

ISPO: A Serious Game to train the Interview Skills of Police Officers

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Abstract

The training of Police Interview competencies relies on the hiring of actors to play the role of victims, witnesses and suspects. While role-play can be a particularly effective training technique, it requires a significant amount of resources. The Interview Simulation for Police Officers (ISPO) is a serious game developed as a collaboration of Gameware Europe with the Portuguese School of Police Officers. The objective of the game is to train police officers in communication competencies related to the interview of victims, witnesses, and suspects.

Through ISPO, players can take the role of a police interviewer and practice the techniques and methodologies learned in theoretical classes. The serious game offers a safe, lightweight and easily repeatable experience.

In order to evaluate the training effectiveness of the serious game, a study was conducted with 194 participants where general subjective learning effectiveness was measured. Overall, the ISPO game improved the self-perceived competence of its players. Additionally, participants changed their opinion regarding the most valuable attitudes necessary to conduct a successful interview. Finally, the interaction with the game had a stronger effect on inexperienced users. These results lead us to believe that ISPO can be an added value to police officer schools.

Keywords: Serious Games, User Study, Game-Based Learning, Police Interview

1 Introduction

One of the core tasks of police officers is to interview victims, witnesses, and suspects. Interviewing is a complex skill, a process of conversational exchange that requires training, practice, and a considered approach to ensure that the interviewer-interviewee encounter is productive [1]. In addition to this, the physical evidence available in a given investigation is scarce, which makes this stage much more critical and places added pressure on the interviewer [2]. Thus, it is essential to facilitate the training of the social skills necessary to properly and successfully conduct a police interview [3].



In order to support the training and teaching of police interview methodologies, police officer training schools hire professional actors so that their students may practice what they've learned in theory. By role-playing as a victim, suspect or witness of a crime, actors play a persona from specific scenarios based on historical material providing an immersive learning environment for police interrogator trainees [4].

While Role-play training can be reasonably effective, it suffers from a multitude of problems; First, organizing training sessions is very costly, both in economic and time management terms, as a consequence, the rate by which these are offered is low. There are also substantial differences in the success rate of role-play-based training: for some students, the learning effect is quite considerate, as they can interact directly, whereas for others it is minimal, as they mostly observe the interaction of others [5]. Finally, it has been shown [6] that students need frequent refreshing sessions, to cement their learning process, which often conflicts with regular work schedules.

Serious games are computer programs that obey solid game design principles but whose purpose, other than to entertain, is to educate or train [7]. Regarding the training of social interactions, serious games often make use of Intelligent Virtual Agents (IVAs) and their capabilities. IVAs are “animated characters that not only move but also exhibit human-like competence when dealing with the world around them” [8]. A serious game, where the suspect or victim is played by an IVA (usually called a Virtual-Suspect) can be a sustainable solution to the problems we have highlighted. Studies have shown that this type of approach is especially efficient as a complementary method to role-play. It can be tailored to individual needs, is easy to combine with work schedules, and more importantly, is cost-effective as multiple students can train simultaneously with an instructor monitoring their progress [2].

In this paper, we present a serious game: Interview Skills for Police Officers (ISPO) developed to train police interviews with suspects, victims, and witnesses of criminal cases. It is important to underline that, while most studies have shown the positive impact of serious games as teaching and training tools, this assessment is an essential but currently heterogeneous process, with varying degrees of methods and achieved quality [9]. Thus, in the final stages of its development, a study was conducted to evaluate its effect on the learning of communication competencies in students of the Police Officer School.

The manuscript will start with a brief analysis of state-of-the-art work both in terms of serious games for police interviews and on modern methodologies currently being used by police officers to obtain trustworthy information from their interviewees. We will then describe the “ISPO: Interview Skills for Police Officers” serious game in-depth, detailing its design objectives, its gameplay, and how its design was influenced by real-life trainer knowledge and led to an interactive learning experience. Finally, we will present the study conducted with the objective of evaluating the impact of the game on the players' learning effectiveness.

2 *Related Work*

In this work, it is important to highlight some key characteristics of Serious Games applications. Firstly, they offer players environments that promote simulation learning. Simulation learning affords the ideal opportunity to practice and apply the principles of learning toward knowledge and skills mastery [10]. In addition to this, it has been shown, the interactive aspect of serious games can facilitate lifelong learning, helping individuals to keep up with the new trends [11].

Another key contributing factor to their importance is the ability to provide repeatable experiences with relative ease. Repetitive training has proven to significantly improve the proficiency of learners compared to traditional lectures [12]. These repeated playthroughs

also serve as refreshing sessions since students need to practice frequently, to cement their learning process [6]. Furthermore, many studies have indicated that regularly spaced practice exercises yield better learning results than the same amount of practice completed all at once [13].

Serious games, however, are not without their issues. There is an inherent risk when developing these types of games since they are, often, trying to achieve more than one goal, if the entertainment factor is neglected, the user's experience might be affected. Additionally, if executed poorly, players might fear that they are being manipulated by a serious game [14] which significantly hinders their learning experience.

Another common issue identified within the serious games field is that the player's adaptability is often overlooked. Individual characteristics of its users such as skill level, learning ability, or learning needs are often not taken into account [15]. Naturally, since serious games are a piece of computer software, the hardware used by its players needs to meet certain requirements which may be outside of a student's budget. Moreover, since they are games, they can also cause addiction or other negative side effects on the player's well-being such as eyestrain or headaches.

In the Human-Computer Interaction field, the wide variety of target audiences and applications along with the natural diversity of the human population itself makes it so that the lessons learned from one work cannot be directly translated into other target groups without some sort of adaptation. Context matters, the challenges found when, for example, creating a serious game for children diagnosed with an autism spectrum disorder are completely different from those found when creating one for adults diagnosed with Post-Traumatic Stress Disorder (not to mention the heterogeneity of the groups within themselves). For instance, Zaror et al., in a review of Serious games applied to Dentistry, found that developers reported issues when designing a game for preschool children due to their short span of attention, inability to adapt to new situations, and lack of ability regarding abstract thinking and understanding of the assessed concepts [16].

Nonetheless, Serious Games aim to provide safe and meaningful learning experiences and allow the active participation of its players in scenarios that, in many cases, mimic professional practice. To exacerbate this effect, most developers include some degree of realism within the design of the games[17]. As it should become clear in the following section, the immersiveness level of serious games, even within the same context, can widely vary. From simple mobile phone applications to complex mixed reality simulations it is usually dependent on the requirements of the instructors and the target audience.

