

Keeping up Stories: Design Considerations for a Police Interview Training Game

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Abstract. This discussion paper presents ideas for designing a serious game for tutoring police officers in training to conduct non-cooperative dialogue in police interviews. The system teaches social interactions. It simulates the social interactions of suspects in police interviews through a virtual suspect agent. These interactions can be non-cooperative as suspects are often not cooperating during the interview. The police officer in training has to interact with the suspect in a way that makes the suspects cooperative in order to gather information from them. In addition, the system must track the progress of the user regarding the training goals. We propose an architecture with a meta-agent that adjusts the suspect agent to present the user with challenging and meaningful interactions, while maintaining a consistent story and immersive game experience.

Keywords: conversational agent, dialog manager, dialog system, serious game, police interview

1 Introduction

Immersive real-time virtual environments allowing multimodal interaction make it possible to create dramatic and highly immersive user experiences. The user can act in such an environment as a character interacting with artificial characters. This vision of interactive storytelling has found its realization in various research projects on the design and evaluation of story-based education and training systems and serious games. The Pienter project¹ aims at building a learning application using embodied conversational agents in which policemen can practice effective police interview² skills and strategies in a game like setting.

In this paper we discuss the following aspects that are raised by the very idea of a serious game for training social conversational skills for police interviews. The aspects relate to different research fields: natural dialog systems, tutoring

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² A police interview is often referred to as an interrogation. However, due to the forceful connotation of “interrogation”, we choose to use interview.

systems, computer games and computer graphics. We discuss the types of dialog moves, strategies and dialogs we see in police interviews and what this means for the dialog system, the core of the virtual suspect character. Most spoken dialog systems assume cooperativeness of user and system with a clear cooperative goal and clear tasks for each of the two interlocutors. Suspects are sometimes non-cooperative, they have a different agenda than the police interviewer. One of the challenges of the police interviewer is to get the suspect to open up and make him tell his own story. This makes one of the training goals of the serious game. The other overall goal for the interviewer is truth finding. Sometimes suspects hide information. They lie or deceive or they simply choose to remain silent. We focus on two types of motives for a suspect to take a non-cooperative stance towards the interviewer: rational reasons and relational motives. If the suspect doesn't trust or like the policeman he will not tell his story (a relational motive). If he believes it is better to hide the truth he will hide the truth (a rational motive).

We discuss possible didactic goals and how a tutoring meta-agent controls the decisions the dialogue manager makes when deciding the way the suspect character behaves during the dialogue. We discuss how a suspect agent can try to simulate a suspect to some extent and what role can be put apart for a meta-agent in the architecture that can provide feedback and give a meaningful learning experience.

2 Police Interviews

“You have the right to remain silent” is a legal right recognized in many of the world's legal systems and many suspects *initially* try to remain silent when they are interviewed by the police. A suspect often has a very uncooperative stance towards the police officer and the police interview in general. Suspects may behave withdrawn, defiant or even aggressive towards the police officer. The police have the difficult task to convince the suspect to cooperate and tell the truth in an interview. How do they do that?

2.1 Interview Methods

Dutch police are trained to use the theory of interpersonal stance, or as they refer to it “Leary's rose” [11]. Leary's rose is a model for human interactional behavior where interpersonal behavior is represented in categories of interpersonal stance on the dimensions of affect (x -axis) and power (y -axis) [11], see Fig. 1A. Similar theories are known under names such as the Interpersonal Checklist [9] and the interpersonal circumplex [16], but the differences are often superficial. The model is often pictured as an ordering of the stances on circle, situated on the two axes. This regular ordering of categories on a circle is called a circumplex. The circumplex is divided in eight areas: these are the interpersonal stances. The circumplex shows that stances that are close together are more related than those that are further apart on the circle, with opposites being negatively related (Fig. 1A). Leary suggests that human stances are modulated by the

interaction with the conversational partner. This means that two conversational partners are influencing each other with their stance during a dialog. Leary calls these interactions ‘interpersonal reflexes’. Acts on the dominance dimension are complementary and acts on the affect dimension are symmetric. This means that a dominant act (e.g. power display) will elicit submissive acts, whereas an act with positive affect (e.g. cooperative) elicits another positive affect act (see Fig. 1B). For example, if someone acts dependent to you (submissive and positive), you will feel a tendency to adopt a leading stance (dominant and positive)[11].

