a man was standing on a bridge threatening to jump from it. After 18 hours of talking with the police, he decided to come down from the bridge in a safe manner (Woyton, 2023). However, not all crisis situations end well. In September 2023 in Detroit a woman stood to the ledge of a tall building threatening to commit suicide. Crisis negotiators spent 12 hours trying to save the woman however it was unsuccessful as the woman ended her life. The police involved in the case were emotionally affected as they “were in tears” showing the strong impact these situations can have on them. These cases are just two of many similar incidents. It is not uncommon for negotiations to take several hours contributing to the strain the negotiators experience. The Detroit Police Department reportedly had answered to over 1100 calls of people wanting to commit suicide since the start of 2023 until September 2023 (Dupnack, 2023). Worldwide approximately more than 700 000 people died by suicide in 2019 with even more having attempted suicide. Suicide is the fourth most prevalent cause of death among young people ages 18-29 years old (WHO, 2021).

The examples and statistics discussed in the paragraph above show how delicate suicide negotiations can be and how impactful they are on the negotiator. The police negotiators in these moments are responsible for doing their best to resolve the crisis in a peaceful manner and secure the safety of those involved. Due to the long time these negotiations can take and the stressful situation, it is unavoidable for the negotiators to make errors. However, despite the importance of the job which handles life and death situations, only little research has been conducted on the impact of errors in crisis negotiations (e.g., Oostinga et al., 2018a, 2018b, 2020). Previous research has found that errors increase stress, negative emotions and distraction in negotiators (Oostinga et al., 2018). This could hamper appropriate response to an error from a negotiator. Inadequately handled errors can negatively

impact the negotiation through maladaptive responses which can hinder rapport building and openness of the PiC (Alison et al., 2013). Therefore, it is crucial to investigate how errors and the way in which they are dealt with can impact the negotiators, and as a result the outcome of the negotiation. If we know more about how views on errors and error handling strategies can influence the negotiator, this knowledge could help to improve their negotiation skills. Two error management strategies have been identified in research: error management and error prevention. Error management encompasses the notion that errors are natural, and they can be learnt from whereas error prevention classifies errors as something to avoid in an effort to prevent negative consequences (Frese & Keith, 2015). The general consensus is that error management leads to more positive outcomes and error prevention to negative ones (Dimitrova et al., 2016) however how these findings apply to crisis negotiations is not clear.

To assess this, participants performed a suicide negotiation in Virtual Reality (VR). Previous work has found that VR is as effective as current in vitro training methods (Saunders et al., 2019). VR has been shown to elicit similar stress responses to real life situations in trainees which is important for training (Kleygrewe et al., 2023). Further, VR training offers a low-cost opportunity to train police with the additional ability to give each trainee the chance to practice under the same conditions in a variety of scenarios (Lavoie et al., 2023). Areas in which the use of VR for training have been researched are for example Special Weapons and Tactics (SWAT) (Giessing, 2021) or security training (Kleygrewe et al., 2023; Saunders et al., 2019). VR is already being used to train police officers for crisis negotiations for example in the Hamilton Police Service in Canada (Hristova, 2022). Thus, VR is used in this study to investigate the effects of the error handling strategies error management and error prevention on people performing suicide negotiations.

Current Study

The current study aims to see how error management strategies affect negotiators by looking at different factors, which have also been researched in prior studies. In this study the affective factors worry and stress, the motivational factor self-efficacy, the cognitive factors on-task thoughts and negative self-related off-task thoughts, behavioural performance and error response are assessed.

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This study adds to research on the effect of errors in crisis negotiation, specifically suicide negotiators and whether the results of previous research from different areas can also be applied to them. It provides more specific information on how making errors can affect negotiators during crisis negotiations depending on which error handling strategy they use. In practice, this means that this knowledge can be utilised to be able to train officers optimally for crisis negotiations in how to handle errors so that they can focus on the negotiation. Furthermore, the well-being of crisis negotiators is important. Helping police to navigate

errors effectively could help to reduce stress and thus improve their well-being. Taking into account the seriousness of a crisis negotiation and that the negotiator needs to respond appropriately to reach a peaceful resolution of the crisis situation, being prepared is vital.

In the following paragraphs the state of crisis is briefly explained followed by an explanation of crisis negotiation and the Behavioural Influence Stairway Model (BISM). Next, errors, current views within the police force and their potential effects will be discussed. Lastly, error handling strategies are explained and affective, motivational, cognitive and behavioural performance measures that could be influenced by the different error handling strategies are described, and their importance explained.

Theoretical Background

Crisis negotiation with suicidal people

As aforementioned suicide is a worldwide issue which affects many people from different backgrounds and the predisposing factors for attempting or committing suicide vary. One risk factor is having a mental illness specifically depression or alcohol use disorders (WHO, 2023). Other risk factors are living in tumultuous conditions such as conflict, disaster or feeling isolated. The act of suicide is often impulsive and often follows an impactful event, such as the loss of a loved one, financial burdens or divorce (Vecchi et al., 2019; WHO, 2023). Unable to handle these life stressors they fall into a state of crisis, usually within the last 24-48 hours before the attempt (Vecchi et al., 2019; WHO, 2023). In this crisis state PiCs are in an emotional state rather than a rational one (Vecchi et al., 2019). Through crisis negotiation the negotiator can help the PiC to calm down and reach a more rational state. Crisis negotiation is the interaction between the PiC and the police officer trained as a negotiator (Herndon, 2009). The goal of crisis negotiation is to change the behaviour of the PiC without physical force (Johnson et al., 2018). There are several methods that can be implemented by negotiators to achieve this goal one of which is the BISM.

The Behavioural Influence Stairway model (BISM)

The BISM was specifically developed by Vecchi et al. (2019) to aid suicide negotiations. The current BISM has a specific focus on how to connect with a suicidal person and to change their emotional state into a more rational one in order to change their behaviour (Vecchi et al., 2019). The crisis negotiator aims to build a trusting relationship with the PiC through communication. During the crisis negotiation there are several goals which the negotiator aims to achieve which are buying time, reducing intense emotions, collecting information, building a trusting relationship with the PiC and in the end, if successful, changing the PiC's behaviour.

The BISM consists of four stages: active listening, empathy, rapport and trust, and finally, influence which will if successful result in behaviour change. Active listening is the first stage of the model through which the negotiator starts to connect with the PiC and is also the underlying mechanism of the model as it is needed throughout the whole negotiation (Vecchi et al., 2019). Active listening means that the negotiator gives the PiC the feeling that they are heard and understood and engages with the PiC from their point of view to be able to start to understand the PiC.

Empathy, the next stage, comes naturally with active listening. Vecchi (2019) defines empathy as “an identification with and understanding of another’s situation, feelings, and motives” (p.234). The negotiator aims give the PiC the feeling that they care about them by conveying genuine empathy. The goal is to take the perspective of the PiC and understand their emotions, situation and rationale. The negotiator can express empathy by adapting the pitch and intonation to give the PiC the feeling that the negotiator is honest (Vecchi et al., 2019).

Building on this, next comes rapport and trust, which is where the negotiator can try to lead the PiC out of their mindset. Rapport is based on mutual affinity, positivity and

coordination (Tickle-Degnen & Rosenthal, 1990). At the same time trust is formed, when the PiC sees the negotiator as a person, they can rely on (Vecchi et al., 2019). Trust is a necessary component as it can increase the likelihood of being open to suggestions (Cialdini & Goldstein, 2004).

Once trust has been developed the negotiator can move on to the influence stage. Here they can have more of a leading role in the conversation for instance, offering the PiC suggestions on how to see things in a different light (Vecchi et al., 2019). After this, behaviour change can be reached, and the PiC is more likely to listen to the negotiator's request without force being needed. Connecting with the PiC and building a relationship takes time and mental effort, which can be exhausting and stressful due to the critical and delicate situation. During the interaction it is natural for the negotiator to make some errors.

Errors

Errors can be defined as something that has accidentally been done that does not adhere to how it was supposed to go (Keith & Frese, 2011). This study focuses specifically on communication errors of which Oostinga et al. (2018a) identified three types that negotiators might make during negotiations: factual, judgment and contextual errors. Factual errors are when the negotiator makes a mistake about a fact for example addressing the person with a wrong name. Judgement errors are when the negotiator did not respond in a way that acknowledges the feeling and thoughts of the other person properly, for instance trying to talk about a topic repeatedly when the other person did not want to talk about it. Contextual errors are when the negotiator does not follow police practices and procedures correctly. It is not possible to avoid making any errors at all in crisis negotiations as these often take a long time and are highly stressful (Reason, 1990). However, making an error can cause feelings of stress and negative emotions in the negotiator (Oostinga et al., 2020). It is important for

police officers to stay focused and calm in order to respond correctly if an error does occur therefore, having an appropriate error handling strategy is useful.

Error handling strategies

In the police force different ways of handling errors depending on the context exist. Oostinga et al. (2018a) interviewed police officers to explore how they handle errors. Police had a contradicting view of errors in the sense that they associate them with something negative but at the same time think that errors are not always harmful. Additionally, the context of when an error is made is of importance in determining whether it seen as worrisome and how it is dealt with. If a suicidal person is in a room an error is viewed as less of a problem than when they are standing at the ledge of a building. When an error has been made the police do not always deem it necessary to respond to the error made and instead may redirect the focus of the conversation in the case that the other party has not responded to the error yet. Often time crisis negotiators are mainly focused on resolving the situation and do not have time to focus on an error made. However, if the PiC acknowledged the error, then the police would have to react to the error made.

Previous work has distinguished between two error handling strategies which are error management and error prevention. The error management approach means that errors are seen as something that naturally occurs and when they happen, they can be learnt from. Contrastingly, error prevention is less accepting of errors since the idea is that making errors is something that should be avoided in order avoid any negative effects (Frese & Keith, 2015; Hofmann & Frese, 2011; Keith & Frese, 2008). Dimitrova et al. (2016) coined two perspectives concerning the error management strategies which are the error management advantage perspective and the error prevention disadvantage perspective. With this it is meant that some research has found error management to result in positive effects on some aspects, whereas other research attributes the previously mentioned positive effects from error

management to the negative impact of error prevention. Dimitrova et al. (2016) found support for both perspectives with error management have a beneficial effect on affective and motivational factors, whereas error prevention had a negative impact on cognitive factors.

While previous research has generally seemed in favour of error management (e.g. Dimitrova et al, 2016; Frese & Keith, 2015; Keith & Frese, 2008) it cannot be assumed that error management will have the same beneficial outcome for crisis negotiators. Oostinga et al. (2018a) saw the possibility of the danger in a negotiator who adheres too closely to the error management strategy so that they do not feel enough stress about making an error which can cause a reduction in focus (cf. Gutshall et al., 2017). Likewise, not having enough ‘sensitivity’ about errors can lead to not noticing that an error was made (Oostinga et al., 2018a). Both can be detrimental to the negotiation process.

The effects of error handling strategies on the error maker have been studied in organisations and on the individual level in different areas e.g., working with computers (Keith & Frese, 2005). The effects of error handling strategies in crisis negotiations and specifically crisis negotiators remain unexplored and thus the current research aims to fill this gap. The question arises how these strategies can affect crisis negotiators and whether the result of previous research in other areas apply to them too.

Effects of error prevention and error management

Worry, Stress and Self-efficacy.

Levels of worry, stress and self-efficacy can affect a crisis negotiator in several ways as will be explained in the following. Worry is the action of thinking about issues or bad things that could happen which can cause feelings of anxiety (Borkovec, et al., 1983). Stress encompasses the way the body reacts to a mental, emotional, or physical stressor (Ramanathan & Desrouleaux, 2022). Self-efficacy is a person’s belief in how capable they are of achieving a set goal (Bandura, 1997).

Error management has been shown to reduce worry (Dimitrova et al., 2016) and anxiety (Wang et al., 2020). Potential negative feelings that come as a result of having made an error such as worry can be minimized by reframing to be seen in a more neutral and less detrimental way (Frese & Keith, 2015). Error management is also said to be able to reduce anxiety due to the social support that comes with Error management culture (Kurtessis et al., 2017). An Error management culture means that within a team or organisation errors can be discussed and are accepted without blaming or fear (Keith & Frese, 2015). This could be particularly important for police officers due to the highly intense experiences they can come across in their duties.

Experiencing stress is to be expected in crisis negotiations (Oostinga et al., 2018a). A certain amount of stress can help negotiators stay focused on the task and can be important to take error seriously (Gutshall et al., 2017; Oostinga et al., 2018a). When one is acutely stressed the body reacts in several ways such as a faster heart rate, memory loss and tunnel vision (Verhage et al., 2018). Too much stress can be a hinderance during police interactions as stress can negatively impact decision making (Stephenson et al., 2022). Thus, examining the amount of stress negotiators feel in regard to negotiations is crucial as well as its effects. Error management culture has been shown to have a reducing effect on stress (Ashraf et al., 2022). Presumably because error management aims to accept errors as part of the learning process which could help negotiator's view errors in a less negative way.