2.1 *Serious Games for Police Training*

The use of Serious Games to improve the training of communicative skills of law enforcement personnel has had a wide range of successful cases [18]. Most, rely on a virtual environment in which trainees interact with embodied virtual characters, however, almost all have different underlying objectives.

The organization of distributed work and coordination among different law enforcement teams often leads to challenges and tension between its members. van Laere et al. [19] created a social simulation game that promoted inter-team coordination strategies. Players were given tasks that could be accomplished in multiple ways; using an "intranet", using a knowledge center, contacting an expert, or even posting a question on a bulletin board (instead of relying only on their own expertise). The game was made in coordination with the Amsterdam Police Force and members of its personnel were asked to play it. The simulation allowed authors to identify key areas that needed to be improved within the organization and guided interventions that promoted coordination.

In terms of Social Skills Training, when dealing with children, police officers have to cope with a particular set of complex emotions. Additionally, it is important to safeguard children's welfare whilst also facilitating the collection of high-quality evidence [20]. Margoudi et al. [21] recognized a need for a better training system when police officers were interviewing children. In collaboration with the UK Police Force, one of the underlying objectives of the Serious Game was to promote the use of the Achieving Best Evidence (ABE) [22] protocol and practices (used by the British Police) while interviewing children. The Child Interview Simulator (CIS) was developed to enable and complement current police training practices in the field of child interviewing, targeting mainly new recruits. During the game, players interviewed a 2D avatar of a child that had witnessed a crime, the character was able to display different facial expressions and answer questions according to its beliefs.

The Virtual-Suspect system developed by Bitan et al. is an interaction model where the responses provided by the IVA are based on both its psychological state and the interviewer's statements [2]. The system supports different scenario parameters and is focused on training inexperienced personnel. An experiment was conducted and humans found it difficult to differentiate between a human trainer and the Virtual-Suspect response model when comparing transcripts.

Bruijnes et al.'s long-term goal were to model a virtual agent that could be used in an application for the training of police students [23]. Together, op den Akker et al. studied the relationship between the stance taken by the suspect and turn-taking behaviour, overlaps, interruptions, pauses, and silences [24] while Bruijnes et al. started designing a serious game to train non-cooperative dialogue in police interviews [25]. This work led to a serious game where the Virtual Suspect is personality driven and takes into account the interpersonal events that have occurred in its past and during the interview. Results showed that participants could recognize which personality they were interacting with, proving the model's consistency [3]

Project LAW-TRAIN's goal was the development of a virtual training platform that allows police officers (and judicial authorities) from different countries to train together in the preparation for, and the conduct of, a police interview with a virtual suspect within the context of an international investigation [26]. Directly tackling the problem of different interview methods from different countries, LAW-TRAIN can train police officers of different nationalities in the same 'standardized' interviewing methodology¹. One of its most interesting features is the use of Virtual Reality to place participants in front of a Virtual Suspect that has to be interviewed accordingly as depicted in Figure 1. Its question-and-answer system is based on the work of Bitan et al. [2] model.

2.2 *Police Interview Methodologies*

Research and relevant experience in the field might lead to the development of new interview methodologies or updates to existing procedures. Furthermore, while interviewing practices and methods differ between countries, the collaboration between different national and international law enforcement organizations is more important than ever [27]. As a result, there is a wide range of interview practices that junior, and even experienced police officers, must learn and keep up with on a regular basis.

Holmberg and Christianson [28] showed that when suspects perceive the police officer's behaviour during the interview as dominant they tend to deny criminal accusations. Alternatively, when suspects perceive the interview as humane and respectful they gain the confidence and mental space required to admit criminal behaviour [29]. A more recent example, in 2014, is a concept called "Language Style Matching" where Richardson et al. [30] showed that police interviewers that match the verbal language style of the suspect have a higher chance

¹<http://www.law-train.eu/>



Figure 1: *Player interacting with a Virtual Suspect in LAW-TRAIN [26]*

to lead to a confession. Further, they suggest that language style matching and mimicry can be employed strategically. The notion that the behaviour of the interviewer influences the outcome of an interview is critical for training and maintaining the skill to conduct a police interview [23].

Overall, in terms of interview methodologies, most European countries follow the PEACE model of interviewing. The PEACE model guides police officers to employ a non-accusatory, investigative-interviewing approach in which new information is compared against the suspects' previous statements and available evidence [31]. The PEACE model is considered a successful alternative to accusatory interviewing and has, since its creation in the United Kingdom, expanded to additional nations and organizations [32]. Additionally, while it is mainly used to conduct suspect interviews it can also be applied to witnesses and victims exchanges [33].

PEACE is an acronym for the five phases of an investigative interview [34]:

1. **Planning and Preparation:** This process begins even before the interview. Interviewers consider how much relevant information can be obtained from the interview, they learn as much as possible about the interviewee and create a list of investigative objectives.
2. **Engage and Explain:** There are two central components to this stage. First, the interviewer engages the interviewee in conversation and, second, the interviewer explains what will happen during the interview.
3. **Account:** The approach an interviewer takes to gain an interviewee's account of an event is dependent on the type of interviewee. In volume and priority crime investigations, the most common way of initiating an account is simply to use an open-ended prompt, such as, "tell me what happened".
4. **Closure:** To avoid immediate or future problems with the relationship formed between the interviewer and interviewee, officers should ensure that, at the end of an interview interviewees are thanked before leaving, and that everyone understands what has happened during the interview and what will happen in the future. The closure should also include elements such as allowing the interviewee to ask any questions [35].
5. **Evaluation:** This final step is subsequent to the interview where the investigator assesses

the information obtained and its contributions to the case [36].

In order to elicit information in the Account phase, interviewers may use different techniques, depending upon the vulnerability and cooperativeness of the interviewee [37]. Numerous law enforcement agencies, and other professionals, all over the world use the cognitive approach called “The Cognitive Interview” [38]. It is focused on gathering truthful and reliable information about a possible criminal event from victims, witnesses, and suspects [39].

The Cognitive Interview method was born out of psychological sciences and memory theory research. Often, witnesses observe the crime under sub-optimal viewing conditions, have poor memories and verbal skills, and/or are traumatized by their experiences [40]. Police officers have no control over these factors, in fact, officers can only control how they interview victims and witnesses. Based on three basic psychological processes: cognition, social dynamics, and communication, Fisher et al. [41] developed the Cognitive Interview with the objective of eliciting high-quality witness information without hurting the interviewees’ mental health. This technique is currently employed by law personnel around the world [39].

