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Authoring vs. Configuring Affective Agents for Interactive Storytelling

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Abstract

Autonomous characters in interactive storytelling can be supported by using affective agent architectures. The configuration of most current tools for controlling agents is however implementation-specific and not tailored to the needs of authors. Based on literature review; a questionnaire evaluation of authors' preferences for character creation; and a case study of an author's conceptualization of this process, we investigate the different methods of configuration available in current agent architectures, reviewing discrepancies and matches. Given these relations, promising approaches to configuration are identified, based on: Initial inner states; 'global' parameters of characters; libraries of stock characters; and selections of backstory experiences.

1 Introduction

The field of Interactive Digital Storytelling (IDS) aims at the development of new media that allow for real-time interaction with an unfolding narrative by

users, thus influencing its generation and evolution. This interdisciplinary endeavour promises new forms of digital entertainment based on Artificial Intelligence, drawing on research and techniques in fields including Human-Computer Interaction; Computer Graphics; media studies; psychology; and narratology. Starting with early experiences provided on the first time-shared and personal computers [Blank et al., 1980] and bolstered by metaphors such as the Holodeck [Murray, 1997], the vision of being immersed in an interactive storyworld has entered public consciousness, and the steady growth of the field is evidenced by the establishment of conference series such as ICIDS[1] (the successor to the TIDSE and ICVS series) and INT[2], high-profile academic research groups (e.g. at the University of Teesside, the North Carolina State University, Georgia Tech, and UC Santa Cruz), and the recent European Network of Excellence, IRIS[3] [Cavazza et al., 2009].

Research in IDS has tried to go beyond traditional linear media by creating new methods for adaptivity, generativity, and interactivity. While there are recent examples of technical approaches that are closer to video-based media than to computer games or the Holodeck, e.g. video recombination [Porteous et al., 2010], and of conceptual approaches to story generation, e.g. based on analogy-mappping [Ontañón and Zhu, 2011], a large part of the research has focused on enabling interactive storyworlds [Charles and Cavazza, 2004, Rank, 2005, Si et al., 2005, Louchart and Aylett, 2007].

Interactive storyworlds are virtual worlds inhabited by synthetic characters. They provide environments in which users participate actively in the creation of a narrative by interacting with and through these characters that are endowed with some degree of autonomy. The assembly of autonomous conversational actors poses significant integration challenges [Gratch et al., 2002]. Alongside the important technical challenges, the development of authoring methodologies and the provisioning of tools usable from an authoring perspective form key requirements for success [Cavazza et al., 2002]. This paper focuses on a review of such approaches to creating characters for IDS. The current disparity between the needs of authors on the one hand and the capabilities of and interfaces to existing systems does not allow for frictionless creative work: The present comparison and systematisation of concepts of authoring and methods of configuring IDS systems shall contribute to the narrowing of this gap.

2 Characters

Characters in a traditional story are carefully crafted to reflect a backstory, i.e., individual and joint histories that motivate their behaviour; that are relevant

[1]Interactive Storytelling: International Conference on Interactive Digital Storytelling http://icids.org/ — All URLs in this paper were last visited in December 2011.

[2]Intelligent Narrative Technologies, initiated as an AAAI Fall Symposium http://www.aaai.org/Press/Reports/Symposia/Fall/fs-07-05.php

[3]Integrating Research in Interactive Storytelling http://iris.scm.tees.ac.uk/

to the story's topic; and implications and consequences of which are fleshed out by the author during the creation of the story. In IDS, different approaches have been proposed to capture such backstories and the resulting personalities of characters involved directly or indirectly in the story. In this paper, we focus on techniques that model characters and their behaviour *explicitly* in order to achieve levels of motivational and behavioral autonomy for these characters that facilitate the generativity[4] and flexibility, and the derived benefits for interactivity, that IDS strives for.

A key dimension for agent control architectures that are needed to drive these synthetic characters is affective competence. Starting from a shallower level of analysis, it can be readily identfied with the requirement for a believable portrayal of emotional reactions—i.e., control of expressive behavior. Digging deeper, in order to embue characters with the capability of selecting appropriate expressiveness under broader ranges of circumstances (as possible in the given storyworld) and to support management of related variability within the consistent boundaries perceived as personality characteristics, such decisions need to be based on first principles [Ortony, 2003]. This paves the way towards recognising how affect modeling finally is intimately related to the recognition of the subjective relevance of canonical (e.g., socially established) events and, further, the detection of subjectly relevant environmental dynamics motivating behaviour and the understanding and maintenance of social relationships [Marsella et al., 2010, Aubé, 2005]. Affective agent control architectures attempt to translate these beneficial competencies, as described in theories developed in disciplines including psychology, cognitive science, behavioral sciences, to application areas such as IDS.