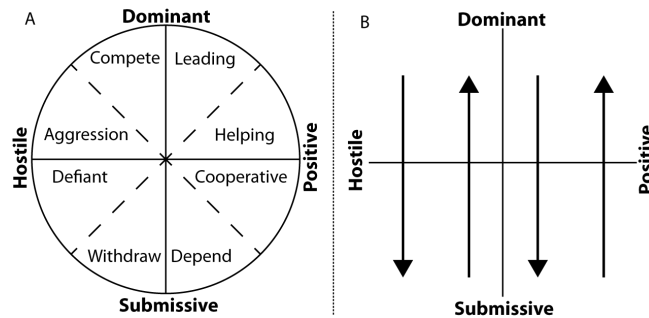


Fig. 1. A: Leary’s rose is defined by two axes: a dominance axis (vertical), describing the speaker’s dominance or submissiveness towards the listener; and an affect axis (horizontal), describing the speaker’s willingness to cooperate with the listener. The rose can be divided into eight areas that each correspond to a stance. B: The solid arrows indicate the behavior inviting relation between the quadrants according to Leary’s theory [11]. So, dominant-positive invites submissive-positive behavior (and vice-versa) and dominant-hostile invites submissive-hostile behavior (and vice-versa).

In addition to these tendencies, there are “negotiation” strategies available to try and change the behavior of the suspect. The *Table of 10* by Giebels [7] describes the strategies a police officer can use (see Fig. 2).

The method of police interviewing is rather robust; even if the suspect is aware of the theory and tactics used, and unwilling to cooperate, they are inclined to talk when the police apply their methods [13]. So the saying from the start of this section might be updated to “We have the right to remain silent, yet we do not”. However, despite the robustness of the methods, the skills required to conduct an effective interview still need to be trained. This is where the Pienter project comes in, it aims at building a learning application with embodied conversational agents in which policemen can practice these skills and strategies in a game like setting.

2.2 Interview Script

The following fragment of a script is based on an unpublished, Dutch training police interviews corpus [1]. The two versions are possible outcomes of the

#	Strategy	Principle	Description
1	<i>Be Nice</i>	sympathy	Show willingness to talk, react empathic.
2	<i>Be Equal</i>	equality	Emphasize commonalities, name external foes.
3	<i>Be Credible</i>	authority	Show trustworthiness, show expertise.
4	<i>Emotional Appeal</i>	self-perception	Play on feelings (consider victims), offer to earn respect.
5	<i>Intimidation</i>	insecurity	Warn of consequences, personal attack.
6	<i>Impose boundaries</i>	scarcity	Deny concessions, ignore opponent.
7	<i>Direct pressure</i>	repetition	Repeat appeal (plant seed), accomplished fact.
8	<i>Legitimate</i>	legitimacy	Refer to rules and laws, refer to other opinions.
9	<i>Trade</i>	mutuality	Ask for something in return, concession after high commitment.
10	<i>Convince rationally</i>	consistency	Bring forward arguments, confront with contradictions.

Fig. 2. Table of 10 as described by [3]. Translated from Dutch.

interview. They differ in the Table of 10 strategy [7] used by the interviewer. The suspect is being questioned regarding the theft of an outboard motor. His car was seen near the docks at the time the theft happened (around 23:00). He stated he was at his girlfriend's place during the theft. However, when the police checked this, she said he left earlier. In the rest of this paper we refer to this script to illustrate our ideas.

- *Suspect: Yeah, I'm not happy. I'm cooperating, telling you where I was. This just takes so long, I've already missed one meeting today because of this.*
- *Police: I understand, it isn't easy. I'm sorry. We just have to ask some more questions. Some things are still a bit unclear.*
- *S: Yeah, I guess it's just your work. Right? Let's get on with it.*
- *P: Thing is, you told us you were at your girlfriend's.*
- *S: Yeah, left at about half past one, am, for home. Can't have been at the docks at 11 pm.*
- *P: Well, we checked. She told us you left a bit earlier... at 10 pm.*
- *S: Hm... maybe I left a bit earlier. Don't really remember.*

Version A: strategy intimidation

- *P: You aren't being honest. I don't like that. I think you should tell the truth now. Otherwise we will be here all day! Come on, you don't want that.*
- *S: What do you mean?! I told you! I left from Julia's and went home! What do you want from me?! I don't...*

Version B: strategy be nice

- *P: I get that, with nice company you don't keep track of time.*
- *S: Exactly! It was really nice, love her you know.*
- *P: Haha, good for you. But, did you maybe go somewhere else afterwards?*
- *S: No. Yeah, well... I guess I could tell you... But...*
- *P: I'll be discrete.*
- *S: Yeah, ok. I went to a bar after I left, near the docks. And... that's why I didn't say anything before... I had some beers and... and then drove home.*

Version A ends in an escalation for this suspect and he refuses to cooperate any further. Version B works better. It turns out that there was another reason

why he did not tell the truth (drunk driving) and he turns out to be innocent of the theft.