The methods described in this section are focused on both, acquiring reliable information and managing the interviewee’s emotional state, without compromising either. The ability to correctly handle both of these factors is essential to conducting an effective police interview. Thus, police officers have to make the best use of their social and communication skills to guarantee to achieve such goal. An interviewer will almost always have to succeed in guiding the interviewee (regardless of their being a witness, victim, or suspect) from one undesirable state (for example, un-cooperative, upset, or agitated), during which time accurate information will be difficult to isolate, to another state such that answers are clearer, fuller or more accurate. Modern interview procedures involve both transitioning from different key interview stages and employing precise social practices to make sure the interviewee is in a productive mental state.

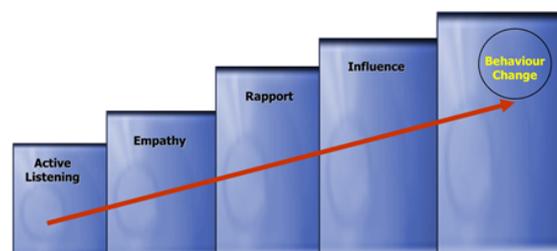


Figure 2: *Behaviour Change during the interview process*

In a real-world situation, to make progress during an interview, police officers must employ, with increasing effect, a range of communicational skills including Active Listening, Empathy, Rapport and Influence to trigger the desired behavioural change in the Interviewee, as shown in Figure 2.

The work presented in this section provides a glimpse of the different approaches to police interview training applications and the wide array of police interview theories or protocols some of these systems must consider. Most of the systems we’ve described were developed with a particular target population, within police interview trainees, in mind, with set requirements and goals, just as ISPO was.

3 ISPO - Interview Skills for Police Officers

The main goal behind the development of ISPO, Interview Skills for Police Officers serious game, is to support the training of police officer candidates in communication competencies related to the interview of victims, witnesses, and suspects of violent crimes. In particular, training in acquiring reliable information and managing the interviewee's emotional state, through the PEACE and Cognitive Interview procedures.

In most countries, police officer courses are offered through bachelor's and master's degree programs in law enforcement and criminal justice schools. All aspiring police officers must pass background checks, physical and psychological exams, and a police academy training program. For their students to train and test their interviewing skills, most police schools prepare simulation exercises with the participation of simulators/roleplayers trained to perform a wide range of usual behaviors on suspects of violent crimes, victims, or witnesses (police officers or professional actors). Thus, in general, police interview students have the opportunity of having some face-to-face practice within a short range of controlled scenarios [18].

The serious game is intended to be used as a supplement to the course and not as a replacement to either classes or training sessions with professional actors. It promotes behavioral changes through its simplified version of reality that allows players to analyse and even go back "in time" when they make errors and the techniques that are important for learning or understanding are emphasized.

One of the goals of ISPO is to provide students with a light but educative experience that can be played on most personal computers, anytime, anyplace. Most of the works mentioned in Section 2 relied on advanced mixed reality technologies where users were asked to play the experience in a specialised room in order to obtain highly immersive experiences that required high-end processing power. With ISPO, students can practice their interviewing skills and knowledge, during breaks, in classes, and at home.

3.1 ISPO Gameplay

The game is composed of a series of simulated interviews that take place in a real-time schedule, i.e. over a 30 to 45-minute period, similar to a real interview. Players may choose to interview a victim, a suspect, or a witness of a domestic abuse case. The player's goal is to extract as much information from the interviewee as possible taking into account their agitated state.

During each scenario, players can choose what they say to the virtual suspect/victim/witness from a wide range of predetermined options. Each option has a certain level of aggressiveness that affects the interviewee's emotional state, which, in turn, affects their responses. According to the virtual agent's mood and overall state of the conversation, the amount of information revealed will vary. Furthermore, players must also consider the veracity of such information. In some cases, the suspect will try to manipulate the officer (using false details) in the hopes of incriminating others. The intelligent agent behind the interviewee is also able to display non-verbal communication through the form of body language and facial expressions. Figure 3 displays the user interface during a game session.

The ideal flow of the police interview within ISPO is divided into 3 phases as shown in Figure 4. The majority of questions (or options) are presented during the first phase of the interview. These will typically be questions that seek to establish the required rapport to trigger behavioural change. Questions such as: "You've told me you work in Santarem, what usually happens there?" or "Is there something you don't feel too happy about?". It is only during the final phase that any confrontational questioning might occur (and would only

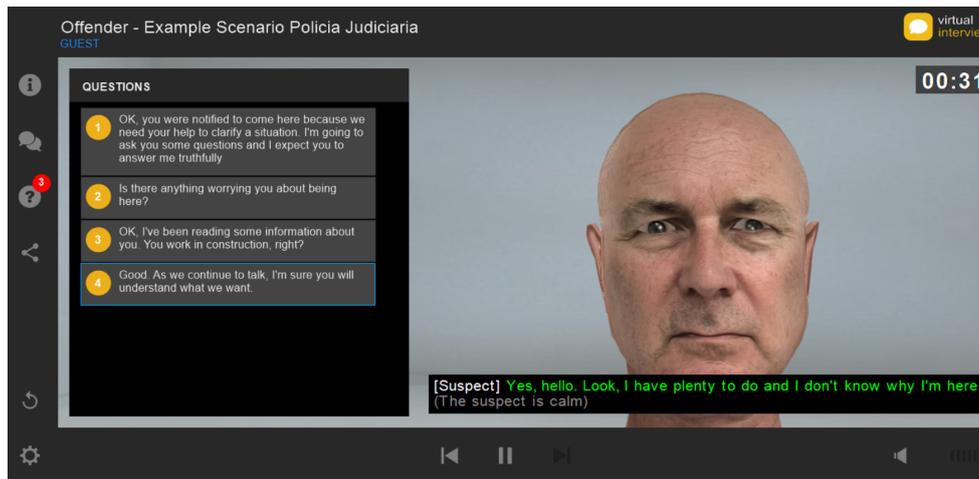


Figure 3: A screenshot of ISPO during a suspect interview play through

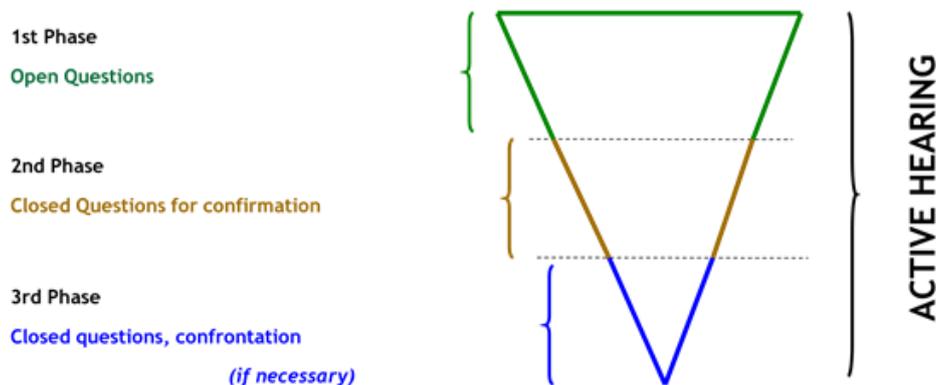


Figure 4: Interview inverted triangle model

be appropriate in limited circumstances). Once again, this approach is directly based on the theory behind PEACE methodology [33].