High self-efficacy has been shown to lead to improvements in many areas, for example improved academic performance (Beatson et al., 2020). Somers and Terrill (2022) theorized that officers with high self-efficacy could be able to cope with stress better, think more strategically and use minimum coercion to deal with situations. It was found that high coping self-efficacy helped military personnel to be able to deal better with acute stress (Wu et al., 2022; Delahaij & Van Dam, 2017). While some research did not find error handling to

affect the level of self-efficacy (Bell & Kozlowski, 2008), other research has found a positive effect of error management on self-efficacy (Carter & Beier, 2010; Dimitrova et al, 2016).

Dimitrova et al. (2016) noted that this difference may be due to the fact that research looking at task specific self-efficacy found no effect while other research looking at general self-efficacy found an effect. Furthermore, feeling control over the outcome when an error occurs and not helpless could increase self-efficacy.

Following the above argumentation, it is expected that:

H1: Adhering to an error prevention strategy leads to more worry in negotiators before a negotiation than an error management strategy.

H2 Adhering to an error prevention strategy leads to higher self-efficacy in negotiators before a negotiation than an error management strategy.

H3: Adhering to an error prevention strategy leads to a higher stress response in negotiators before and during a negotiation than an error management strategy.

Negative self-related off-task thoughts and on-task thoughts. When focusing on a task people can have on-task thoughts or negative self-related off-task thoughts. On-task thoughts are those thoughts that people have when focusing on a task while negative self-related off-task thoughts are those that happen when attention is redirected on something other than the task at hand (Smallwood et al., 2006). Since humans only have a finite capacity of cognition, on-task thoughts and off-task cannot be present at the same time with the same amount (Kanfer and Ackerman, 1989). Negative self-related off-task thoughts can take up the limited cognitive resources making it hard for a person to focus on the task well and thus hinder successfully reaching a goal.

Error prevention has been shown to reduce task focus and increase negative self-related off-task thoughts (Dimitrova et al., 2016). Error prevention could make negotiators distribute mental effort on not making any error and thus leading them to focus less on the

negotiation and more on themselves and how well they are performing while error management would leave more room to focus purely on the task since errors are not seen as much of a threat. Furthermore, it is possible that after having made an error negotiators become more focused on the conversation, which may be because they see errors as something they can learn from which would be in line with an error management strategy (Oostinga et al, 2018a). Based on these results the following is expected in this study:

H4: Adhering to an error prevention strategy leads to more negative self-related off-task thoughts and less on-task thoughts in negotiators than an error management strategy.

Behavioural performance.

The performance variable encompasses how well the negotiators adhere to the BISM. The more negotiators deviate from the BISM the worse their performance is and vice versa. It is expected that error prevention would cause more errors by deviating from the BISM during the negotiation. Focusing on avoiding errors can take up cognitive capacity to focus on the task (Frese & Keith, 2015). When the negotiator is not fully able to use their full cognitive capacity their ability to think of the correct way to respond could be reduced. Since errors are largely inevitable an error is bound to happen during a negotiation. When an error happens but are seen as negative it can cause cognitive overload and negative feelings which in turn can lead to making more errors causing an error cascade, meaning making one error leads to further errors (Goodman et al, 2001). However, when errors are seen as something that can be handled in a positive way there is less chance for more errors (Frese & Keith, 2015). Furthermore, since people in an error prevention group want to avoid making errors as much as possible perhaps, they would try to end the negotiation as fast as possible and get the PiC to safety fast. However, this would be detrimental to the negotiation process and cause them to move too fast onto the next stage of the BISM. Those in the error management group

would be able to focus more on building a relationship with the PiC since they do not fear errors as much. Thus, the following is expected:

H5: Adhering to an error prevention strategy leads to more errors made by negotiators in applying the BISM during a negotiation than an error management strategy.

Error Response

Apart from looking at how well negotiators adhere to the BISM, another important aspect what they say having made an error. When having made an error negotiator may generally respond in four different ways: apologise, accept, contradict, deflect (Oostinga et al., 2018a). Apologise is when the negotiator says sorry and explains the reason for the error (“I am sorry, I think I did not hear it correctly. Can you explain that to me again?”) and has been found to have the most positive effect. Accept is when the negotiator acknowledges the error was made (“You are right, my error.”). Contradict is when the negotiator refuses that an error has been made (“I think you understood me wrong.”). This is used to set boundaries when necessary (Oostinga et al., 2020) but should not be used otherwise since it can have a negative effect (Oostinga et al., 2018b). Lastly, attribute/deflect refers to when the negotiator blames someone else for the error (“I misunderstood this from a colleague.”).

The reason for which response a negotiator might choose could depend on different factors. Oostinga et al., (2020) found that negotiators responded to an error with an apology when they felt more stressed and the fewer negative emotions they felt, the more they deflected. According to this finding, in our study it should be found that participants in the error management groups would be less likely to apologise than the error prevention group, due to the hypothesised lower levels of stress the error management group should experience. Further, the error management group would be more likely to deflect than the error prevention group, since they hypothetically should feel fewer negative emotions regarding making an error. However, error management is about learning from errors and has been

shown to improve adaptive transfer learning meaning they can apply existing knowledge to a different problem or circumstance (Dimitrova et al., 2016). Thus, their learnt knowledge that errors need not be harmful to the negotiation process would possibly make negotiators more likely to respond adequately to an error by apologizing or accepting the error, while the error prevention group would be more worried about the error and avoid admitting to it in order to try and redirect the PiC's attention to avoid negative consequences. Due to these contradicting arguments, providing a hypothesis is not possible and therefore, an exploratory approach is taken to answer the following question:

RQ: How do the error strategy approaches affect the error response of a negotiator?

Methods

Design

To answer the hypotheses of this study a between-subject design was implemented. The independent variable was the *error handling strategy* (error prevention vs. error management) and the dependent variables were *worry*, *stress (perceived stress & physiological stress)*, *on-task thoughts* and *negative self-related off-task thoughts*, *self-efficacy*, *behavioral performance* and *error response*.

Participants

The participants were recruited via SONA systems at the University of Twente, where students can collect points by taking part in studies and additionally, participants were recruited using snowball sampling and distributing flyers. In total 41 participants participated in the study. The participants were randomly distributed into the two conditions by Qualtrics: error prevention ($n = 20$) or error management ($n = 21$).

Of the 41 participants 14 (34.1%) were male and 27 (65.9%) were female. Regarding level of education achieved, 32 (78%) had completed high school, 2 (4.9%) an apprenticeship, and 7 (17.1%) a bachelor's degree. About half of the participant originated

from Germany ($n = 19$, 46.3%), 12 from the Netherlands (29.3%), and 10 from other countries (24.4%). Ages ranged from 18 to 56 ($M = 23.51$, $SD = 1.22$). Most participants did not tend to get motion sickness ($n = 34$, 82.9%) and more than half had previous experience with VR (25, 61%). Of those 13 had used it one to three times, one (7.7%) four to ten times and one (7.7%) more than 10 times. The majority of participants did not have any experience with crisis negotiation ($n = 34$, 82.9%). Of those that did the experiences consisted of suicide prevention, an internship in a psychiatry and work experience, having worked in a rehab for addition and own contact to a hotline for personal reasons, having had training sessions on how to handle difficult patients in their university course, personal experience with a friend, and having saved two of their own friends from suicide.

Materials

Learning Material

The learning material was part of the study to provide participants with useful background knowledge of the topic of suicide negotiations as a preparation for the VR crisis negotiation simulation. It consisted of two parts: a video miniseries and a post video quiz. The video miniseries consisted of five videos to watch for each participant and a total watch time of approximately 15 minutes. The videos included slides with information appearing on the slide as it was mentioned by a narrator (see Appendix A for script and slides).

The first video started with suicide statistics and information about the contents of the videos. The second video concerned crisis negotiation and its goals. The third video introduced the BISM and explained each of the four stages with an example after each stage. The example consisted of a crisis negotiation between a negotiator and a suicidal PiC (see Appendix B). Inspiration for the example negotiation was taken from van der Klok (2023), who conducted an exploration of the revised BISM which included the use of a script between a crisis negotiator and a PiC and thus applicable to this study. The fourth video

informed the participants about types of errors and based on their assigned group, about one of the two error management strategies (error prevention vs. error management). The last video was a summary of all the content. Following the videos, the participants answered a post video quiz consisting of seven questions concerning the content of the videos (see Appendix C)

It was decided to split the video into short segments because it can improve engagement and learning (Brame, 2016). Moreover, methods such as signalling by highlighting crucial information were used to keep the cognitive load low (Brame, 2016), for instance using bold letters, or showing information when it was introduced. It was decided to include examples of a crisis negotiation as it has been shown to enhance understanding (Diken, 2023). The post video quiz was implemented to improve knowledge retainment (Healy et al., 2017).

Manipulation

The manipulation was done via the video miniseries. The narrator presented the manipulation text in the video of the learning materials (see slide 21 (Error management) and 22 (Error prevention) of Appendix A). The slide presented six boxes which each showed up when the corresponding sentence was read. The content of the manipulation texts was based on the work of Dimitrova et al. (2017) and were adapted to the current study by exchanging some words, and adding some phrases which emphasise the use and impact of errors in crisis negotiations.

The error management group learned the following: “Errors can happen and making these is a natural part of the learning process. You can reduce the negative consequence and there are positive things to be gained such as learning more information about the person in crisis. When you make an error, it is important to think of how it can be corrected, what can be learned from it, and how what you learn can help you in similar situations in the future. By

successfully handling errors you will learn how to negotiate more effectively. If you try to find the useful information errors provide, you will do better during the negotiation.”

The error prevention group learned the following: “Errors should not be allowed to occur during the learning process. Errors can be harmful to the negotiation process and can lead to negative consequences. It is important to think of how you can prevent errors from occurring, what you can do to successfully detect situations possibly leading to errors, and how what you know can help you with similar situations in the future. By successfully preventing errors you will learn how to negotiate more effectively. If you try to prevent errors from occurring, you will do better during the negotiation.”

Manipulation check. To see whether the manipulation had the desired effect on the participants, a manipulation check was included within the questionnaire after the VR crisis negotiation simulation. Participants rated on a 4-point scale how they had approached the negotiation ‘Because of the training, my approach during the negotiation was to think that making errors was... 1 – “*Problematic and I tried to prevent them as much as possible*” to 4 – “*Something I could learn from*”. The error prevention group should choose the options 1 or 2 and the error management group 3 or 4. The manipulation check was evaluated with a Mann-Whitney-U test. If the results indicated a statistically significant difference and the error management group had a higher mean than the error prevention group, then the manipulation was considered successful.

Devices

The Empatica4 wristband was used to track physiological measurements. The Oculus Quest 2 was used to conduct the VR crisis negotiation simulation. Both devices were borrowed from the BMS lab of the University of Twente.

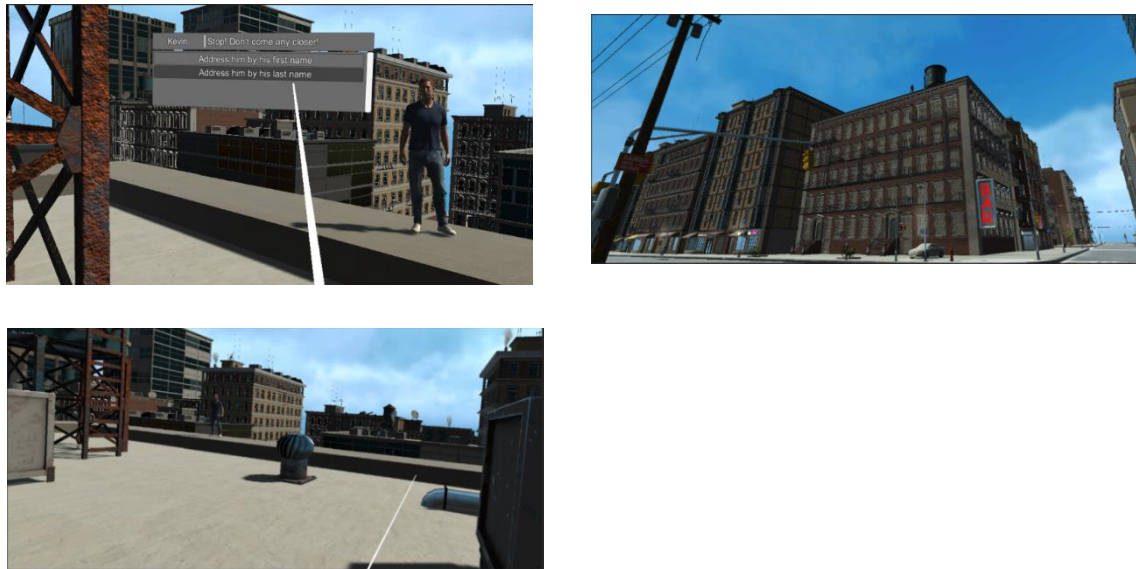
Crisis negotiation simulation in VR

VR Environment. Pictures of the VR environment can be seen in Figure 1. Once the participants entered the VR crisis negotiation simulation environment, they were standing on the street in a city facing a building which was in the opposite of the direction they would need to go to start the negotiation. This was done to give the participants some incentive to look around the environment and move around until they heard a police call 15 seconds later telling them: “We have an emergency. We have information that a person named Paul Jansen is standing on the edge of a roof and seems to be suicidal. Please go there quickly”. The participants did not know anything about the PiC other than what they were told in the call. Throughout the conversation they would learn that the PiC had debt which would cause them to lose their house and they were unsure about how to tell their family. The participants then made their way toward the tall building on top of which the PiC was standing and at a certain point, they were teleported to the top of the tall building where the PiC was again in the opposite direction of where the participants were standing. They then approached the PiC, who started the dialogue with: “Stop don’t come any closer.”