A related interesting facet of the notion of authorial control in IDS concerns the issue: How much explicit control does an author using an IDS system need to relinquish to runtime decisions? In the context of IDS-systems using affective agent control architectures, this translates to the question: How can an affective agent be used to create a synthetic character with suitable personality and level of autonomy; i.e., an autonomous personality agent? Or, more concretely: How does the notion of a story character with a backstory relate to the configuration and parameterization of an affective agent?

We investigate this problem from the authorial perspective by means of both, looking at feedback from a questionnaire study performed during an authoring workshop, and by the case study of one of the co-authors practice in authoring, strongly rooted in drama theory. With the aid of the resulting conceptualization of story creation, we then scrutinize the methods for configuration and parameterization made available in different affective agent architectures, analyzing how these relate to the notions surrounding a character's backstory and what additional concepts they introduce.

[4]In his Ph.D. thesis[Mateas, 2002], Mateas clarifies the notion of dramatic generativity by contrasting it to the one of transparency — "that is some detailed way a human observer can readily determine what the system's response will be to some given input" (p.61).

3 Characters from Authors' Viewpoints

The participants of a summer-school on IDS authoring[4] held in Wiesbaden, Germany, from 2011-08-19 to 2011-08-25 as an activity of the IRIS Network of Excellence, were asked to participate in a questionnaire-based exercise aimed at gathering insights on the authoring perspectives on character creation.

The same questionnaire was distributed twice, at the beginning and at the end of the event.

Apart from basic demographic information (age, gender, and relevant experience), it comprised free-text feedback and a set of Likert-scale questions intended to gauge the relative importance of different strategies for creating characters for a story-world. In total, we received 2 times 19 (rounds 1 and 2) anonymously filled forms. The two groups of respondents did not coincide completely, also because some participants arrived late or could not attend the final feedback session.

As expected, and in agreement with informal comments gathered during the summer school, the free-text feedback reflected a wide range of approaches to character creation as a part of story writing. Examples include placing the focus on events, conflicts, or feelings that happen to the character; the reliance on known characters or on personal experience as a starting point; and picking the background and underlying goals of a character as central element. At the same time, the information collected points at the complementarity of different approaches to character creation. The following questions of the questionnaire relate to exactly this point and were derived from previous experience with authors and IDS system components in order to verify that no easily identifiable general preference for one or the other method of character creation exists.

When I create the main characters for a story, ...

1. *... I start with characters I already know.*
2. *... I mainly think of them in terms of their actions in the story.*
3. *... I mainly think about their personality traits.*
4. *... their most important elements are their hopes and fears.*
5. *... the most important element is what happened to them before the actual story.*
6. *... the most important elements are their goals and beliefs.*

[4]The program of the IRIS summer school http://iris.interactive-storytelling.de/Summerschool included plenary tutorials alongside week-long hands-on authoring workshops, each employing one out of four different IDS creation tools: Scenejo[5] [Spierling et al., 2006]; Scenemaker/AAA[6]; the EmoEmma plan authoring tool[7] [Pizzi and Cavazza, 2008]; and IDtension[8] [Szilas, 2003, Szilas, 2007].