Naturally, among the wide range of dialogues available to players, there are a few that are clearly outside of normal police conduct. If selected, these will drastically lower the mood of the virtual character and users will immediately fail the task, abruptly ending the interview. At any time, even after failing, players have the ability to look at the history of the session, using an in-game tool that provides the dialogue history, a graph with the progress of the mood of the character along with the information collected so far. The objective behind these tools is simple: help players reflect on their sequence of actions and decisions they’ve made throughout the game and hopefully learn from past mistakes.

The scoring system behind ISPO, encourages players to follow the behavioral change steps described in Section 2.2. Throughout an interview segment, ISPO, provides its players with the ability to check their current score on different interviewing techniques and skills. Among these, the ability to create Empathy with the subject, a fundamental step in the PEACE protocol, Conflict Management, necessary to maintain a continuous and productive interaction with the subject and Information Gathering, for instance, where the amount of accurate information obtained is accounted for. These skills are based on state-of-the-art findings in the field, for instance, Masip and Garrido’s work on Police Officer’s accuracy and estimated



Figure 5: ISPO Gameplay: Player viewing their scores during an interview

ability to detect lies [42].

At any point during the interaction officers can evaluate their estimated ability to gather information versus how well they actually performed such task. Figure 5 captures a player viewing their current score during an interview. The scoring system is intended to guide users both as to where their communication techniques can be improved as well as to establish their level of understanding of the core competencies which they are required to demonstrate.

3.2 Authoring

In order to facilitate the creation of different scenarios, a Script Authoring Tool was designed. Each interview script can either be built from scratch or imported from other existing scenarios to alter their intended difficulty or realism. Potential questions can be set along with configurable parameters, for example, the priority assigned to that inquiry in a real situation, or its aggressive nature (which in most cases is influenced by its timing within the interview).

For each question, a set of potential answers can then be created. Each response is associated with a set of parameters which might include its informational value (i.e. trivial or important); its truthfulness; or even the tone (emotion) which is ascribed to the answer. Scripts can be entered directly through the editing tool or imported, in .csv format, from spreadsheets.

All of the content presented and available in ISPO was created by experts and psychologists in the field. In particular, the tool facilitated collaboration between Gameware Europe² and the Portuguese Police Officer School

Psychologist teachers. Using scripts inspired by real-life police interviews, teachers were asked to describe and annotate each dialogue in terms of aggressiveness, information revealed and emotions associated. The data was then imported into the game and used in the experiment we will promptly describe.

4 Study and experimental procedure

In order to evaluate the effects of playing the ISPO game, a study was conducted, focused on the learning of communication competencies and interviewing skills. It is important to add the fact that most Police Officer Courses are available to any police member as long as

²<http://www.gamewareurope.com/Public/EUProjects>

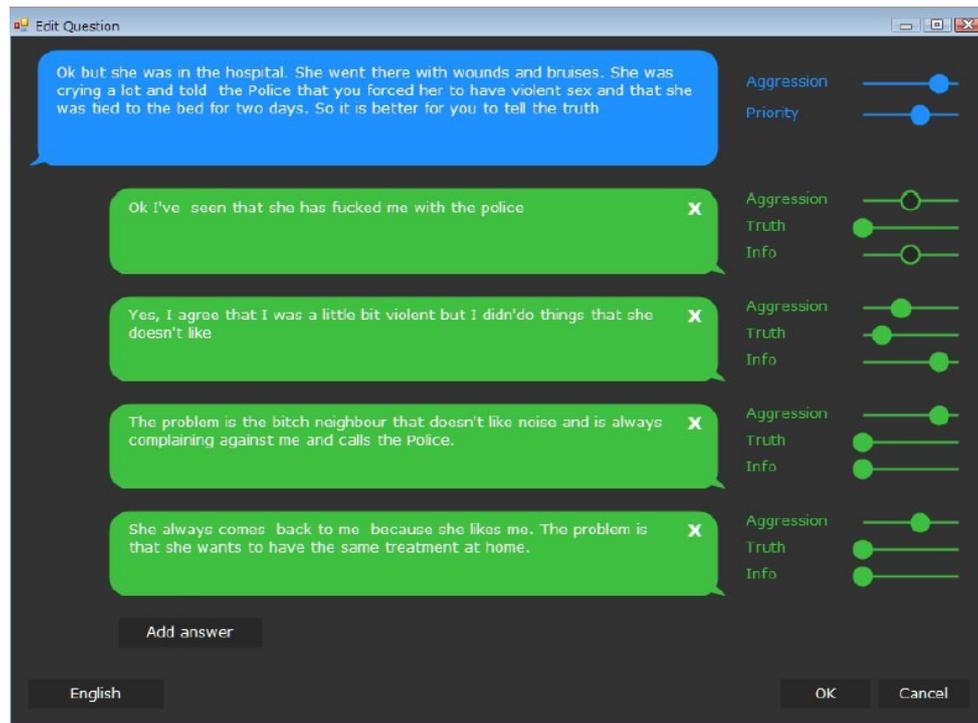


Figure 6: *Script Authoring Tool*

they graduated from police school. As a consequence, there is a high variance in the work experience of the course's participants; while some have just graduated from Police School, others have been in the field for more than 20 years. Thus, it was of interest to study how the previous work experience of participants influenced their experience with ISPO [43].

The study had 2 different goals:

- Study the influence of the game in the learning of the task competencies (communication and interviewing skills).
- Study if prior experience of the participants causes interaction effects.

4.1 Participants

The study was performed with 194 participants which were all part of that year's introductory police officer course. Participants were from different police departments and police schools around Portugal. 85 of those were female (44%) and the remaining 109 were male. The average age was 35 years old with ages ranging from 24 years to 56 years old. In terms of work experience, the average was 6 years of work in a police department, with participants ranging from no experience to 32 years of experience.