Dialogue. The dialogue tree can be found in Appendix D. During the negotiation, the responses by the PiC could be heard but not read so that the participants could focus more on the gestures of the PiC to increase immersion and connection to the PiC. The dialogue started with the participants having the option to address the PiC by either their first or last name. Both options elicited a negative response from the PiC, for example “Don’t call me that. I don’t like it when people call me this formally.” Addressing a PiC in a way they don’t like can be a judgment error. This was implemented to be able to see the effect the error had on the negotiators during the rest of the negotiation depending on which of the two error handling strategies they had learned about. The error was done this way so that the participants felt they had a choice and that they were responsible for the error and so that every participant experienced the same error, making the negotiation more comparable. The

participants had to respond to by choosing one of four options that represented the four response strategies (apologise, accept, deflect, contradict) identified by Oostinga et al. (2018a) for example apologise was represented with the statement: “I am sorry about that.”

After this the participants progressed through the four stages of the BISM and for each stage had two options to choose from. By giving the participants options to choose from, they were guided through the model and had to make decisions based on what they had learned in the videos. The options were displayed as short descriptions about the content of what that option would say, for instance after selecting the ‘Suggest solutions to their problems’ the participants could read what they would say as the negotiator, “I see that you've got a lot of problems going on in your life. I want to help you to solve these problems. Did you try to reach out to a debt consultant?” If the participants chose the wrong option, the PiC would react negatively such as stating: “I won’t step down!” However, even if a crisis negotiator does everything according to the BISM, the PiC might still react negatively. Thus, to enforce a second error all participants were confronted with a negative reaction by the PiC displaying hopelessness and apathy as a response to either option chosen in the empathy stage. After this, participants were faced with the rapport and trust stage, which needs to be developed before proceeding to the influence stage where the PiC is receptive to suggestions (Vecchi et al., 2019). Therefore, the choice the participants made in the rapport and trust stage determined the result of the negotiation. Rapport and trust could be built by participants explaining their role as a negotiator so that the PiC could learn to trust that the negotiator wants to help them. If participants chose this option, both choices in the influence stage led to the PiC agreeing to step away from the ledge. In contrast the wrong option was to explain the effects that suicide can have on the loved ones. This does not build rapport or trust as it only leads to the PiC feeling worse. If participants chose this option, both choices in the influence stage led to the PiC requesting a different negotiator.

Figure 1**Dependent variables**

The study included seven dependent variables: worry, stress, self-efficacy and on task-thoughts, negative self-related off-task thoughts, behavioural performance and error response (see Appendix E for all scales).

Worry

Worry was measured with two items taken from Dimitrova et al. (2017) ('I felt anxious.' and 'I felt worried.'). The items were introduced with the statement: "Please rate on a 5-point scale, from 1 (*'not at all'*) to 5 (*'very much so'*), to what extent you experienced the following **before** the negotiation". Worry was measured how it was before the negotiation to see how the error handling strategies would influence the participants without influence from the performance of the task. The mean of the items was calculated. The higher the score the more worry participants felt. The items showed moderate correlation $r(39) = .5, p < .001$.

Self-efficacy

Self-efficacy was measured with 5 items (e.g. "I was confident that I could efficiently deal with unforeseen events"), which were based on the items used by Dimitrova et al. (2016). 'I felt' was added since the questions referred to how they felt before the negotiation

was introduced with the following statement: “Please rate on a 5-point scale, from 1 ('not at all') to 5 ('very much so'), to what extent you experienced the following **before** the negotiation.” The reason for measuring how the participants self-efficacy was before the negotiation is so that it can be seen how the error handling strategies affect their confidence in themselves before starting the negotiation rather than the negotiation itself influencing them. The mean of all items was calculated. The higher the score the more self-efficacy the participant felt. The scale showed good reliability ($\alpha = .77$).

Stress

Perceived stress. Perceived stress was measured with three items (e.g., “I felt nervous”). These were based on the 4-item stress measure by Ströfer et al. (2016). The items were introduced with the statement: Please rate on a 5-point scale, from 1 ('not at all') to 5 ('very much so'), to what extent you experienced the following **before** the negotiation. The items were changed from questions to I-statements to fit the style of the current study and removed the indicators ‘during, or directly after the interview’. The item about feeling upset (“To which extent did you feel upset during, or after the interview?”) was removed because being upset would happen as a result of an event. However, in this study it was measured how the participants felt before the negotiation therefore only items in anticipation of the negotiation were relevant. The mean of the items was calculated. The higher the score the more stressed the participants felt. The scale showed good reliability ($\alpha = .74$).

Physiological stress. The physiological measurement to assess stress was heart rate. The Empatica 4 was worn by the participants on the left wrist since they would use the controller with their right hand. A stopwatch was started as soon as the Empatica 4 started measuring. The time was stopped when the call in the VR started so that it could be determined from which point the heart rate data represented the time during the VR. The participants wore the Empatica 4 until the end of the study file. The mean of the heart

rates was calculated for each group before, during and after the VR negotiation. The rates were compared between the groups to measure stress.

On task thoughts

On-task thoughts was measured with 3 items for instance “I found it easy to concentrate on the negotiation” and were introduced with the statement: Please rate on a 5-point scale, from 1 ('not at all') to 5 ('very much so'), to what extent you experienced the following **during** the negotiation. The items were based on Dimitrova et al. (2017). The word ‘task’ was replaced with ‘negotiation’. The mean of all items was taken. The higher the score the more task focused the participants were. The scale showed good reliability, ($\alpha = .73$).

Negative self-related off-task thoughts

Negative self-related off task thoughts, based on Dimitrova et al. (2017) and originally created by Dickhäuser et al. (2011) were measured with 3 items for example “I thought about how poorly I was doing” and were introduced with the statement: Please rate on a 5-point scale, from 1 “*not at all*” to 5 “*very much so*”, to what extent you experienced the following **during** the negotiation. The word ‘negotiation’ was used instead of ‘task’. The mean of the items was taken. The higher the score the more distracted the participants were from the task. The scale showed good reliability, ($\alpha = .75$).

Behavioural Performance

To assess how well participants performed during the VR negotiation the responses of each participant were recorded. For each stage of the BISM participants could choose one of two options where one adhered to the BISM and the other did not. The number of correct answers of the first three stages were added together to get the final score. The more points each participant achieved the better they performed since they adhered more closely to the BISM.

Exploratory analysis variables

Presence

To measure presence participants answered an 11-items questionnaire based on the 14-item questionnaire of Renes (2023). For this study three items were removed because they did not relate to the current VR experience. Additionally, the words ‘my partner’ were replaced by ‘the other character’ to be more specific to the current study. The items were answered on a scale from 1-*strongly disagree* to 5-*strongly agree*, for example “I felt like I was actually in the virtual environment.”) The questionnaire measured three aspects of presence: environmental presence (5 items), social presence (4 items) and co-presence (2 items). The mean of the items was taken. The higher the score the more immersed the participants felt. The reliability was good ($\alpha = .70$). This measure was included to be able to account for differences in the scores of the dependent variables.

Error Response

To find out how participants responded to an error, the participants could choose between four response options which represented one of the four responses identified by Oostinga et al. (2018a). “My colleagues told me to open this way” (deflect), “I think you understood me wrong.” (contradict), “I am sorry about that.” (apologise), and “You’re right, I will address you the way you prefer from now on.” (accept).

Procedure

Before collecting data, the Ethics Committee BMS (Behavioural, Management and Social sciences) of the University of Twente had given permission to conduct the study (ethics number, 231348). Qualtrics was used to present the videos which included the manipulation, and collect the data of the informed consent, scales, demographics and to debrief the participants. The study consisted broadly of three parts, the learning materials, the VR crisis negotiation simulation and lastly the questionnaire.

When the participants entered the room, they were instructed to take a seat and were then briefed on what would happen in the study, by telling them that they would first watch videos, followed by a VR crisis negotiation simulation and lastly would fill out a questionnaire. After this the participants read the informed consent form (see Appendix F) and agreed to taking part in the study. The informed consent made them aware of risk factors in the study: VR motion sickness, heights, and topic of suicide. Then the participants were asked to wear the Empatica4 wearable after which the participants answered questions about motion sickness and prior VR experience in Qualtrics. Next, the participants moved on to the learning materials followed by the VR crisis negotiation simulation. Before starting the VR crisis negotiation simulation, the participants were informed that they would receive a call after 15 seconds once in the VR environment and subsequently the VR crisis negotiation simulation was started. The mean time until the start of the VR negotiation was 20.45 minutes ($SD = 1.40$), and the VR negotiation took a mean time of 3.35 minutes ($SD = 1.05$) to complete. After this the participants answered the questionnaires and questions about their demographics. Finally, the participants read the debrief (Appendix H) and were asked again for their consent to use the collected data for the research.

Data Analysis

To analyse the data, SPSS was used and an alpha level of .05 was applied in the analyses. The manipulation check and the hypotheses 1, 2, 3, 4 and 5 were assessed with Mann-Whitney-U Test since the data were not normally distributed. Additionally, for hypothesis 3 the physical stress based on heart rate was analysed with ANCOVA controlling for post VR heart rate. A Chi-Square Test was performed to test whether there was a difference in what negotiators say after making an error and was evaluated with the Fisher's Exact Test.

Results

Descriptive statistics

Table 1 displays the correlations, means and standard deviations of the dependent variables and additional variables. Pearson correlation was performed for all variables except post video quiz and performance for which the spearman's correlation was conducted. Stress and worry showed a significant moderate positive correlation meaning those that scored high on stress were more likely to score high on worry. The higher the scores of the post video quiz, which indicated how well the participants understood the contents of the video, the more likely they were to score high in level on presence. Off-task thoughts had a slight positive correlation with levels of stress which indicated that those that scored higher on feeling of stress before the VR negotiation were more likely to score higher on off-task thoughts during the VR negotiation. Further, the more presence the participants felt the more likely they had on-task thoughts during the VR negotiation. Furthermore, performance showed a moderate negative correlation with off-task thoughts and presence.

Manipulation check

A Mann-Whitney-U test showed that there was a statistically significant difference between the error prevention group ($M = 1.85$, $SD = 1.04$) and the error management group ($M = 2.81$, $SD = 0.98$), ($U = 105.5$, $z = -2.82$, $p = .005$). Additionally, the mean for the error management group was higher than for the error prevention group meaning the manipulation was successful.

Table 1*Correlations of Dependent Variables of the Groups Error Prevention and Error Management*

	<i>M</i>	<i>SD</i>	1	2	3	4	5	6	7	8	9	10
1 Worry	2.17	0.91	--									
2 Self-efficacy	3.45	0.70	-.09	--								
3 Stress	2.23	0.83	.67**	.02	--							
4 On-Task	4.16	0.69	.15	.19	.00	--						
5 Off-Task	2.01	0.85	.22	-.24	.39*	.18	--					
6 Post video quiz	6.34	0.85	.12	-.06	-.08	.26*	.11	--				
7 Presence	3.58	0.47	.18	.22	.30	.38*	.23	-.12				
8 Pre HR	83	10.14	.19	-.02	.19	.43*	.53*	.35*	.01			
9 During HR	83.59	12.44	.05	.12	-.13	.16	.02	.16	-.02	.46**		
10 Post HR	81.47	11.10	.09	-.04	-.18	.36*	.27	.28	-.11	.72**	.59**	
11 Performance	2.73	0.45	-.16	-.13	-.10	-.30	-.43**	-.14	-.46**	-.29	-.05	-.25

Note: $n = 41$ for worry, self-efficacy, stress, on-task, post video quiz, presence and performance

$n = 40$ for off-task

$n = 33$ for heart rate (HR)

Worry, Self-efficacy, stress, on-task, off-task, presence = 5-point-Likert scale

Post video quiz = maximum of 7 points, Performance = maximum of 3 points

* = $p < .05$, ** = $p < .001$

Hypotheses Testing

In this study it was investigated whether adhering to an error management strategy leads to less worry (H1) and higher self-efficacy (H2) in negotiators before the negotiation than an error prevention strategy. Further, whether following an error prevention strategy elicits a higher stress response in negotiators before and during the negotiation (H3), more negative self-related off-task thoughts and less on-task thoughts during the negotiation (H4) and making more errors in applying the BISM during the crisis negotiation (H5) than an error management strategy. The means, standard deviations and analyses results of the Mann-Whitney-U tests and ANCOVA for each group are listed in Table 2.