2.3 Interview Tactics

Suspect and police both try to come to an agreement about a coherent story. They both contribute to the construction of this story. Both have their own constraints; properties that the constructed story should satisfy. For the police some constraints are related to elements of the Proof Matrix (Dutch “bewijsmatrix” [3]). It contains different elements, among which:

- Tactical Clues: Pieces of hard evidence.
“The girlfriend stated the suspect was not with her at the time of the crime. The car of the suspect was spotted near the docks at the time of the crime.”
- Tactical Goals: Goals that relate to tactical clues.
“Determine if the suspect considers his girlfriend trustworthy. Determine that the suspect was the only one who used the car that night.”
- Actions: Concrete actions to attain a tactical goal.
“Conduct interview with the suspect”

3 Police Interview Training Game

What elements should a game for police interview training contain? Designing a game metaphor that closely represents the relevant aspects and mechanisms of the real life interview “game” is one thing, designing a valid game as a tool to learn skills that are usable in the real life interview situation is another. In this section we discuss game-based learning theory and some learning goals for the interview training game.

3.1 Game Metaphor

The police interview can be described using analogies between real-life and common game-concepts. When trying to realize the tactical goals of the interview, the interviewer has to deal with the stance of the suspect. The suspect may not be very willing to talk about certain topics. The interviewer has to take care that there is enough *space* to talk and that the suspect is willing to continue the interview. Many of the acts taken by the police may not be directly aimed at reaching a tactical goal (task related) but more at achieving social alignment, to make room for pursuing the task goals.

Arguments (such as the facts or tactical clues) are the tools or *weapons* that the interviewer can use to try to unravel the (false) constructs built up by the suspect. Constructs are more or less sensitive depending on three things, a) the logical dependency between the argument and the statement in the story constructed (is it true?), b) the stance that the suspect takes (do I like this guy?), and c) the value that this part of the story has for the suspect (do I want to tell

this fact?). A suspect who constructed some lie and gets attacked on this lie feels his story space getting smaller: the truth is closing in. Before the suspect can give up the part of his story that is under attack, he needs a way out of this ever smaller story space. It is the responsibility of the interviewer to offer the suspect this way out, as the interviewer is the one that attacks the suspect. Without a way out, the suspect might see no other option than to defend his space at all costs. This defense takes the form of a negative stance (e.g. aggressive) towards the interviewer. Stance is something that has to be dealt with before task related issues can be discussed. An uncooperative (defiant, aggressive) stance makes that the weapons don't work. The interviewer can attack the space of the suspect, but the suspect will not accept "a way out". He will only defend his story (space). Eventually, if the suspect doesn't have anymore space he will give up (stop talking) and it is *game over* for the interviewer without getting to the (suspect's) truth.

3.2 Game-based Learning

In a serious game for police interview training, we propose a virtual agent that acts as suspect and a meta-agent that deals itself with teaching. A virtual suspect agent has an intrinsic "motivation" which is not that of a tutor or teacher. The suspect agent acts according to its own goals such as *saving face* or *withholding sensitive information*. An agent acting in such a way yields an application that *simulates* an interview to some extent. However, implementing an agent that thinks and acts like a suspect has some limitations with respect to the learning goals. In the current training of police officers actors are used that act as suspects. In their choice of action, these actors choose their moves in such a way that not only they impersonate believable suspects but also in such a way that the best learning experience is realised: they act as suspects but think as tutors.

As inspiration for our approach to game-based learning theory we considered the work of Kiili [8]. Kiili relates game-based learning to the flow state as introduced by [5]. An individual in the flow state has an optimal experience during an activity through complete absorption and engagement. The flow state is related to the correspondence of the challenge an activity poses and the skill required to master the activity. Flow has been shown to have positive impact on learning [18] and is explored in computer-mediated environments [6]. The model for designing and analyzing educational games proposed by Kiili is based on the flow theory and the principles of experiential learning: *direct experience* and *reflective observation*. These design principles should be taken into account for any tutoring game. We argue that in our tutoring game, the game must provide feedback to the user and control, on a higher level, its components to enable a learning experience during the dialog with the suspect agent.