4.2 Research Design

In order to study the effects of the ISPO game, participants were tested before and after playing the game. Taking into account that the game was designed to be used as a complementary tool to learning, a short tutorial was created. The tutorial consisted of a slideshow that described the Cognitive Interview technique in depth. Participants could go through it at their speed and learn or refresh their knowledge about the technique through 35 slides, which took about 30 minutes to complete.

A set of measures were used, before and after the game session to detect possible effects of the game. Participants played a single session of the ISPO game which takes around 1 hour and 30 minutes to complete.

4.3 Evaluation Instruments

To evaluate the effectiveness of the game, 2 different metrics were used: the first one, the Perceived Competence subscale of the Intrinsic Motivation Inventory (IMI) questionnaire [44], measures the general subjective learning effectiveness of the experiment. The second one, the Police Interview Competency Inventory (PICI) [45], captures domain-specific subjective learning effectiveness. In particular, PICI asks participants to identify the importance of 5 different dimensions related to the skills required to conduct a successful police interview, namely: Carefulness, Control, Domination, Benevolence, and Communication:

- **Careful-tenacious:** captures the level of attention to detail and sustained focus during an interview.
- **Controlled-non-reactive:** describes if officers are calm, undisturbed, self-controlled, and capable to handle pressure.
- **Dominant-insisting:** measures the level of assertiveness and dominance that officers exhibit.
- **Communicative:** describes if officers are sociable and communicative.
- **Benevolent:** describes if officers are empathetic and have the ability to calm other people

It is important to note that, according to the guidelines, all but the Dominance skill, should have a high level of importance attributed to them.

4.4 Procedure

Participants started the experiment by reading information regarding the project and signing a consent form. Afterwards, participants were asked to perform the following tasks:

1. Complete a survey about work and learning experience.
2. Complete a pre-game Self-Perceived confidence survey using the Perceived Competence subscale of IMI and the Police Interview Competency Inventory (PICI) questionnaire.
3. Play the ISPO game for about 1 hour and a half.
4. Complete a post-game Self-Perceived confidence surveys (same as 2).

Disclaimer: The protection of subjects' data and privacy was done in accordance with the Country's legislation. Participants voluntarily took part in the study and were free to withdraw from it at any time and without any repercussions. Data collected and processed for the evaluation was anonymous.

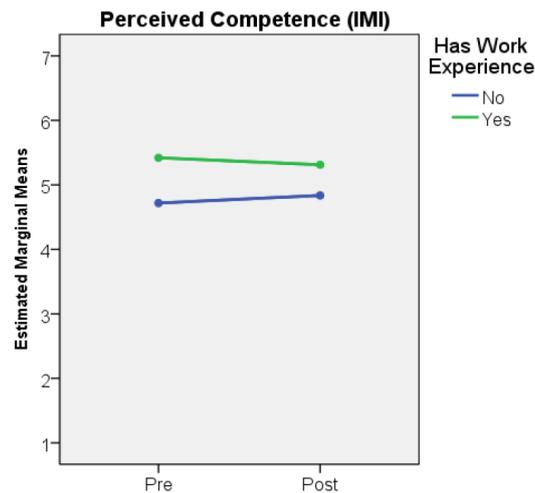


Figure 7: Results on Perceived Competence on participants with and without work experience

4.5 Results

Firstly, a Cronbach' alpha analysis was performed in order to determine if the individual items of the questionnaire could be aggregated to mean scores for both the Perceived Competence (IMI) and the 5 PICI categories (both pre and post-tests). The alpha scores obtained for each dimension were all above 0.75 indicating an acceptable internal consistency of the scales. The analysis was performed using a Mixed ANOVA to the aggregated mean scores. The results are presented in the following sections

4.5.1 IMI - Perceived Competence

Regarding the Perceived Competence subscale of the IMI questionnaire, no significant difference was found ($F=0.077$, $p=0.781$) between the pre and post questionnaire results of participants that played the game.

Nonetheless, when analysing the participant's previous work experience, a significant main difference was found ($F=27.592$, $p<0.001$, $d=0.763$). Inexperienced participants rated their competence significantly lower than those who did have police experience. Thus, once we isolated participants with none or almost no previous police work experience, a significant interaction was found, affecting the pre-post changes on this dimension ($F=4.378$, $p=0.031$, $d=0.316$). These results are illustrated in Figure 7.

4.5.2 PICI Analysis

In order to measure domain-specific subjective learning effectiveness the Police Interview Competency Inventory was used. As we've mentioned, the PICI, asks participants to rate the importance of 5 different competencies to conduct a successful police interview:

Careful There was no significant main effect in playing the ISPO game ($Z=-0.456$, $p=0.648$) nor when comparing participants' work experience ($F=0.146$, $p=0.703$). The results are shown in Figure 8.

Control Regarding the Control dimension, and, similar to the Careful one, there was no significant effect in playing the game ($Z=-0.772$, $p=0.440$). A significant main effect, however,

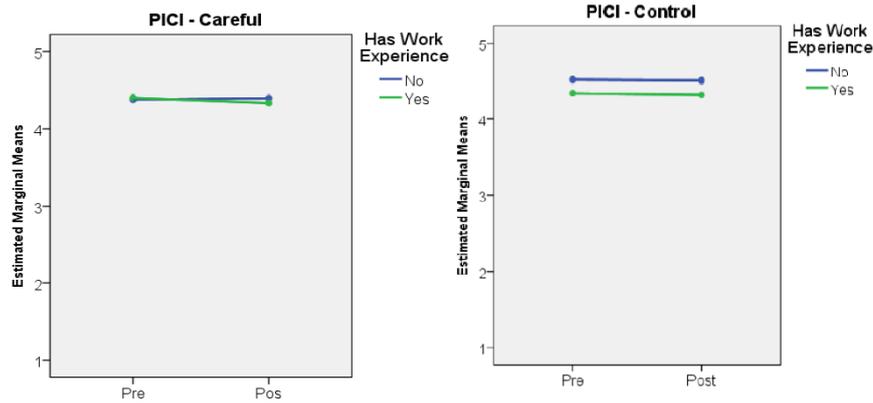


Figure 8: Results on PICI of Control and Careful competencies on participants with and without work experience