Contradictory to expectations the results indicated that there was a significant difference between the level of worry prior to the negotiation, with the error management group scoring higher. Thus, hypothesis 1 was rejected. Furthermore, those in the error management group experienced higher levels of perceived stress than those in the error prevention group before the negotiation. Controlling for the heart rate post VR crisis negotiation, no statistically significant difference was found for the heart rate during the VR crisis negotiation between the error management and error prevention groups. Thus, hypothesis 3 was rejected.

Furthermore, there were no significant differences between the groups regarding on-task thoughts and off-task thoughts during the negotiation or self-efficacy before the negotiation. Therefore, hypotheses 2 and 4 were rejected. Lastly, the results do not indicate a significant association between error management strategy and adherence to the BISM and thus hypothesis 5 was rejected.

Table 2

Means, Standard deviations, and Statistics of the Dependent Variables of Both Groups.

	Condition				Mann-Whitney-U test		
	Error Management		Error Prevention		<i>U</i>	<i>z</i>	<i>p-value</i>
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>			
Worry*	2.48	1.04	1.85	0.63	134.5	-2.00	.045
Self-efficacy	3.42	0.86	3.49	0.50	205	-0.13	.896
Stress*	2.49	0.88	1.95	0.70	135	-1.98	.048
On-task	4.12	0.65	4.20	0.75	191	-0.50	.615
Off-task	2.11	0.93	1.91	0.77	177.5	-0.60	.547
Performance	2.76	0.44	2.70	0.47	223	-0.44	.659
ANCOVA							
					<i>F (1, 30)</i>	<i>p-value</i>	η^2
Pre-HR	83.48	9.13	82.49	11.39			
during HR	80.77	11.32	86.58	13.22	2.88	.100	.088
post HR	81.52	12.19	81.42	10.22			

Note: * = $p < .05$

Error management: $n = 21$, Error prevention: $n = 20$ except $n = 19$ for off-task¹

Heart rate (HR)²: $n = 16$ (error prevention), $n = 17$ (error management)

Exploratory analysis

The exploratory analysis investigating how negotiators respond when having made an error depending on their error management approach showed that all participants chose either accept or apologise, thus there was no difference observed between the two groups. In total 15 (36.6%) participants apologized and 26 (63.4%) accepted. None of the participants contradicted or deflected the error. In the EM group 7 (33.3%) participants chose to apologise and 14 (66.7%) chose to accept while in the EP groups 8 (40%) chose to apologise and 12 (60%) accepted. The Fisher's Exact Test indicated there was no difference ($p = .751$) between the groups in the frequency of either choosing to apologise or accept.

¹ One participant did not answer one of the items for off-task thoughts meaning this participant was excluded for this variable but included for the others.

² Due to failing to be able to provide an accurate time for when the participants started the negotiation 17 participants from the error management and 16 participants from the error prevention group were included from the analysis of the heart rate.

Additional Analyses

To see whether these correlations could be group specific the correlations between the variables were analysed by group as can be seen in Table 3 and 4. A higher score in self-efficacy correlated with less off-task thoughts for error management, but with more on-task thoughts in the error prevention group. Furthermore, in the error prevention group higher scores on presence correlated moderately with more off-task thoughts and lower performance scores showed a moderate negative correlation with off task thoughts and presence. The scores from the post video quiz were slightly positively correlated with levels of on-task thoughts.

Furthermore, to test whether there were any differences in heart rates before, during or after the VR crisis negotiation a mixed 3x2 ANOVA was conducted. There was no interaction effect of heart rate and group, $F(2, 62) = 2.18, p = .122$, partial $\eta^2 = .066$. Further, there was no main effect of heart rate $F(2, 62) = 0.81, p = .448$ partial $\eta^2 = .026$ and no between-subjects effects $F(1, 31) = 0.22, p = .644$ partial $\eta^2 = .007$. Lastly, a t-test showed that there was no significant difference in presence $t(39) = 0.79, p = .433$.

Table 3

Correlations for Error Management

	1	2	3	4	5	6	7	8	9	10
1 Worry	--									
2 Self-efficacy	-.19	--								
3 Stress	.68**	-.02	--							
4 On-Task	.38	-.02	.09	--						
5 Off-Task	.24	-.45*	.26	-.02	--					
6 Post video quiz	.11	-.35	-.00	.08	.18	--				
7 Presence	.36	.28	.34	.41	-.10	-.04	--			
8 Pre HR	.29	-.20	.14	.43	.60*	.21	.02	--		
9 During HR	.22	.06	-.31	.09	-.40	.06	-.15	.06	--	
10 Post HR	.18	-.15	-.15	.25	.30	.04	-.13	.78**	.50*	--
11 Performance	-.25	-.26	-.31	-.29	-.41	-.22	-.38	-.41	.35	-.09

Note: $n = 21$, $n = 17$ for heart rates (HR)

* = $p < .05$, ** = $p < .001$

Table 4

Correlations for Error Prevention

	1	2	3	4	5	6	7	8	9	10
1 Worry	--									
2 Self-efficacy	.25	--								
3 Stress	.54*	.15	--							
4 On-Task	-.10	.54*	-.06	--						
5 Off-Task	.09	.25	.57*	.43	--					
6 Post video quiz	-.07	.30	-.35	.48*	-.03	--				
7 Presence	.11	.15	.41	.36	.67**	-.09	--			
8 Pre HR	.08	.26	.23	.43	.47	.42	.01	--		
9 During HR	.01	.17	.16	.21	.48	.27	.03	.80**	--	
10 Post HR	-.05	.20	-.24	.49	.22	.54*	-.09	.68**	.74**	--
11 Performance	-.19	.00	-.02	-.28	-.49*	-.10	-.49*	-.22	-.41	-.38

Note: $n = 20$ for worry, self-efficacy, stress, on-task, post video quiz, presence and performance

$n = 19$ for off-task, $n = 16$ for heart rates (HR)

Discussion and Conclusion

Errors are an inevitable part of crisis negotiations and how they are dealt with may impact impact on the negotiation. Thus, this study aimed to analyse how the error handling strategies error management and error prevention affect negotiators. More specifically, how they affect levels of worry, self-efficacy, stress, on-task and negative self-related off-task thoughts and the behaviour of suicide negotiators. The current study found that negotiators in the error management group experienced higher levels of worry and stress prior to the crisis negotiation than those in the error prevention group. The other dependent variables, on-task thoughts, negative, self-related off-task thoughts, self-efficacy, physiological stress and

performance were not shown to have any significant difference between the two groups. Further, all participants correctly chose to either accept or apologize after having made an error. Thus, this study not only failed support the general notion of the error management advantage or the error prevention disadvantage effect (Dimitrova et al., 2016) but also showed an opposite effect regarding worry and stress. There may be several explanations for why this study did not confirm our hypotheses or reflect the results of previous research. First the results of worry and stress are discussed, followed by self-efficacy. Lastly, on-task and negative self-related of task thoughts and behavioural performance are discussed.

One reason for finding an opposite effect of stress and worry than expected could be that the error management group were told that errors are normal, and thus bound to happen, while the error prevention group did not expect errors to happen since they were told to avoid them. With inevitability of errors in this high stakes situation, the error management group could have felt worried and stressed about how to deal with them, while the error prevention group did not expect any errors to happen since they were told to avoid them. Further, the average level of stress and worry in the error management group although higher than in the error prevention group was not concerningly high meaning it would not likely be detrimental as also evidenced by no significant difference in heart rate pre-VR. However, the results are in line with previous research indicating that error management has an impact on affective factors (Dimitrova et al., 2016).

While the difference between the heart rates of both groups was not statistically significant there was a difference in that the error prevention group showed a higher mean heart rate than the error management group during the VR suicide negotiation. A larger sample size could confirm whether there could be a significant difference since the number of participants available for the heart rate comparison in this study was low. Furthermore, electrodermal activity (Ain et al., 2022), and heart rate variability (Peabody et al., 2023)

would be other reliable measures of stress and could also be evaluated in future research to gain a more in-depth insight into the stress response of negotiators. Additionally, investigating how negotiators physiologically react just after having made an error can provide more detailed insight into how an error affects the negotiator and whether error management and error prevention lead to different outcomes.

Regarding self-efficacy, the general score was neither high nor low in both groups and thus, error management was not shown to have a beneficial effect like Dimitrova et al. (2016) and Carter and Beier (2010) had found. However, previous research had also not found any effect of the error approach on the levels of self-efficacy (Bell & Kozlowski, 2008) which they attributed to individual differences in cognitive ability where people with higher ability benefited from an error management approach (Gully et al., 2002). Another factor to consider is that the participants did not know what to expect from the negotiation since they were not crisis negotiators with experience and thus unable to estimate their abilities prior to the negotiation. Participants could have felt more or less self-efficacy that they would if they knew how a crisis negotiation would actually be like. The results of our study could therefore be more applicable to novice negotiators than those with more experience. Future research could examine whether there is a difference in self-efficacy before and after the task and between novice and experienced negotiators depending on their error management approach.

There could be two options for why no difference between the two groups concerning on-task and off-task thoughts were found: there is no effect of error handling strategies on on-task and off-task thoughts, or the negotiation task was too easy. Dimitrova et al. (2016) had found only error prevention to have a negative effect on thoughts, while error management had no effect. Based on the findings in this study it could be concluded that error prevention does not affect the thoughts of negotiators negatively during negotiation. However, it is to be noted that while no difference in on-task and off-task thoughts was found between the two

groups, the extent to which self-efficacy and stress correlated with on-task and off-task thoughts did differ thereby indicating that error handling strategies could have another type of effect which could be relevant to research further.

Another point regarding the findings of on-task and off-task thoughts is that the dialogue of this negotiation was simple and similar to the examples shown in the video miniseries. Previous research has shown the effect of error management to be less evident when tasks in the experiment were similar to the tasks in training, which would require analogical transfer (Keith & Frese, 2008) and thus, perhaps not able to fully reflect the effect of each error handling strategy. Error management was found to be useful in complex tasks such as tasks which require applying learnt knowledge to a different task and thus requiring adaptive transfer (Keith & Frese, 2008). Moreover, the simplicity of the task could also be a reason for not finding in difference in performance between the two groups. Adhering to the BISM was not very difficult, and thus a lower chance to see how well both groups would be able to come up with responses adhering to the BISM themselves. In our study it was not possible to fully see whether there would be an error cascade since the negotiators in the study did not have to come up with their own responses to errors directly, while at the same time trying to minimise negative consequences, which could cause a cognitive overload (Frese & Keith, 2015). Thus, further research with a more complex longer and cognitively demanding negotiation dialogue could offer a way to assess the effect of the error handling strategies situation closer to reality. Another possibility which is to have participants come up with responses themselves.

The situation of this study was quite different from that of other studies. Previous studies had focused on mundane tasks where a mistake would not be devastating such as death. One example of a task used in previous research is the train task where participants played the role of a train dispatcher and had to make sure that trains reached their designated

destination (Dimitrova et al., 2016). Further, previous research includes other types of errors than communication errors such as learning computer skills (Frese & Keith, 2015). In contrast, this study dealt with a specific high stakes situation where an error could have direct devastating consequences. Thus, taking these differences into account, it could be that the conditions of the current study lead to a different effect than previous research suggest and therefore providing a reason to further investigate error handling strategies within crisis negotiations.