3.3 Learning Goals

A learning game revolves around making users choose what to do and give feedback on those choices. Relating to the game-based learning theory, in particular

the idea of facilitating the *flow state*, we argue that learning is better if the choices can have different grades of difficulty and have different, meaningful effects (i.e., they do not all have the same result). A number of *incremental* learning goals could be:

- C1: Learn to identify different interview strategies.
- C2: Understand the effect of different interview strategies on the interview.
- C3: Understand how stance can be used to efficiently perform an interview.

Depending on the concept that we aim to teach in the game, we can see how the presented dialog acts by the suspect agent should vary in different ways. For C1 we want a variety of different strategies represented in the available actions, whereas the contextual part (or topic) of the questions should be comparable. For C2 it is important that the available strategies differ in their impact on the suspect agent. For C3 we are interested in conversation choices that vary on stance and the effect these differences have on the course of the interview. The game should make the user have to consider his actions in relation to the learning goal, by offering both direct experience and reflection relevant to the learning goal.

In the following section we discuss our ideas towards the design of a virtual suspect agent. After that, we discuss the tutoring meta-agent that can make the game a valid learning tool.

4 Suspect Agent

The first challenge is to design a simulation of a police interview that closely represents the relevant aspects and mechanisms of a real life interview. We view the dialog manager that decides on what utterances an agent produces as the core component of such a suspect agent.

4.1 Dialog Manager

The core task of a dialog manager (DM) component of a conversational agent is to decide “what to do” (for spoken dialogue systems “what to say”) next. It needs to decide which contribution to the dialog to provide based on the input of the user, the goal that the agent tries to realize and some model of the (dialog) world. The complexity of the DM model may range from a basic state machine to dynamic, data-driven and machine-learned models[15]. The complexity typically depends on what aspects of behavior (like rational goals, social relation, face and politeness) have been modeled explicitly and what aspects are not taken into account or only implicitly implemented in the system.

Typically, a DM – and by extension the agent that employs it – has goals that are congruent with the goal of the application. Take for example a system that assists customers of an airline while booking a flight ticket. The agent that is in dialog with the user has the same goal as the overall system: assisting the user. Most practical dialog systems assume a collaborative task to be performed

within a system (e.g. a booking agency) with clear roles and tasks for the agent and the user. However, in a police investigation the suspect and investigator can have opposing goals. The suspect sometimes tries to avoid certain sensitive topics, refuse to answer questions, and give information that may not be true. His goal is to come out of the interview *looking innocent*, regardless of truth. The goal of the police officer is to *find the truth*.

4.2 Formalization of Information

For our concept of a DM design we propose the *information-state* based architecture as proposed by [10]. This approach involves formalizing actions and information, so that the system can formally define different goals for agents and plan sequences of actions that reach these goals. However, such a system can never completely represent all the options that are possible in the world, and neither does the user know about the completeness of the system. That is, the user doesn't know what can or cannot be said (or understood) in the dialog with the system. We therefore suggest to provide the user with a set of actions to choose from, instead of letting the user freely interact with the system.

We present different components of an information-state-based dialog manager. Specifically, we illustrate formalization of actions and information in the interview world. All actions that the two agents can perform are dialog acts. Annotation schemes for dialogs such as DAMSL [2] form a good starting point for defining the performable actions in our system. Instead of opting for such a general scheme, we choose to use a more illustrative taxonomy that is specific to the interview situation. Further, we do not use a proper knowledge representation of the information, but rather formulate information in simple string-type natural language expressions. Consequently, we do not approach techniques of *surface realization*. We merely write out results for illustration, ignoring required interim steps. The examples are based on the script from the corpus of practice police interviews [1].

4.3 Information

Information is the central part of an interview and can have different qualities. Is a statement an established fact? Is it a lie? Is it incriminating or exonerating someone? Is it private or personal information? Whom does it concern? In an interview situation, information plays different roles for the dialog of the involved parties. The interviewer is interested in gathering or confirming information, the interviewee is interested in giving some information but withholding or lying about other information. We approach this by formalizing a scenario in the information-state.

The scenario information is stored in the information-state of the DM. The DM also considers other data, such as a history of previous actions and stances of agents during the dialog. The current information-state affords a certain set of actions. The action that is acted out changes the information-state and this continues turn-by-turn. The idea is that the information-state abstractly models

the facts that are known, including the previous dialog moves and interpersonal stances of the involved parties.