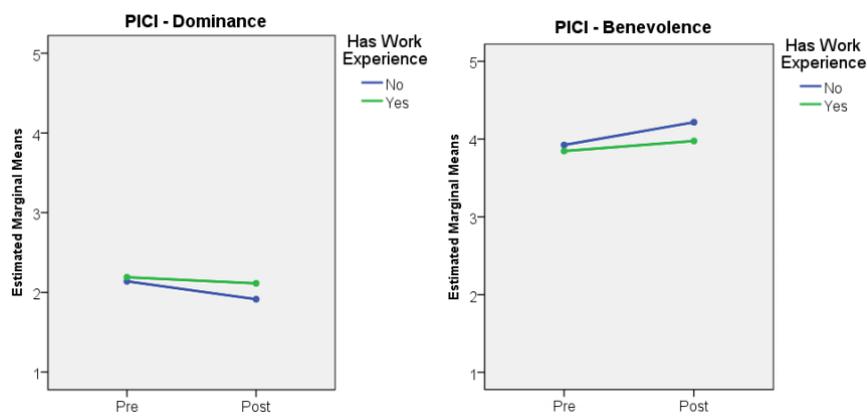


Figure 9: Results on PICI competence Dominance and Benevolence with or without work experience

was detected concerning the participants' previous experience ($F=13.475$, $p<0.001$, $d=0.533$). These results are shown in Figure 8

Dominance We found a significant main effect of playing the game in the Dominance dimension ($F=22.918$, $p<0.001$, $d=0.695$), the act of playing the ISPO game was able to reduce how participants rated Dominance as an important feature during an interrogation. There was a significant interaction effect between the pre and post results and the previous work experience of participants ($F=4.476$, $p=0.031$, $d=0.312$). The left side of Figure 9 shows this effect.

Benevolence Similar to the Dominance dimension, there was a significant main effect associated with playing the game ($F=46.693$, $p<0.001$). Additionally, when comparing with the Dominance dimension a significant main effect was also found concerning past experience ($F=5.207$, $p=0.024$, $d=0.34$). More precisely, participants with no previous experience gave a higher value to the Benevolence dimension after playing the game than those who are experienced.

Communication Similar to the Dominant and Benevolent dimensions' results we also observed some significant effects in the Communication measure. Firstly, there was a significant

main effect of playing the game ($F=6.730$, $p=0,01$, $d=0.383$) and a significant interaction effect between previous experience and playing the game ($F=6.186$, $p=0.014$, $d=0.367$).

4.6 Results Discussion

In general, it is clear ISPO had a positive impact in the subjective learning of police interview competencies. In addition, and as expected, participants with little or no experience rated their competence level significantly lower than those who do have police work experience. More significantly, however, having no previous experience interacted positively with the changes in the perceived competence after playing the ISPO game.

Results on the domain-specific subjective learning effectiveness, which were measured using the Police Interview Competency Inventory, show that there are significant effects in 4 of the 5 dimensions. Additionally, while there were no significant effects in the Careful dimension, overall, all participants attributed it a high value which, according to PICI directions is quite positive. A high score on this dimension indicates that police officers think it is important to be able to be focused on details and keep focused on the interview at hand.

In the Control competency, participants with no experience rated their importance significantly higher than experienced participants. One would expect that police officers with previous experience would give more importance to this aspect but it appears to be the opposite case. A possible explanation for this effect can be theorized given the results of the Benevolence section, discussed further ahead.

The Dominance competency indicates the level of importance officers give to being coercive and dominant during an interview. According to the PICI guidelines, a police officer should attribute a low value to this dimension. Here, the act of playing the ISPO game was able to reduce participants' attributed importance to being Dominant during an interview, which is quite a noteworthy result.

The Benevolence dimension indicates how empathic participants think they should be during an interview. Here, interestingly, results suggest that there may be a tendency for police officers to become less compassionate as they accumulate work experience. On the other hand, it may also indicate that inexperienced participants tend to overrate this particular dimension. If we assume the former thesis to be correct then it would also help to explain why experienced participants tend to rate the Control dimension significantly lower. A confirmation of this tendency would require a more in-depth analysis and further studies.

Last but not least, participants reported an increase in the importance attributed to the Communication competency after playing the game. PICI guidelines indicate that police officers should consider this dimension as one of the most important during an interview.

Overall we consider ISPO and the study presented here, to provide two primary contributions to the field. First, after playing ISPO, students successfully reassessed which skills are most important to a police interview, even changing their own opinions compared to before playing the game, indicating there was, in fact, an improvement after the intervention. Secondly, while the effect was found to be stronger in inexperienced users both groups felt it, which, in our view, suggests the application can be most effective as a complementary tool to training courses, in particular, for new students.

4.7 Trainer Provider Feedback

Along with the experimental results described above, teachers and trainers were asked to provide feedback on the ISPO game and its potential for police training. This feedback was obtained through a survey composed of various open-ended questions. We believe this feedback is incredibly valuable for any Training Tool or Intelligent Tutoring System, even outside

of the Police Interview field. Thus, in this section we will present some of the most relevant opinions of the experts.

The responses were in line with the work we presented in Section 2 both positive and negatively. When asked about the benefits of using applied games during their police officer course, most responses highlighted how suitable it is regarding the training of police interviews “The game is suited for the training of specific skills of communication, and allows self-learning.” and “It can be used for training skills in several types of scenarios and types of crime.”. Additionally, teachers were also quite keen on its potential for using fewer resources; “Requires less human resources for simulation training.”, “Allows training in the workplace and allows rehearsal times according to the number of times considered adequate for the professional rank of the police users”.

Regarding the main obstacles when using applied games during the police officer course, training providers found several issues. As we mentioned before, since it is a software application, providers pointed at the requirement to have more computer resources and that it is quite “Propitious to technical issues”. Additionally, the low-immersiveness and low amount of options provided to players was pointed out; “It provides a more reduced interaction when compared with human interaction”. Thus, another issue arises; “The requirement of having academic staff capable of implementing more scenarios”

Regarding the main question of the survey: “Do the benefits outweigh the difficulties of introducing applied games to the course”, the answers were positive. It was clear that the ISPO game was considered advantageous for the Portuguese Police Officer school training activities for both initial and expert training levels. The game has shown to be beneficial in terms of time, monetary, and human resources that are needed for real simulated training sessions. Trainers noted that if possible, in the future, different police organisations could be able to use the game in their own courses at their academies as it represents an innovative tool.

One particularly important opinion experts agreed on: the ISPO game should only be used in a balanced way, it cannot replace the use of realistic simulation scenarios. Human interaction is essentially mandatory for a successful training course.

Finally, they concurred that further improvements to ISPO regarding its authored content and flexibility could represent a big improvement for training as it would allow police officers to create their scenarios and avatars based on real criminal investigation cases. For example: “Increase the number and complexity of scenarios; Allow the possibility to create new scenarios and avatars”.