Lastly, another factor which could have affected on-task and off-task thoughts is that the negotiation took place in VR. The results of the presence questionnaire were similar to previous research conducted using this questionnaire (Renes, 2023; Hartman et al., 2015). However, correlations indicated that the more presence the participants felt the more off-task thoughts they experienced. Thus, it is possible, that in a real-life scenario or higher feeling of presence could have led to a higher-off task thoughts results of the error prevention group which would in turn replicate previous results (Dimitrova et al. 2016). Further, the heart rate scores were not particularly high and thus perhaps in indication suggesting that the VR negotiation was not a sufficiently stressful experience and thus might not have been close enough to replicate a real-life scenario since a certain stress response is necessary for training (Kleygrewe et al., 2023). However, considering how short the crisis negotiation simulation was, a longer dialogue could remedy the limitation by allowing participants more time to immerse themselves into the situation.

Limitations and Future Research

The current study has some limitations and gives room for future research to extend on. Firstly, this study did not include real negotiators as it was more convenient to recruit university students and other people who were not negotiators. People who do not have experience in crisis negotiations are not familiar with crisis negotiations whereas crisis

negotiators have the training and experience to conduct negotiations. Therefore, the results of this research could possibly be applied to more novice crisis negotiators who are new to training and the knowledge gained from this research could be used to frame the way they approach errors throughout their career. As Oostinga et al. (2018a) had found, experienced negotiators have different ways of handling errors during crisis negotiations and there seems somewhat of an error management culture established in those they interviewed. However, some aspects of error prevention were present for some. How further training with specific error handling approaches would affect experienced negotiators is not clear. Thus, future research could further investigate how error management approaches affect experienced versus novice crisis negotiators.

Secondly, the crisis negotiation took place in VR, thereby taking away from a real-life experience. VR was used in this research since the same situation can be used for all participants and thus exposing all participants to the same conditions making the results more reliable. Further it is more time efficient and requires less planning and resources and VR has shown to be an effective training method (Saunders et al., 2019). Presence in the VR was average, however scores indicated that potentially off-task thoughts would be more likely in the error prevention group the more presence they felt, which could lead to results more in line with previous research such as Dimitrova et al. (2016). Perhaps more importantly the dialogue used in the VR limited the participants in ways they could communicate. A premade dialogue is useful to be able to compare participants and makes it easier to involve non-professionals. The downside here is that since the dialogue was simple the cognitive demand of the task was low. Consequently, the task was easy to focus on and not as cognitively demanding as a real-life scenario. As aforementioned the complexity of a task can affect the influence of error management strategies (Keith & Frese, 2008). Future research could work on the VR environment to make it more realistic by adding other people such as pedestrians.

Additionally, the VR scenario could be made more realistic and demanding by extending the dialogue and giving more options to choose from to increase complexity. Going a step further, more extensive research could conduct a study in real life with no premade dialogue.

Thirdly, the type of error encountered could have an effect on how it affects the negotiator. Factual errors are experienced as more problematic by negotiators than judgement errors (Oostinga et al., 2020). Since this research involved a judgement error, future research could include a factual error to see whether there would be more of a difference between the two groups regarding stress during the negotiation, on-task and off-task thoughts than this study revealed.

Lastly, the current study did not include a control group since it was not feasible. A control group would not learn about any of the error handling strategies. This could be useful since it could show whether the error management strategies even had an effect on the variables where no difference was found. Furthermore, future research could also investigate how a combination of the error handling strategies affect negotiators as some research suggests this could be useful in some cases (e.g., Van der Byl & Vredenburg, 2023).

Conclusion

In summary, this study provides first indications that error management leads to more worry and stress in crisis negotiators before a negotiation than error prevention. Furthermore, there was no statistically significant difference found for on-task and negative-self related off-task thoughts, self-efficacy, stress during the negotiation or behavioural performance and error response. Therefore, the results of this study contradict previous research and give reason for further research to be conducted concerning error handling strategies in crisis negotiations while improving on the limitations in this study such as including real crisis negotiators, a more complex dialogue or adding a control group. For practice the results mean that error handling strategies should be considered when training negotiators. The results did

not indicate a drop in performance as a result of either error management or error prevention strategy or any disadvantage of either strategy concerning focus during the negotiation. Thus, either strategy would seem appropriate to include in training. Error prevention may seem more suitable due to the lower stress and worry beforehand however, error management did not show any disadvantages during the negotiation.

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Appendix A

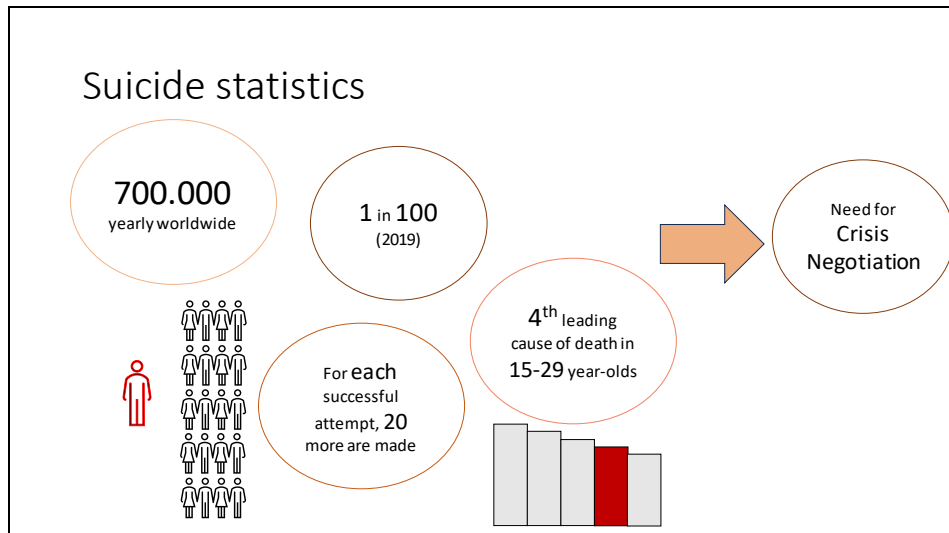
Script and Slides

Video 1

Slide 1



Slide 2



“It is estimated that more than 700.000 suicides occur worldwide every year. It is also estimated that for each successful suicide attempt, 20 other attempts are being made. Suicide is one of the most prevalent causes of death. More than one in every 100 deaths in 2019 were the result of suicide. It is the 4th leading cause of death in 15–29-year-olds. People who are considering or attempting suicide are often in a state of crisis. When a person puts themselves in a dangerous situation, crisis negotiators are called to help them back to safety. And this leads us to today's topic of crisis negotiation.

Slide 3

BMO

What you will learn

- What crisis negotiation is
- How it works
- What needs to be considered



“After this training you will know what crisis negotiation is and how it works. With that you will also learn what issues may occur and what to consider when they do. In the end you will be asked a few questions about the content of this training, so pay close attention.”

Slide 4



Click through the video miniseries consisting of 5 videos



Pause the videos at any time



Read through the notes



Imagine yourself as a negotiator



Let's start!

“You will click your way through this video miniseries consisting of 5 short videos. You are welcome to pause the videos at any time and can read through the notes presented on the screen. During this training imagine yourself as a negotiator. Now, let's move on to the first video!”

Video 2

Slide 5

Crisis State

- **Intense emotional & irrational behaviour**
- Caused by an impactful event or multiple events

Divorce

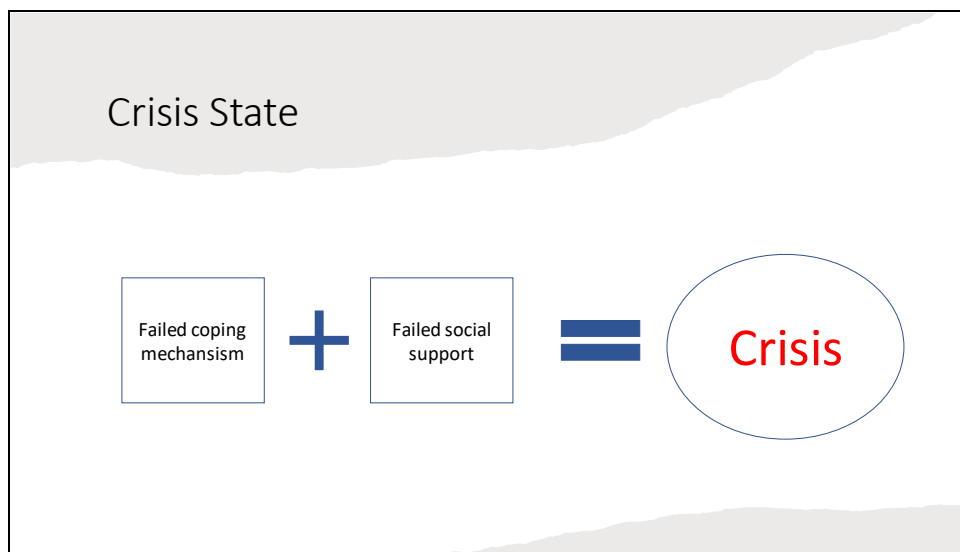
Death

Loss of Income

- 2 or more in a short time frame ➡ feeling overwhelmed

“As mentioned before suicidal people are in a state of crisis, which is characterised by a state of intense emotional and irrational behaviour. It can be caused by an impactful event or multiple events such as a divorce, death of a loved one, or the loss of income. Often two or more events that happen within a short time can lead to the person feeling overwhelmed.”

Slide 6



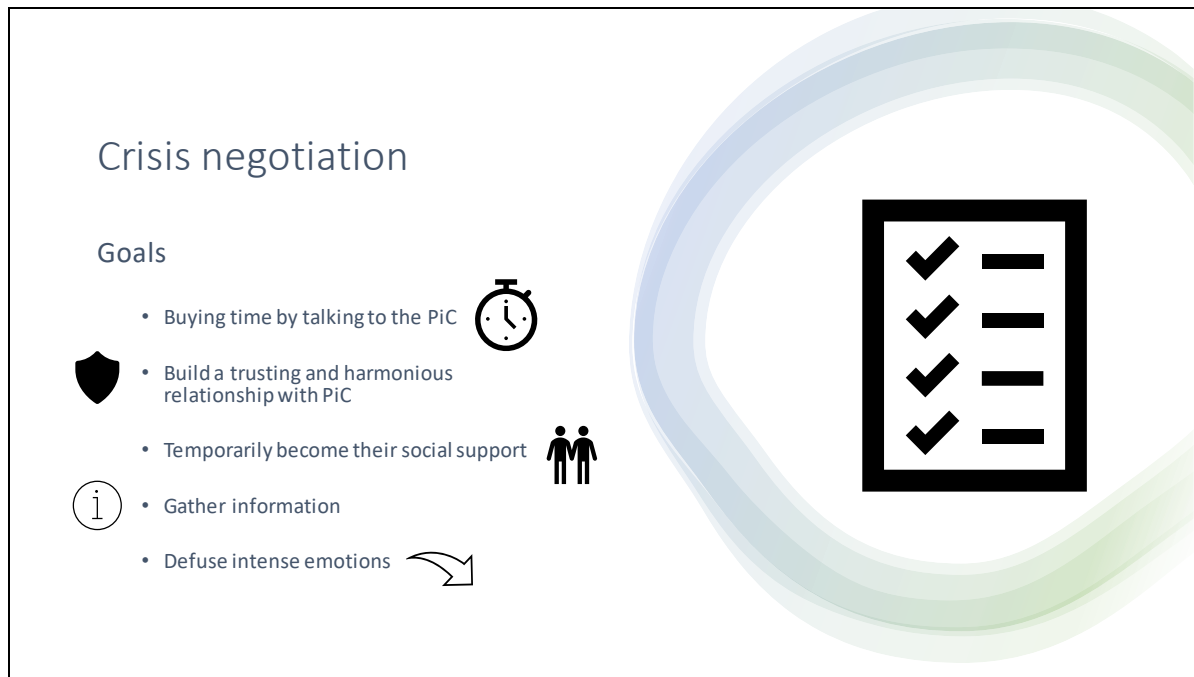
“If the person feels incapable of coping with their problems by themselves and perceives a lack of social support, they can fall into this crisis state.”

Slide 7



“Crisis negotiation aims to help these people, who are in a dangerous situation, back to safety. To achieve this, you as the negotiator should strive to achieve several goals.”

Slide 8

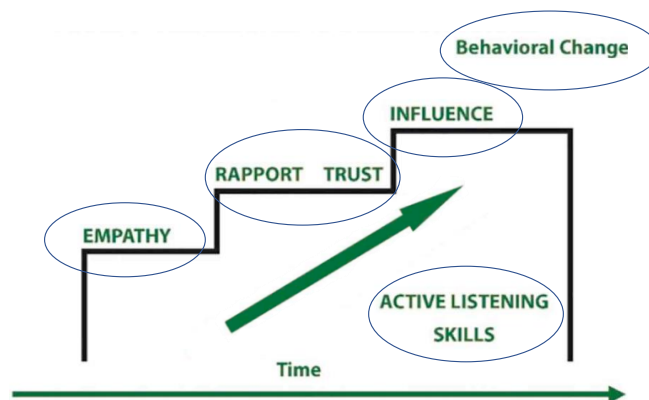


“An important part of negotiation is buying time, by talking to the person in crisis, while also building trust and a harmonious relation with the person in crisis. The negotiator aims to become their social support during the negotiation, which is vital to be able to influence the person in crisis and guide them to safety. Additionally, the negotiator gathers information to build and carry out the optimal negotiation strategies to resolve the current problems. Lastly, as a person in crisis is filled with intense emotions another crucial factor is to defuse these intense emotions. To achieve these goals, the Behaviour Influence stairway model is used, which you will learn more about in the next video.”