[5]http://www.scenejo.org/

[6]http://www.informatik.uni-augsburg.de/lehrstuehle/hcm/projects/scenemaker/

[7]http://www.scm.tees.ac.uk/f.charles/bovary.php

[8]http://www.idtension.com/

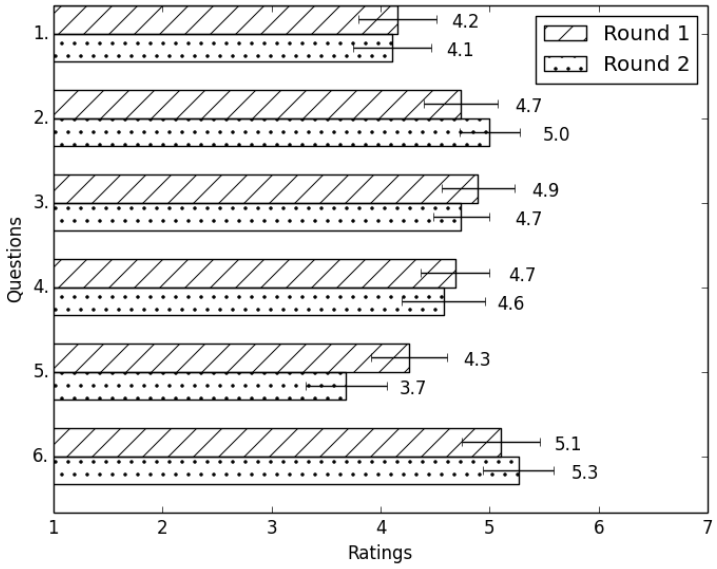

Figure 1: The rating results for the six questionnaire items on a seven-point Likert scale (see main text). Error bars indicate one standard error.

The questions were rated on a seven-point Likert scale ranging from "Strongly disagree" to "Strongly agree". As expected and illustrated in Figure 1, no significant differences between different authoring approaches were found at this level of investigation.

As a second source for authors' viewpoints on the problem of configuring synthetic characters in an effective way, we draw on the authoring experience of one of the co-authors. This component of our approach is motivated by a methodology from usability that instigates focusing design on a very detailed user persona [Cooper, 1999, Long, 2009]. This particular author is experienced in both, authoring traditional linear narratives (i.e., script writing) and in authoring for interactive storytelling systems. Further, the author is active in the IDS community [Struck, 2005] and member of the IRIS network's interest group of authors. This case study of a single author's practice complements the insights gained from previous experience and interaction with the interest group. The author's practice is informed by advice found in the literature and strongly rooted in drama theory.

The central tenet of this author's experience is the conceptualization of narrative as a *sequence of emotional effects*. In this view, the narrative spine of a story is best developed as a sequence of character states in terms of emotional relations. Underlying this approach are character-centered drama models based on work such as by Frank Daniel (see [Howard and Mabley, 1995]), and the no-

tion of a *conceptual space* [Struck, 2005]. Furthermore, the practice corresponds to the cyclic process of *engagement* and *reflection* that has been proposed as a model of creativity in writing [Sharples, 1999, Gervás, 2009].

As a quick way to concretize a character's role in a narrative, it is proposed to answer the question: What does the character want the most? Motivations and aversions of a character are then considered subordinate to this main desire. A fictional character is taken to be mostly single-minded about a specific goal, and changes related to this goal are reflected directly in the story. *This model contrasts with the hierarchical subdivision of goals into ever smaller subgoals commonly used as important element of agent-based cognitive modeling.* In stories, human behaviour is seen to be experienced in concentrated form by involving characters in existential situations, i.e. situations that relate to their aspirations and vocations.

The notions of aspirations, vocations, and goals are crucial to derive a character's *fears*. As an example, consider a character that wants to see the world: Potential candidates for suitable fears (i.e., of high potential impact) would then be fear of flying or fear of crossing open water. Fears can be further subdivided by asking:

1. What happens when the character does not try to reach their goals?

2. What happens if the character fails to reach their goals?

A narrative is then seen to pitch a character's goals against obstacles involving the need to risk high stakes. The repeated encounter of obstacles is intended to trigger uncertainty in the spectating or interacting audience as to whether the main character can and will succeed. A prerequisite for such uncertainty is, e.g. in film, to introduce the nightmares and hopes of the character, i.e. what has to be overcome and what is to be reached, so as to raise hopes and fears in the audience identifying with this character. In linear narratives, this principle is also used as an exclusion criterion for what *not* to show: Anything lacking in connection to a character's hopes and fears is to be omitted. Conversely, everything that is shown relates to this backstory of the character.

This process also contributes to the development and incremental sharpening of a character's profile, as the surveying of the character's activities throughout a story indicates what properties it must include for the story to be worth telling (cf. e.g. [McKee, 1997]). Note that such constraints quickly extend beyond individual characters to comprise their social stances and interrelationships [Spierling and Hoffmann, 2010]. In addition, note how consideration for this selection principle contributes to the perceived believability of characters, given that this has been related to an observer's ability to infer and predict their motivations and intentions through observations (e.g., [Riedl and Young, 2010], p. 220).

Based on this model and recent experience gathered in the IRIS project [Spierling et al., 2010], the following suggestion for a character creation system matching the conceptual space of authors can be formulated: A library of experiences can serve as a means to define a characters reactions in a range of given

situations: Experiences can represent actual past experiences of a character as well as its imagined history or future. Such a set of experiences relates to the notion of episodic memories. Together with a character's defining goal, the set of experiences forms an emotional map suitable for directing a character. In addition, a variety of authoring approaches should be allowed for, enabling and supporting the exploitation of their complementarities.