5 Conclusion

The training of law enforcement personnel for suspect, witness, or victim interview situations typically resorts to the use of role-play, by making trainees practice with human actors. Naturally, such approach tends to be quite expensive and requires a large amount of resources. One possible solution for this issue combines Human Computer Interaction and Serious Games.

In this paper, we presented ISPO - Interview Skills for Police Officers, a serious game designed with the objective of training its users on state-of-the-art police communication methodologies regarding the interview of suspects, witnesses, and victims. ISPO contains a wide range of playable scenarios where users take the role of a police officer in an interview simulation (with an Intelligent Virtual Agent), serving as a repeatable and safe tool to use at any time.

Furthermore, a study was conducted with 194 participants whose aim was to understand the impact of the game on learning, particularly as a complementary method to standard police interview training. We found that there was a significant main effect concerning the partici-

participants' previous work experience. Participants who have no experience rated their competence significantly lower than those who do have police experience. Additionally, regarding domain-specific subjective learning effectiveness, using the Police Interview Competency Inventory as a metric, we found that, after playing the ISPO game participants' level of importance attributed to certain competencies was significantly different. After playing the game, participants felt that being dominant and coercive during an interview was not as important as before. Finally participants' level of importance also significantly increased regarding competencies such as being benevolent and empathetic and having good communication skills.

The results found in the study are quite encouraging and provide further support for using serious games as a complementary tool to train social skills, even in sensitive contexts, such as police interview scenarios. Additionally, collaborations between police institutions and serious games companies are not that common, we hope that by sharing the process behind the development of ISPO we can encourage others to follow a similar path. Finally, the input and knowledge from the trainers and experts from the Portuguese School for Police Officers was extremely valuable throughout this project, and, as such, we included the perspective and opinion of police trainers on these systems so that future researchers and developers may take their advice into account.

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References

- [1] E. Shepherd, "Ethical interviewing." *Issues in Criminological & Legal Psychology*, 1993.
- [2] M. Bitan, G. Nahari, Z. Nisin, A. Roth, and S. Kraus, "Psychologically based virtual-suspect for interrogative interview training," in *Thirty-First AAAI Conference on Artificial Intelligence*, 2017.
- [3] M. Bruijnes, "Believable suspect agents: response and interpersonal style selection for an artificial suspect," 2016.
- [4] M. Bruijnes, R. op den Akker, A. Hartholt, and D. Heylen, "Virtual suspect william," in *International Conference on Intelligent Virtual Agents*. Springer, 2015, pp. 67–76.
- [5] K. Bosman, T. Bosse, and D. Formolo, "Virtual agents for professional social skills training: An overview of the state-of-the-art," in *International Conference on Intelligent Technologies for Interactive Entertainment*. Springer, 2018, pp. 75–84.
- [6] S. Wang, L. Hayes, and L.-L. O'Brien-Pallas, *A review and evaluation of workplace violence prevention programs in the health sector*. Nursing Health Services Research Unit Toronto, ON, 2008.
- [7] K. Squire and H. Jenkins, "Harnessing the power of games in education," *Insight*, vol. 3, no. 1, pp. 5–33, 2003. doi: 10.1007/BF03072055

³<http://rageproject.eu/>

⁴<https://research.ou.nl/en/publications/d84-second-rage-evaluation-report>

- [8] R. Aylett and D. Ballin, *Intelligent virtual agents*. Springer, 2013.
- [9] R. Wang, S. DeMaria Jr, A. Goldberg, and D. Katz, “A systematic review of serious games in training health care professionals,” *Simulation in Healthcare*, vol. 11, no. 1, pp. 41–51, 2016.
- [10] Y. Okuda, E. O. Bryson, S. DeMaria Jr, L. Jacobson, J. Quinones, B. Shen, and A. I. Levine, “The utility of simulation in medical education: what is the evidence?” *Mount Sinai Journal of Medicine: A Journal of Translational and Personalized Medicine: A Journal of Translational and Personalized Medicine*, vol. 76, no. 4, pp. 330–343, 2009. doi: 10.1002/msj.20127
- [11] G. Kalmpourtzis, *Educational Game Design Fundamentals: A journey to creating intrinsically motivating learning experiences*. AK Peters/CRC Press, 2018.
- [12] J. Creutzfeldt, L. Hedman, and L. Felländer-Tsai, “Effects of pre-training using serious game technology on cpr performance—an exploratory quasi-experimental transfer study,” *Scandinavian journal of trauma, resuscitation and emergency medicine*, vol. 20, no. 1, pp. 1–9, 2012.
- [13] R. Clark and G. L. Harrelson, “Designing instruction that supports cognitive learning processes,” *Journal of athletic training*, vol. 37, no. 4 suppl, pp. S–152, 2002.
- [14] R. Dörner, S. Göbel, W. Effelsberg, and J. Wiemeyer, *Serious games*. Springer, 2016.
- [15] A. Mittal, L. Scholten, and Z. Kapelan, “A narrative review of serious games for urban water management decisions: Current gaps and future research directions,” *Water Research*, p. 118217, 2022.
- [16] C. Zaror, R. Mariño, and C. Atala-Acevedo, “Current state of serious games in dentistry: a scoping review,” *Games for Health Journal*, vol. 10, no. 2, pp. 95–108, 2021. doi: <https://doi.org/10.1089/g4h.2020.0042>
- [17] W. Westera, R. Prada, S. Mascarenhas, P. A. Santos, J. Dias, M. Guimarães, K. Georgiadis, E. Nyamsuren, K. Bahreini, Z. Yumak *et al.*, “Artificial intelligence moving serious gaming: Presenting reusable game ai components,” *Education and Information Technologies*, vol. 25, no. 1, pp. 351–380, 2020. doi: <https://doi.org/10.1007/s10639-019-09968-2>
- [18] T. Bosse and C. Gerritsen, “Towards serious gaming for communication training—a pilot study with police academy students,” in *International Conference on Intelligent Technologies for Interactive Entertainment*. Springer, 2016, pp. 13–22.
- [19] J. van Laere, G. De Vreede, and H. Sol, “A social simulation-game to explore future co-ordination in knowledge networks at the amsterdam police force,” *Production Planning & Control*, vol. 17, no. 6, pp. 558–568, 2006. doi: <https://doi.org/10.1080/09537280600866611>
- [20] A. Adams, J. Hart, S. Beavers, and A. Ryan, “Game-based learning for police training in child interviewing (2017).”
- [21] M. Margoudi, J. Hart, A. Adams, and M. Oliveira, “Exploring emotion representation to support dialogue in police training on child interviewing,” in *Joint International Conference on Serious Games*. Springer, 2016, pp. 73–86.
- [22] J. Davidson and A. Bifulco, “Investigating police practice in the uk: achieving best evidence in work with young victims of abuse,” *Pakistan Journal of Criminology*, vol. 1, no. 3, pp. 19–46, 2009. doi: <https://doi.org/10.1130/1052-5173-19.7.46>
- [23] M. Bruijnes, J. Linssen, R. op den Akker, M. Theune, S. Wapperom, C. Broekema, and D. Heylen, *Social Behaviour in Police Interviews: Relating Data to Theories*. Cham: Springer International Publishing, 2015, pp. 317–347. ISBN 978-3-319-14081-0
- [24] R. op den Akker, M. Bruijnes, R. Peters, and T. Krikke, “Interpersonal stance in police interviews: content analysis,” *Computational linguistics in the Netherlands journal*, vol. 3, pp. 193–216, 2013.