Video 3

Slide 9

Behavioural Influence Stairway Model (BISM)

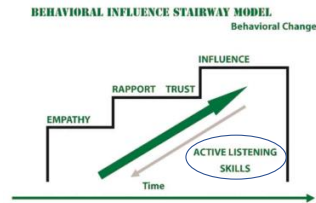


“The Behavioural Influence Stairway Model. The Behavioural Influence Stairway Model or the BISM for short is used to achieve crisis negotiation goals so that the behaviour of the person in crisis can be influenced and they can be guided to safety. The BISM consists of four stages, active listening, empathy, rapport and trust, and influence, each building up on the other to ultimately be able to help the person in crisis out of a dangerous situation by moving them to change their behaviour. As a negotiator you need to move up through the staircase fulfilling every stage before tackling the next. It might happen that you “fall down” a stage, at which point you need to repeat that stage to move back up again.”

BISM– Active Listening

BMO

- Backbone of the model and needed throughout the **whole negotiation**
- **defuse** intense negative emotions
- develop negotiator **credibility**
- focus on getting the PiC to **express emotions** → myth: harmful to ask if they want to commit suicide



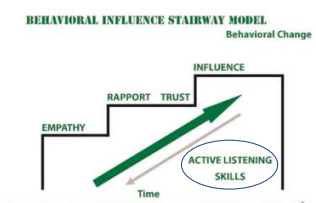
“Active listening is the backbone of the stairway model and is needed throughout all the other stages. It is also the first step in defusing intense negative emotions and developing credibility as a negotiator. During this stage you should try to not bring in your own experiences and opinions actively listen with a focus on getting the person in crisis to express emotions. Counter to widely held belief that it is harmful to ask suicidal people about their intentions to commit suicide, most are willing to discuss their thoughts.”

Slide 11

BISM-Active Listening – Core listening Skills

Core Listening Skills

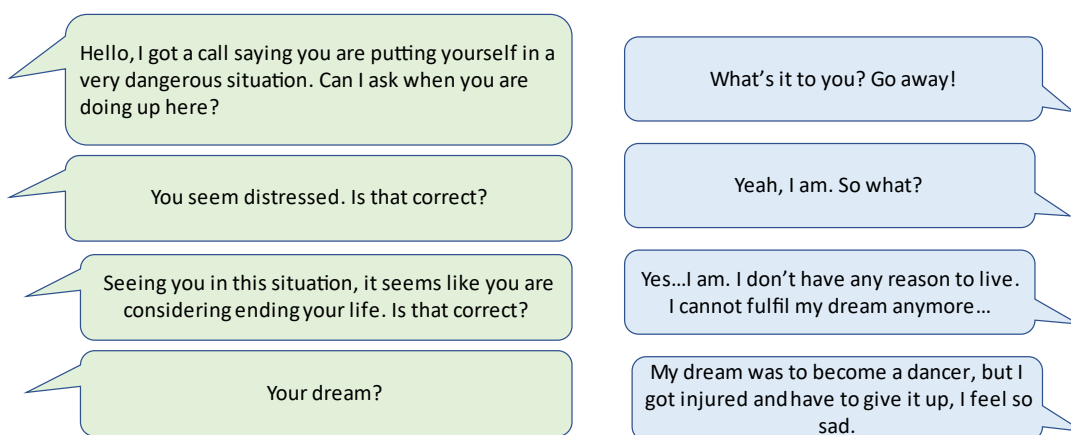
- Repeating back : “Thats why I got fired” - “You were fired.”
- Emotional Labelling : “You seem angry”
- Paraphrasing
- Summarising



“There are a range of different skills that can be helpful during the stage of active listening. These skills can help the negotiator gain more information, clarity of what is being said, and may help the negotiator to be perceived as a better listener.” One of these “Core Listening Skills” repeating back, for example, “That’s why I got fired” - “You were fired.”. Another is Emotional labelling such as “You seem angry”. Others are paraphrasing and summarising of what the person in crisis has said.”

Slide 12

Example – Active Listening

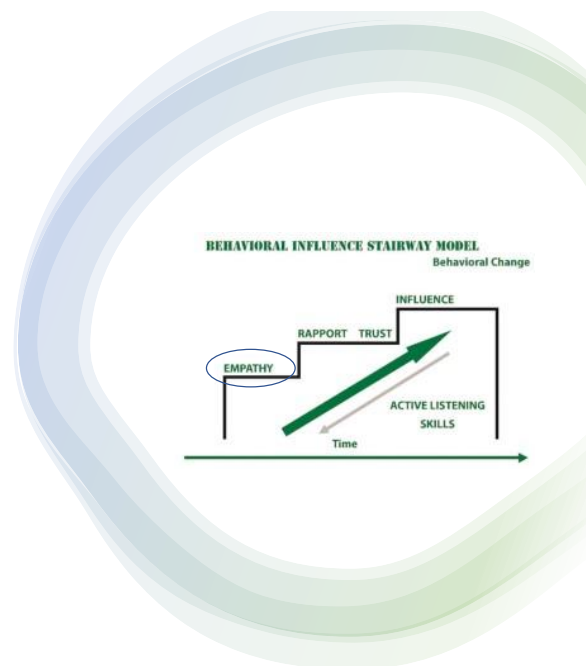


Video 4

Slide 13

BISM - Empathy

- Byproduct of active listening
- Negotiator **identifies** with the PIC
- **make subject know** the negotiator **cares** about their situation. --> important that the PIC believes this
- Otherwise, the subject will not listen to what the negotiator has to say.
- *"It is understandable how you would be angry about that"*



“Empathy. Empathy is the second stage of the model and is a by product of active listening. Showing empathy means that you identify with the person in crisis and makes them feel like you care about the situation of the person in crisis. It is crucial that the person in crisis believes you genuinely care about them so that they will listen to what the negotiator has to say. However, you still avoid giving your own opinions or experiences during this stage. An example of showing empathy would be ‘It is understandable how you would be angry about that’.”

Slide 14

TS(SMP0)

Example - Empathy

My dream was to become a dancer, but I got injured and have to give it up. I feel so sad.

It's understandable that this will make you feel sad.

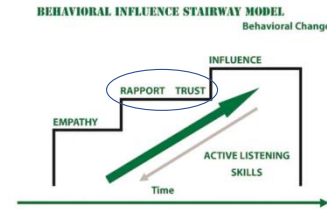
Yeah, it is very hard. I feel hopeless...

Slide 15

BISM – Rapport/Trust

Rapport = a friendly, harmonious relationship characterised by **mutual understanding and respect**.

- Good rapport: negotiator can make the person in crisis feel **comfortable to share their concerns**

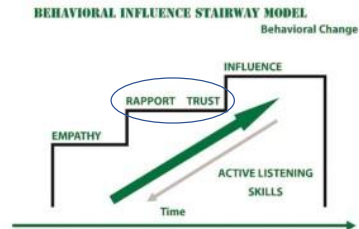


“Rapport and Trust. Rapport and Trust are the third stage of the model. Rapport is a friendly, harmonious relationship, characterized by a mutual understanding and respect for each other. Rapport is the last stage in which you should remain in the person in crisis’s frame of reference. This is the stage where, after showing a genuine desire to better understand the person in crisis, the emphasis shifts to establishing a working relationship where the person in crisis starts to see the negotiator as a collaborative partner. Good rapport means that you can make the person in crisis feel comfortable to share their concerns.”

BISM – Rapport/Trust

Pacing: the negotiator **matches** the subject in conversation which then can be helpful **guide** the subject out of the negative mindset.

- 2 techniques
 - **Matching emotion**
 - For example *if the subject is sad the negotiator also shows sadness shortly to sync with the person in crisis.*
 - **Matching the rate of speech**
 - People in crisis often speak slower than normal.

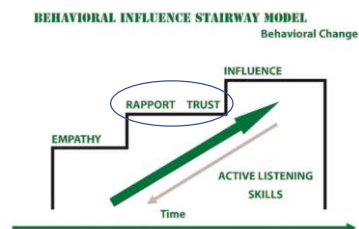


Pacing is a technique that allows the negotiator to build a connection with the person in crisis. This technique involves matching the person in crisis in conversation. For example, if the person in crisis is sad the negotiator also shows sadness very briefly, to sync with the person in crisis. This way the negotiator can guide the person in crisis out of their negative mindset. Another part of pacing is matching the rate of speech. People in crisis often speak slower than normal.

Slide 17

BISM – Rapport/Trust

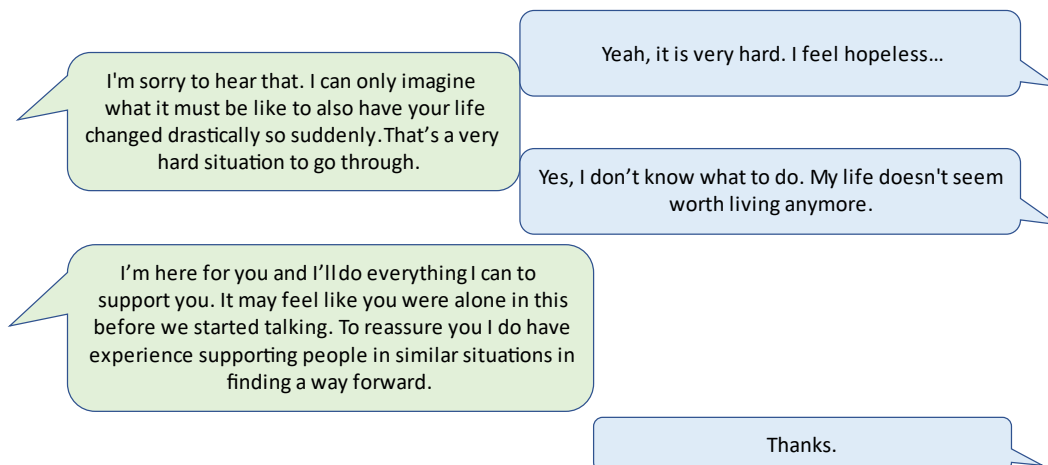
- Trust: Naturally occurs with high rapport which makes the subject open to listen
 - But only if you are honest with the PiC



“Trust naturally occurs with high rapport and makes the person in crisis open to listen to what the negotiator has to say. However, trust can only form if you are honest and keep your word. For example, if you offer to give them something you should give it to them. From this point onwards, you can point out to the PiC what you as a negotiator can do to help them and build an alliance with the PiC.”

Slide 18

Example – Rapport / Trust



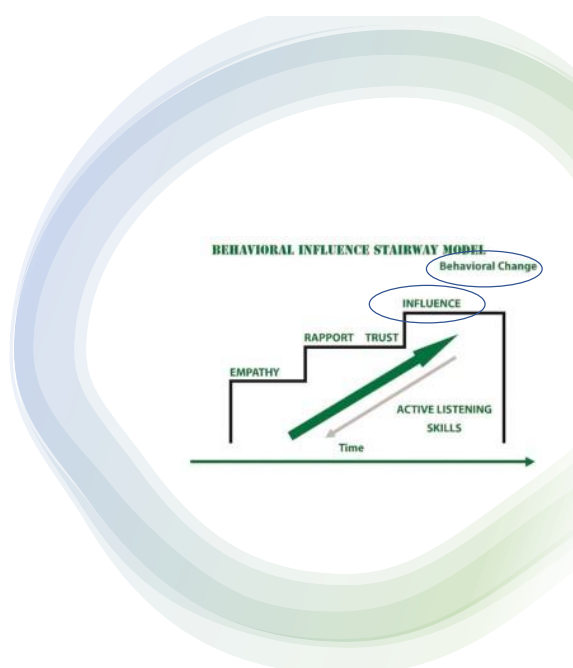
Slide 19

BISM - Influence

- Make suggestions for actions that are mutually acceptable
 - requesting the person to remove themselves from a dangerous situation or negotiate conditions for them to do so.