In the following we present, from different perspectives, some conceptual ideas on how to model information in our system and illustrate what actions might be meaningfully afforded given the information(-state).

4.4 Dialog Actions

In a turn based fashion, the two agents, an interviewer (user) and an interviewee (system), perform *actions*. An action has effects (post-conditions) that will be manifest in the information-state. We simplify the pool of actions by restricting them to actions that are archetypal or characteristic for the “character” the agents portray. The interviewer’s (user) actions always dictate the direction of the interview. Actions are the simple action type (like `make_statement`, `infer`, `accuse`, `respond`). Additionally, action types could be paired with a strategy from the *Table of 10*.

- action: `make_statement`(`be_nice`(P)) \Rightarrow “Police: I understand, it isn’t easy. I’m sorry.”

Other interviewer actions may only be appropriate as a follow-up to some suspect actions, like a counter question. Some actions can only be used in combination with something that is already said or known. For example, confronting a suspect on a lie requires the suspect to have committed to a fact know to be false (from a tactical clue).

4.5 Logical Reasoning

Logical reasoning to build up one’s line of arguments is vital to interviews. The goal of the interviewer is to uncover the truth. The saying “knowledge is power” applies to interviews as well. An interviewer is interested in verifying as many facts as possible to give him the upper hand and to be flexible in the use of interview strategies. The Dutch police surround a fact (a tactical clue) with questions (and answers) before they confront the suspect with this fact. In this way they try to prevent the suspect a way out. For example, if the suspect from our script had said that *no one else ever uses his car*, he would have difficulty convincing a judge that he was *not* driving his car at that time. The suspect can have a different and opposing goal, for example to hide some fact. Consequently, this must be reflected in the dialog manager design as well. Truth/logic related qualities of different facts afford different kinds of dialog actions, for example:

- fact A: [S left at 1:30am]
- fact B: [S left at 10pm]
- action C: `claimTrue`(S, A) \Rightarrow “Suspect: Yeah, left at about half past one, am, for home. Can’t have been at the docks at 11 pm.”
- action: `provenFalse`(P, \neg C, B) \Rightarrow “Police: Well, we checked. She told us you left a bit earlier... at 10 pm.”

The suspect claimed fact A to be true while the police knew fact B to be true and used this knowledge to confront the suspect on his lie (action C). On a higher level, this is an example of the strategy “*Convince rationally*” from the Table of 10.

4.6 Stance Response Model

Part of the current state are the interpersonal stances of the suspect and the interviewer. A certain stance may afford certain actions and different actions have different influences on stance. In a stance response model, the suspect agent’s stance is computed based on his previous stance and the interviewer’s stance. The basic foundations here are that: opposing behavior results in opposing behavior; dominating behavior results in submissive behavior (see Fig. 1B)[4]. The interviewer’s stance depends on his current action. An action may address information, which, as described before, has certain properties. These properties can give cues to how an individual “feels” about the addressed context, and thereby how it will interpret stance of the action.

In this section, we discussed how a suspect agent can try to simulate a suspect. It needs a DM that decides “what to say next” and for this it needs a formalized information-state. The information-state (which includes stance) can inform the selection of an action, by checking the current dialog state against pre-conditions of actions. To update the information-state, the post-conditions of actions need to contain information compatible with the formalized information-state. The system can have a stance towards the user’s actions, they have consequences. Finally, the suspect agent might have several affordable actions at any time. To select an appropriate action to reach his goal he can employ planning. We suggest this is done in concurrence with a tutoring meta-agent.

5 Tutoring Meta-Agent

An agent that is designed only to think and act as a suspect by itself doesn’t afford a good learning experience for the user, because it does not consider the learning goals of the tutoring application. In this section, we describe our view on a *meta-agent* that can provide reflective feedback on the user’s actions and can also give a meaningful learning direct experience by assisting the suspect agent in selecting actions.

5.1 Planning & Selecting Choices

An agent can employ a planning strategy to determine what actions can be performed next. An agent tries to find a sequence of actions that maximizes the chances of reaching some goal (see [17] for an example of a planning agent). As pointed out earlier, these goals can be fundamentally different for the suspect and tutor agents.