- [25] M. Bruijnes, J. Kolkmeier, R. op den Akker, J. Linssen, M. Theune, and D. Heylen, "Keeping up stories: design considerations for a police interview training game," in *Proceedings of the Social Believability in Games Workshop (SBG2013)*, 2013, p. 14.
- [26] E. Jaspert, D. Rato, R. Prada, A. Paiva, and G. Vervaeke, "A virtual platform to train cross-national police teams in team collaboration and police interviewing," *European Law Enforcement Bulletin*, 2018.
- [27] D. Walsh, G. E. Oxburgh, A. D. Redlich, and T. Myklebust, *International Developments and Practices in Investigative Interviewing and Interrogation: Volume 1: Victims and Witnesses*. Routledge, 2017.
- [28] U. Holmberg and S.-Å. Christianson, "Murderers' and sexual offenders' experiences of police interviews and their inclination to admit or deny crimes," *Behavioral sciences & the law*, vol. 20, no. 1-2, pp. 31–45, 2002. doi: <https://doi.org/10.1002/bsl.470>
- [29] M. Vanderhallen, G. Vervaeke, and U. Holmberg, "Witness and suspect perceptions of working alliance and interviewing style," *Journal of Investigative Psychology and Offender Profiling*, vol. 8, no. 2, pp. 110–130, 2011. doi: <https://doi.org/10.1002/jip.138>
- [30] B. Richardson, P. Taylor, B. Snook, S. M Conchie, and C. Bennell, "Language style matching and police interrogation outcomes," *Law and human behavior*, vol. 38, 04 2014. doi: <https://doi.org/10.1037/lhb0000077>
- [31] H. Cleary and T. C. Warner, "Police training in interviewing and interrogation methods: A comparison of techniques used with adult and juvenile suspects." *Law and human behavior*, vol. 40, no. 3, p. 270, 2016. doi: <https://doi.org/10.1037/lhb0000175>
- [32] B. Milne and R. Bull, *Investigative interviewing: Psychology and practice*. Wiley, 1999.
- [33] B. Snook, J. Eastwood, M. Stinson, J. Tedeschini, and J. C. House, "Reforming investigative interviewing in canada," *Canadian Journal of Criminology and Criminal Justice*, vol. 52, no. 2, pp. 215–229, 2010. doi: <https://doi.org/10.3138/cjccj.52.2.215>
- [34] D. Walsh, G. Oxburgh, A. Redlich, and T. Myklebust, "Investigative interviewing in england and wales: Adults, children and the provision of support for child witnesses," in *International Developments and Practices in Investigative Interviewing and Interrogation*. Routledge, 2017, pp. 148–165.
- [35] B. J. McGurk, M. J. Carr, and D. McGurk, *Investigative interviewing courses for police officers: An evaluation*. Citeseer, 1993.
- [36] C. E. Kelly, J. C. Miller, and A. D. Redlich, "The dynamic nature of interrogation." *Law and Human Behavior*, vol. 40, no. 3, p. 295, 2016. doi: <https://doi.org/10.1037/lhb0000172>
- [37] L. M. Howes, "Interpreted investigative interviews under the peace interview model: police interviewers' perceptions of challenges and suggested solutions," *Police Practice and Research*, vol. 21, no. 4, pp. 333–350, 2020. doi: <https://doi.org/10.1080/15614263.2019.1617145>
- [38] P. B. Marques and B. Milne, "The investigative interview contribution to law enforcement: perceptions of portuguese police officers' and magistrates," *European Law Enforcement Research Bulletin*, no. 18, 2019.
- [39] R. P. Fisher and R. E. Geiselman, *Memory enhancing techniques for investigative interviewing: The cognitive interview*. Charles C Thomas Publisher, 1992.
- [40] —, "The cognitive interview method of conducting police interviews: Eliciting extensive information and promoting therapeutic jurisprudence," *International journal of law and psychiatry*, vol. 33, no. 5-6, pp. 321–328, 2010. doi: <https://doi.org/10.1016/j.ijlp.2010.09.004>
- [41] R. P. Fisher, R. E. Geiselman, and M. Amador, "Field test of the cognitive interview: enhancing the recollection of actual victims and witnesses of crime." *Journal*

- of Applied Psychology*, vol. 74, no. 5, p. 722, 1989. doi: <https://doi.org/10.1037/0021-9010.74.5.722>
- [42] E. Garrido, J. Masip, and C. Herrero, “Police officers’s credibility judgments: Accuracy and estimated ability,” *International Journal of Psychology*, vol. 39, no. 4, pp. 254–275, 2004.
- [43] C. Steiner, K. Gaisbachgrabner, A. Nussbaumer, J. Mertens, M. Hemmje, R. Nadolski, W. Westera, B. Bazzanella, M. Casagrande, A. Molinari *et al.*, “D8. 4–second rage evaluation report,” 2018.
- [44] E. McAuley, T. Duncan, and V. V. Tammen, “Psychometric properties of the intrinsic motivation inventory in a competitive sport setting: A confirmatory factor analysis,” *Research quarterly for exercise and sport*, vol. 60, no. 1, pp. 48–58, 1989. doi: <https://doi.org/10.1080/02701367.1989.10607413>
- [45] F. De Fruyt, M. Bockstaele, R. Taris, and A. Van Hiel, “Police interview competencies: Assessment and associated traits,” *European Journal of Personality: Published for the European Association of Personality Psychology*, vol. 20, no. 7, pp. 567–584, 2006.