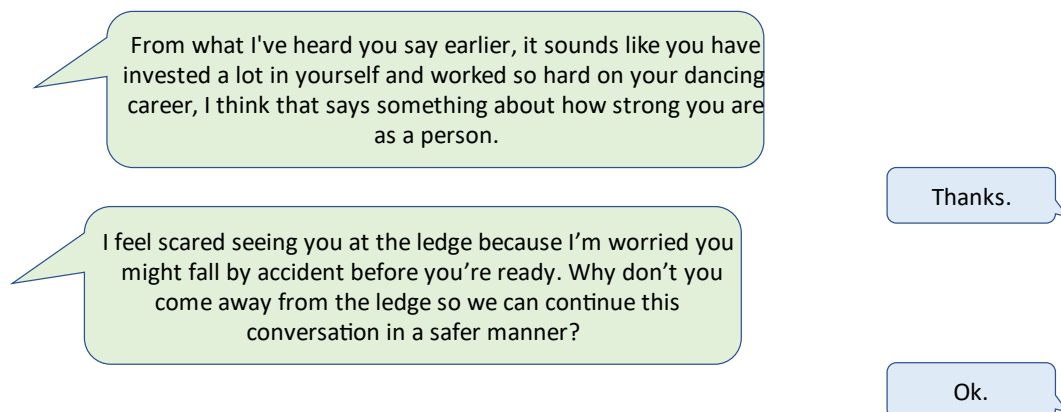
Successfully achieve behavioural change
 - PiC turns to safety



“Now that you as the negotiator have connected with the person in crisis and built a good bond it is possible to make suggestions to the person in crisis. You can then negotiate actions and resolutions that are mutually acceptable. This may include requesting the person to

remove themselves from a dangerous situation or negotiate conditions for them to do so. If everything goes well then you have reached the final step which is the goal of this model. Namely, changing the PiC's behaviour and have them return back to safety.'

Example – Influence & Behaviour change

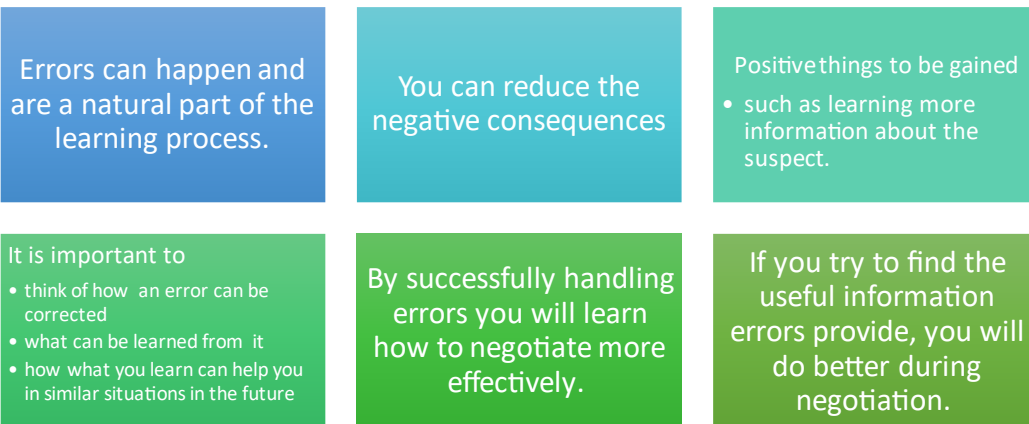


Video 5.1 Error management

Slide 21

“During negotiations with a person in crisis, it may happen that you say something that is inaccurate or not productive for the current situation. These statements are classified as ‘errors’ but they can be remedied if managed appropriately.”

Error management (Group A)



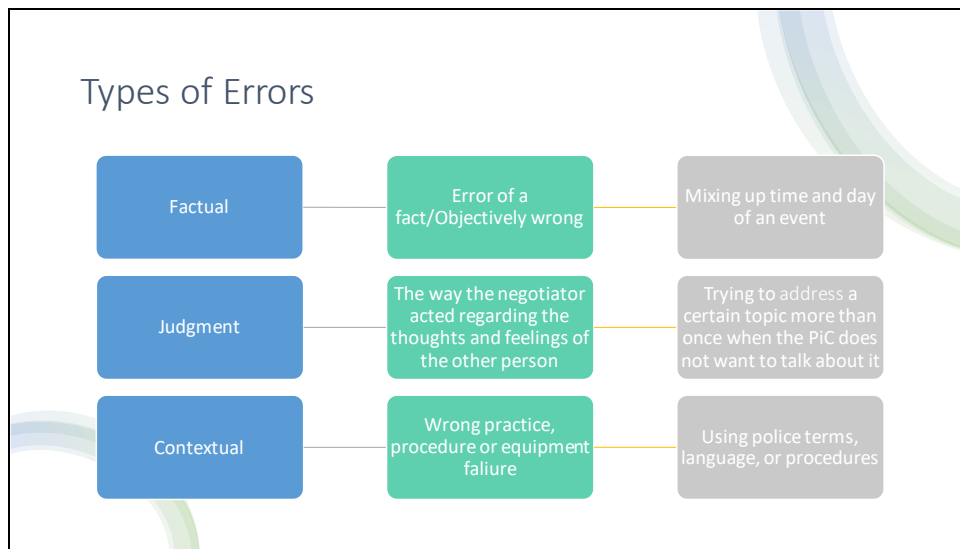
The error management group learned the following: “Errors can happen and making these is a natural part of the learning process. You can reduce the negative consequence and there are positive things to be gained such as learning more information about the person in crisis. When you make an error, it is important to think of how it can be corrected, what can be learned from it, and how what you learn can help you in similar situations in the future. By successfully handling errors you will learn how to negotiate more effectively. If you try to find the useful information errors provide, you will do better during the negotiation.”

Video 5.2 Error prevention

Impact of Errors (B Error prevention)



The error prevention group learned the following: “Errors should not be allowed to occur during the learning process. Errors can be harmful to the negotiation process and can lead to negative consequences. It is important to think of how you can prevent errors from occurring, what you can do to successfully detect situations possibly leading to errors, and how what you know can help you with similar situations in the future. By successfully preventing errors you will learn how to negotiate more effectively. If you try to prevent errors from occurring, you will do better during the negotiation.”



“There are three types of errors: Factual, Judgement & Contextual

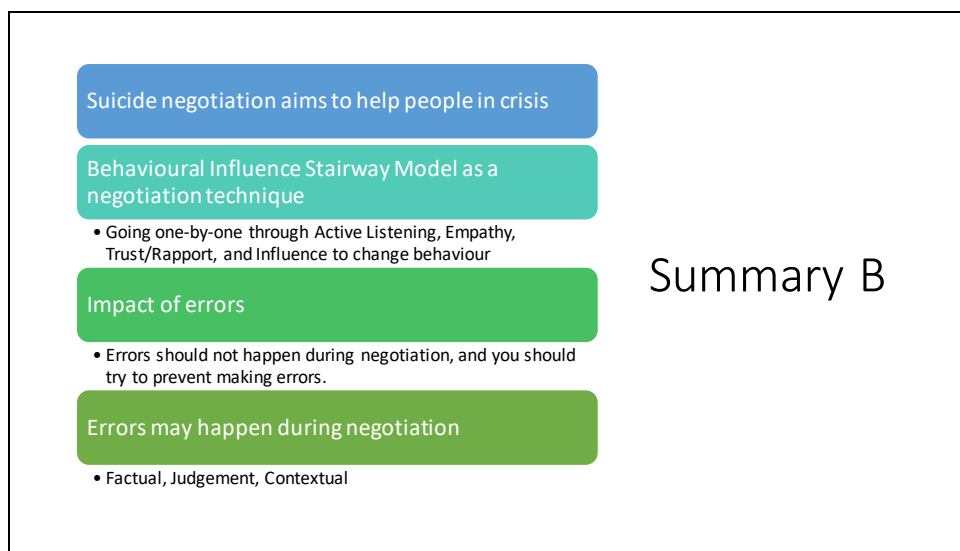
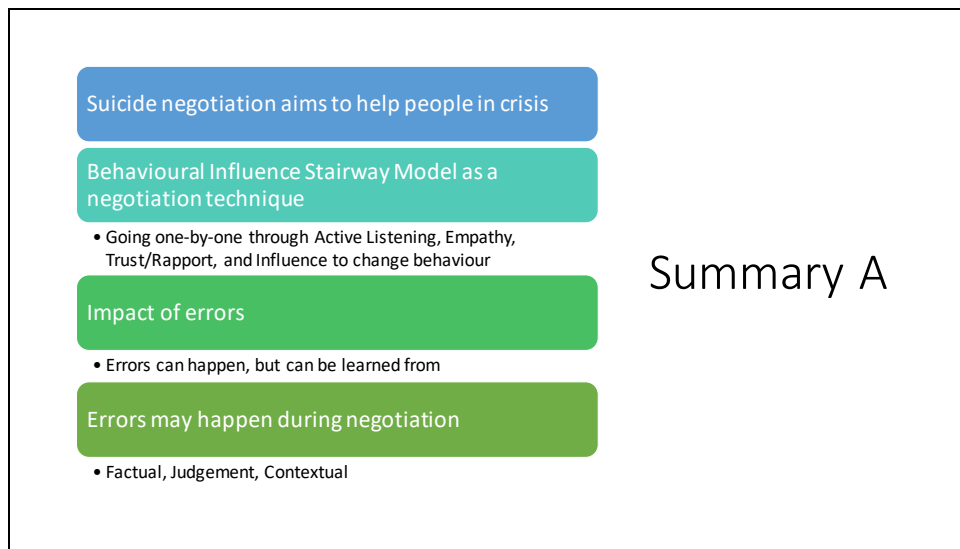
A Factual error is an error of a fact. The negotiator says something that is objectively wrong.

For example, mixing up the time and date of an event.

A Judgement error is an error in the way a negotiator acted regarding the thoughts and feelings of the other person. For instance, trying to address a certain topic more than once when the PiC does not want to talk about it.

A Contextual error results from not acting in line with correct police practices or procedures or the failure of equipment. For instance using police terms, language, or procedures.”

Video 6



“This is a brief summary of what has been mentioned during this video miniseries.

Suicide negotiation is an important practice used to help people in a state of crisis. The behavioural influence stairway model is a tool that is used to reduce emotions and agree upon mutually acceptable solutions. It consists of multiple stages which have to be fulfilled one by one: Active listening, which is active through all other stages as well, empathy, rapport and trust, and lastly influence. In the end, if successful behavioural change of the PiC is achieved.

(Error management) Throughout the negotiation process, errors can happen, but they can be learnt from.

(Error prevention) Errors should not happen during negotiation, and you should try to prevent these from occurring.

There are 3 types of errors: Factual, Judgement and Contextual.”

Appendix B

Example crisis negotiation

Active listening

N: Hello, I got a call saying you are putting yourself in a very dangerous situation. Can I ask when you are doing up here?

PiC: What's it to you. Go away!

N: You seem distressed. Is that correct?

PiC: Yeah, I am. So what?

N: Seeing you in this situation, it seems like you are considering ending your life. Is that correct?

PiC: Yes I am. I don't have any reason to live. I cannot fulfill my dream anymore.

N: Your dream?

PiC: My dream was to become dancer, but I got injured and have to give it up. I feel so sad.

Empathy

PiC: My dream was to become dancer, but I got injured and have to give it up. I feel so sad.

N: It is understandable that this will make you sad.

PiC: Yeah, it is very hard. I feel hopeless...

Rapport / Trust

PiC: Yeah, it is very hard. I feel hopeless...

N: I'm sorry to hear that. I can only imagine what it must be like to also have your life changed so drastically so suddenly. That's a very hard situation to go through.

PiC: Yes, I don't know what to do. My life doesn't seem worth living anymore.

N: I am here for you and will do all that I can to support you. It may feel like you were alone in this before we started talking. To reassure you I do have experience supporting people in similar situations in finding a way forward.

PiC: Thanks.

Influence

N: From what I've heard you say earlier, it sounds like you have invested a lot in yourself and worked so hard on your dancing career, I think that says something about how strong you are as a person.

PiC: If you say so.

N: I feel scared seeing you at the ledge because I'm worried you might fall by accident before you're ready. Why don't you come away from the ledge so we can continue this conversation in a safer manner?

PiC: Ok.

Appendix C

Questions (after completing the training)

1. What is the overall aim of crisis negotiation?
 - a. To solve the problems of the person in crisis.--> The crisis negotiator is there to ensure the safety of the person in crisis. Afterwards the person in crisis can be helped by other professionals.
 - b. To guide them to safety
 - c. I don't know.