In relation to the concepts on the authoring side obtained so far, the following section examines existing systems, the ways of character creation supported in them, and in particular the means for configuration of affectively competent agents. We will first look at related work on character creation in general, followed by more in-depth coverage of the details of selected systems.

4 Related Work

The dichotomy of 'strong autonomy' and 'strong story' used as a way to classify approaches to interactive storytelling systems has a long tradition in the field [Mateas and Stern, 2000, Swartjes, 2010]. The idea of emergent narrative is most compatible with strong-autonomy approaches that do not prescribe fixed potential plots [Louchart and Aylett, 2004, Louchart et al., 2008] but that nevertheless require purposeful authoring (even down to the details of initial positions of characters, in addition to their first goals [Cavazza et al., 2002]) to be successful. ActAffAct [Rank, 2005] is a proof-of-concept system that relies solely on the affective competences of the individual characters and their configuration in terms of beliefs and desires to generate interesting plots within a classical storyworld setting comprising a hero, a villain, a victim and a mentor. Different options of agent control are available to realise autonomous agents which, in turn, entail different application-specific abstractions. For example, IDS systems can use real-time hierarchical planning techniques to simulate the roles of actors with strong autonomy [Cavazza et al., 2002] while recognizing story-relevant situations during interaction [Charles and Cavazza, 2004].

Overall, it is clear that the further a system goes towards strong-autonomy the more important the configuration of individual characters and their affective and situated competencies become [Petta, 2003, Marsella et al., 2010]. However, even in a strongly story-based system autonomously competent agents are invaluable if they can be configured to act 'in character' during episodes that are not directly controlled by the story-based framework. Further, the techniques for configuration can also influence strongly story-based systems that explicitly represent emotional links between characters as part of the authoring process [Pérez y Pérez, 2007]. The negative effects of a clear-cut division between story-controlled and free interaction with synthetic characters within a single user experience are best illustrated by the behaviour of non-player characters in quest-based role-playing computer games, as in the case of a smith character ignoring the player before, during, and after a quest, but terribly excited to present its craft while delivering the quest.

In the VirtualStoryteller framework [Swartjes et al., 2008], *late commitment*

is used for the autonomous characters to determine the actual values of internal parameters and to define the state of the storyworld during the users' interaction rather than beforehand at authoring time. To inform these delayed decisions, an assessment of the benefit of available options for story development is computed.

The Thespian system [Si et al., 2005, Si et al., 2007, Si et al., 2009] also uses a strongly character-based approach towards IS. Beliefs, goals, and recursive beliefs-of-others are the main parameters that drive the behaviour of individual characters. In addition, in support of authorial control, characters can be configured by specifying multiple story-paths that are used to deduce their goals. Thereby, this approach employs a strong-story element to parameterize a system that is originally autonomy-driven.

The EMA emotion model [Gratch and Marsella, 2004, Marsella and Gratch, 2009] of cognitive appraisal of events and coping with the perceived implications has been used to drive affective agents in several applications, which however are often geared more towards training simulations rather than storytelling scenarios. Here, the internal state of an agent contains a subjective causal interpretation of the current state of the world annotated with utilities and probabilities of hypothesised past and envisioned future developments.

The agent architecture FAtiMA has been used originally in the FearNot! serious game application on bullying at schools and later in the multi-cultural scenarios of the eCircus project to drive character behaviour [Dias and Paiva, 2005, Louchart and Aylett, 2007]. The internal states of agents are carefully crafted for them to fulfill their dramatic roles, with the overall goal to achieve the desired pedagogical effect of demonstrating the consequences of different social strategies in the interactive system.

In [Spierling and Hoffmann, 2010], the authors claim that creative authorship is far from obsolete in the context of IDS. Abstractions at the creative conceptual level [Spierling, 2009] are seen to be distinct from, and not necessarily mapping directly to, the more formal abstractions [Crawford, 2004] required for implementation. Rather, the authors argue, this relationship between authorial conceptual abstractions and implementation-specific abstractions of a more technical kind and the special kind(s) of dedicated support required of an IDS system for this transformation needs to be *investigated* for each case.