At any given time, the suspect agent has a number of choices available (we assume at least one). It chooses the action that brings it closest to its goal. However, the goal can usually be reached only through a number of consecutive actions: a plan. At any time, the agent can have multiple actions but also multiple plans available. While the suspect agent can simply choose to carry out the plan that brings it closest to its goal, we propose that the tutoring agent compares its available plans by their outcome as related to the current learning goal. The suspect agent can be forced to choose a less than optimal plan if it seems to bring the conversation closer to the learning goals. For example, if the learning goal is to learn about the effects of interrogation strategies on the stance of the suspect, we are interested in actions that incorporate different strategies while also having different suspect stances as outcomes of the plan initiated by that action. This is similar to the out-of-character reasoning method used in [12].

It is possible that there are no plans available that bring the conversation closer to the learning goals. In this case, we propose that the tutoring agent alters the “state of mind” of the suspect agent. Utilities of the suspect agent (like stance) could be altered. This might be done using late commitment [12] by letting the suspect agent assume facts that were, up until that moment, undecided. Consider for example a scenario in our game in which the learning goal is to let the player learn to deal with a very angry suspect. When, at a certain time, there is no action available that would make the suspect agent angrier, the meta-agent could alter the stance of the suspect agent. The meta-agent could, by using late commitment, make the suspect agent be very insulted by the last comment of the interviewer (the player) and thus change the stance of the suspect agent so that it would become very angry.

Besides choosing the best action for the suspect agent, it is very challenging to predict what a user would do. One solution is to present the user with a set of possible dialog actions to choose from (see Fig 3). We argue that the meta-agent could play a supportive role in finding a set of choices for the user that illustrates the learning goal. For example, when the goal is to teach the player that the strategy of *being kind* works, we give the user options that relate to being kind and the “more kind” the choice, the more the suspect cooperates:

- strategy A: [Intimidation] \Rightarrow response C: [Escalate]
- strategy B: [Be nice] \Rightarrow response D: [Cooperate]
- action E: $\text{strategy}(P, A) \Rightarrow$ “Police: *You aren’t being honest. I don’t like that. I think you should tell the truth now. Otherwise we will be here all day! Come on, you don’t want that.*”
- action F: $\text{response}(S, E, C) \Rightarrow$ “Suspect: *What do you mean?! I told you! I left from Julia’s and went home! What do you want from me?! I don’t...*”
- action G: $\text{strategy}(P, B) \Rightarrow$ “Police: *I get that, with nice company you don’t keep track of time.*”
- action H: $\text{response}(S, G, D) \Rightarrow$ “Suspect: *Exactly! It was really nice, I love her you know.*”



Fig. 3. A screen shot of the Pienter game. Several dialog options for the player are presented by the system. The player can listen to each of these options (to get a feeling for the prosody etc.) and select the one he wants to say to the virtual suspect.

5.2 Feedback & Score

Experiential learning is based on *direct experience* and *reflective observation* [8]. Through meaningful modeling of interviews, the architecture supports reflective observation by providing feedback that is related to the experienced dialog. Feedback might be as simple as a score calculated from the difference of the length of the path the user chose versus the path computed to be the most “optimal” by the planning algorithm. Of course, more in-depth commentary can be given on the choices made by the user in relation to a training goal. Higher level components may however also take control over the dialog manager to provide an even better experience of the feedback. Ideally (see Kiili’s serious game criteria [8]) the tutoring system adjusts the learning task to the skills of the trainee so the task remains challenging. Finally, the dialog could be *rewound* to important plot points, for example those at which the player had to choose between different strategies. In this way, players can go back in history and change their choices to see and compare alternative outcomes. This can be especially powerful when used as a tool to “try to experience failure” [14]. A player might play with the intent to fail in order to experience an interview that spirals out of control. Combined with appropriate feedback about why the interview failed, this might lead to a better recognition of erroneous behavior in real interviews.

6 Conclusions

In this paper, we addressed several design considerations for the *Pienter* police interview game. Based on current practice in the police training curriculum, we envision Pienter as a serious game in which trainees can interact with a virtual

suspect agent. Key to this game is that players need to become aware of how their strategies influence the outcome of interview with these suspect agents. The approach we take in creating these agents is two-layered. First, we need a dialog manager that can handle the exchange of information, i.e., it should be able to reason about knowledge available to both suspect and interviewer. Then, when players interview the suspect, the dialog manager can let the suspect respond to the actions the players take. Second, we support the opinion that players need proper feedback on their actions and advocate the use of a meta-agent that concerns itself with player tutoring. That is, this meta-agent should be aware of the learning goals of the game and let the suspect agent act according to these, for example by letting the suspect change its behavior to let players attain a specific learning goal. One of the goals of our research is therefore to strike a correct balance between these two levels.

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