2. During crisis negotiation, you always need to get the person to safety before you can talk to them.
- a. True --> In some situations you have to focus on the persons safety first. But often you should talk to the person first as they will be more likely to listen to you.
 - b. False
 - c. I don't know.
3. The stages of the BISM are: Active listening, Sympathy, Rapport / Trust, Influence
- a. True --> The correct answer is Active Listening, **Empathy**, Rapport/Trust, Influence
 - b. False
 - c. I don't know.
4. If you "fall down" a stage, you cannot continue the negotiation.
- a. True
 - b. False --> If you fall down a stage you can work on moving back up the stages.
 - c. I don't know.
5. Active listening is necessary during the whole negotiation.
- a. True
 - b. False
 - c. I don't know.
6. A Judgement error is When the police officer is in the problem-solving phase, whereas the relationship is not well-established yet.
- a. True
 - b. False
 - c. I don't know.

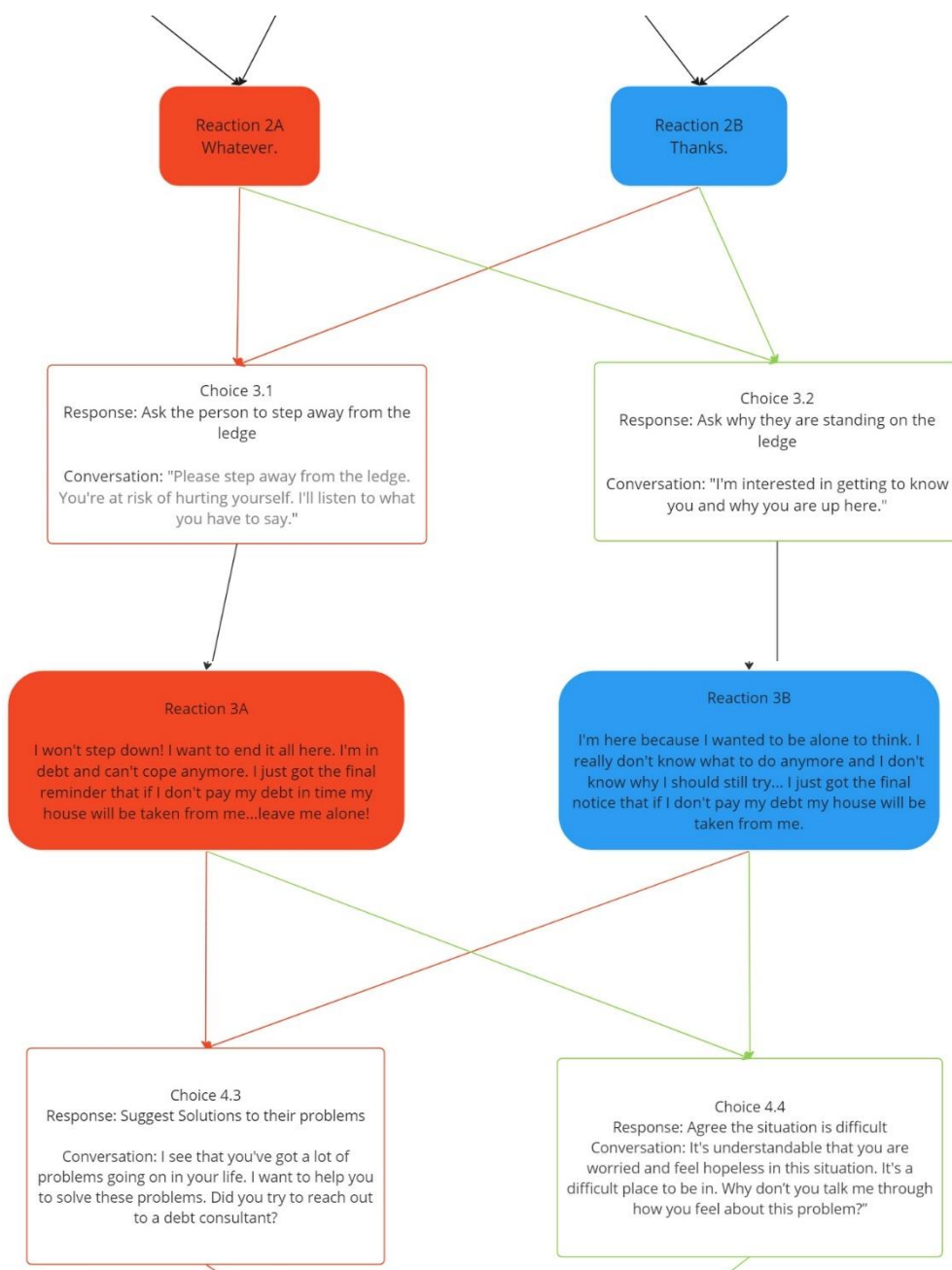
7. What is an example of a Factual Error?
- a. When the time and day of an event are mixed up.
 - b. When the negotiator asks too openly what can be done to help. --> The correct answer is when the time and day of an event are mixed up.
 - c. I don't know.

Appendix D

Dialogue Tree



I think you understood me
wrong.

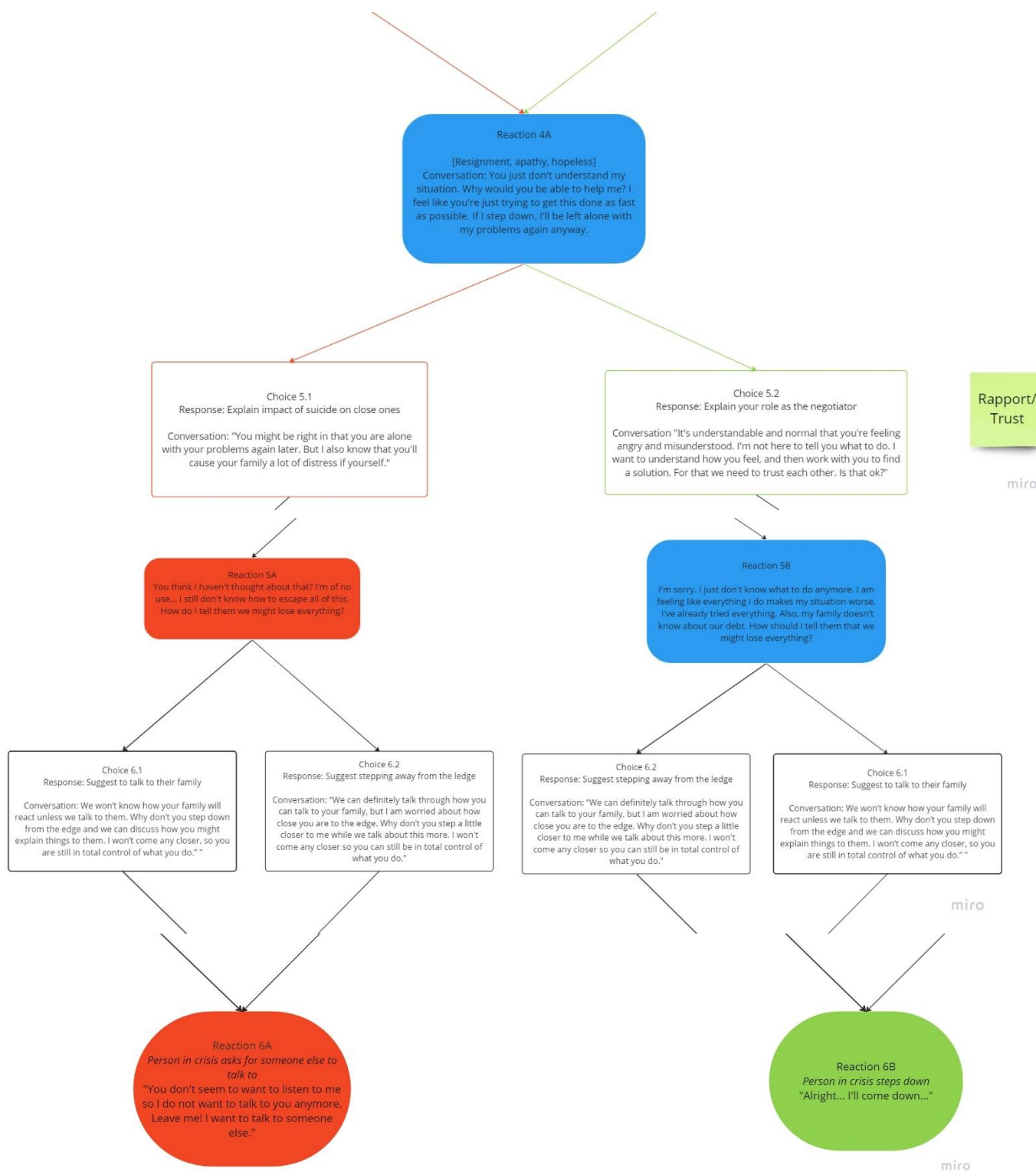


Active
listening

miro

Empathy

miro



Appendix E

Questionnaires

Worry

1. I felt anxious.
2. I felt worried.

Self-Efficacy

1. I was confident that I could efficiently deal with unexpected events.
2. I felt that thanks to my resourcefulness, I knew how to handle unforeseen situations.
3. I felt I could solve most problems if I invested the necessary effort.
4. I felt like I could usually handle whatever came my way.
5. I felt that if I was confronted with a problem, I could usually find several solutions.

Stress

1. I felt nervous.
2. The stress I felt increased to such high levels I could not let go of it.
3. I felt tension.

On-task thoughts

1. I found it easy to concentrate on the negotiation.
2. I found it easy to keep thinking about how I was supposed to respond.
3. It was easy to concentrate on what I was doing.

Off-task thoughts

1. I thought about how poorly I was doing.
2. I thought about how dissatisfied I was with how I was doing during the negotiation.

3. I thought that I didn't have the necessary skills to do well in the negotiation.

Presence

Spatial Presence Experience Scale

1. I felt like I was actually in the virtual environment.
2. I felt like I was part of the virtual environment.
3. It felt like I was physically present in the virtual environment.
4. I felt I could be active in the virtual environment.
5. 7. It felt like I could do anything I wanted in the virtual environment.

social presence

6. I was easily distracted during the interaction.
7. It was easy to tell how the other character felt in the virtual environment.
8. The other character was responsive towards me in the virtual environment.
9. The other character behaviour was often a reaction to my own behaviour in the virtual environment.

co-presence

10. I felt as if the other character was actually in the virtual environment.
11. The other character made me feel like I was in the environment with another person.

Appendix F

Informed consent

General Study Information

Thank you for taking the time to participate in this study about crisis negotiation.

Often times, police are called to situations involving people showing concerning behaviour.

In this study, you will be asked to take on the role of a crisis negotiator by first learning about crisis negotiation and then utilising this knowledge in a Virtual Reality environment.

Risks associated with participating in the study

I understand that taking part in the study involves the potential risk of motion sickness.

This study contains the following sensitive topics: Suicide, Fear of heights

If I feel uncomfortable to continue I can withdraw from participating in the study without penalty or having to state a reason.

Use of Information

I understand that information I provide will be used for a study as part of a master's thesis, and potentially other projects that build on this internship project. I understand that the recordings and all data made during the VR training will be anonymised and only anonymised data will be stored or shared beyond the study team.

Future use and reuse of the information by others

I give permission for the physiological data (e.g. heart rate) and survey data and the recordings of the VR training that I provide, to be archived within the cloud service Sharepoint by Microsoft Teams as well as the cloud storage Unity Version Control (formerly PlasticSCM) and within the survey platform Qualtrics. These storage options are not accessible for anyone other than the researchers involved with the project and no identifiable information will be collected or stored.

I have read the study information or they have been read to me and I confirm I understood the information given.	☐
I have been able to ask questions about the study and my questions have been answered to my satisfaction.	☐
I consent voluntarily to be a participant in this study and understand that I can refuse to answer questions and I can withdraw from the study at any time, without having to give a reason.	☐
I understand that taking part in the study involves tracking of physiological data using a wristband.	☐

Appendix H

Thank you for taking part in this experiment.

The aim of this experiment is to see what effects different error strategy trainings can have on negotiators. There were 2 groups, one that learnt about error management and one about error prevention. You were randomly assigned to one of these groups.

- 1) Error management teaches that making errors is natural and learning how to handle these errors makes you better at your job.
- 2) Error prevention teaches that making errors needs to be avoided to avoid negative consequences and preventing these errors can make you better at you job.

If you would like to know more about this study or have any questions you can contact:

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s.l.tomlin@student.utwente.nl

Lorenz D. K. Bünnemann

l.d.k.bünnemann@student.utwente.nl

The previous study was about suicide. We realise that this may trigger something in you.

If you or someone you know is suicidal you can call one of the following hotline

numbers:

Netherlands: +31 800 0113 or +31 900 0113

Germany: +49 800 111 0 111 or +49 800 111 0 222

United Kingdom: +44 800 689 5652

Having learned the intention of this study, you are still allowed to withdraw your consent and all your data will be removed. To do that, simply close this page and your data from this study will be deleted. If you still consent to having your data used within the research, you can indicate that preference below.