5 Character-based Storytelling

As mentioned previously, also plot-based 'strong story' approaches that strive for flexible interactivity with characters on a smaller scale can benefit from autonomous agents that are capable to behave in character. Affective agent architectures are an important mechanism in that respect. However, the origins of such architectures often lie with scenarios of use [Rank and Petta, 2006] that target other application areas, such as the development of AI methods as part of cognitive modeling or the direct modeling of psychological theories: Models of artificial emotion thus are a crucial element for building intelligent agents in

social virtual worlds [Gratch and Marsella, 2007] and can also provide valuable benefits for theorizing in emotion psychology itself [Gratch et al., 2006]. However, biologically or cognitively plausible models of agents and the respective configuration of these models are not necessarily suited directly for synthetic characters, i.e., characters particularly shaped for storytelling and entertaining effect—cf. e.g. the single-mindedness of characters mentioned earlier on (see e.g., [Martinho and Paiva, 1999]).

Both the theoretical background and the specific mechanism have an influence on the configuration and parameterization that is possible. Underlying any affective architecture are the different AI methods used: e.g., planning with hierarchical task networks or practical reasoning. An architecture that follows a specific theory of emotion, e.g. [Ellsworth and Scherer, 2003] or [Frijda, 2007], necessarily includes specific elements and parameters. In the following, we consider the principled and concrete ways how parts of configuration can be presented during authoring, focusing on those aspects that have an effect on the personality of a character.

6 Configuration of Affective Agents

For the context of this work, the top-level of an IDS system is not considered: Drama management [Laurel, 1986, Weyhrauch, 1997, Roberts and Isbell, 2008] or narrative planning that affects the system as a whole [Porteous and Cavazza, 2009, Riedl and Young, 2010], often used to fulfill the role of this top-level, is of course an important part, but we intentionally focus our perspective to single characters and their autonomous behaviour, i.e., *character goals*—what characters want to achieve—rather than *author goals*—expressions of preferences of human authors in narrative structures [Riedl, 2004, Riedl, 2009]. We therefore assume a suitable storyworld that characters inhabit and the framework that allows interaction between user(s) and characters, and disregard the effects that these 'environmental' factors (from the perspective of an agent) have on the perception of personality. Based on this assumption: What can existing affective agent architectures provide for authors in terms of configurability?

As a starting point, it is most helpful to look at the possibilities for configuration of characters in some concrete systems. Note that an important biasing factor for the selection of example systems that are covered in this section was the open or confidential availability of source code.

Many affective agent architectures can be described as extensions of *belief-desire-intention (BDI) agent models* which in turn are based on ideas about resource-bounded practical reasoning [Bratman et al., 1988]. These 'BDI+E' agent architectures rely on the elements of a practical reasoning infrastructure: Beliefs that represent what an agent holds to be true in a declarative representational language, desires (or goals) that an agent tries to fulfill, and a representation of what the agent is capable of doing, often in terms of a *plan library*. The third name-giving element, intention, refers to capabilities that are

activated in pursuit of a current goal. The main influences on agent behaviour that all these architectures share are the relative importance of different desires, i.e. their *utility*, and the set of capabilities available to a specific agent.

ActAffAct [Rank, 2005, Rank and Petta, 2005] is an example of such an architecture that adds an operationalization of *affective* appraisal. This addition results in further parameters for configuring an individual agent: The relative importance of standards, i.e. the *evaluation of different types of behaviour*; the initial relative importance of the actors and objects in the storyworld; and the *creation thresholds and decay rates* for different types of emotions. Further, the architecture has been extended to consider *mood as a meta-level effect*, i.e. as an aggregate of previous emotions. An important additional parameter in this respect is the number of emotions considered.

FAtiMA [Dias and Paiva, 2005] is an agent architecture with a similar lineage, originally with a BDI framework at its core, but, in its latest iteration, modularized to allow different combinations of functionality. For the basic set of modules, this results in a configuration that is very similar to ActAffAct, including *thresholds and decay rates* for types of emotions. Different extensions, drawing from very different theoretical backgrounds, extend the core architecture and in the process add further configuration options. Double appraisal [Louchart and Aylett, 2007] is an extension that reuses the appraisal mechanism to judge the affective impact of alternative actions or intentions. A potential high-level parameter in this context is the weight that this evaluation carries in the decision process. Another adaptation of the FAtiMA agent architecture [Doce et al., 2010] is an example of applying a popular model of personality, the so-called OCEAN or five-factor model of personality. An individual's personality is expressed as values of five *personality traits*: Openness, conscientiousness, extraversion, agreeableness, neuroticism [John et al., 2008]. Consequently, individual agents can be configured using five parameters. The values for the five OCEAN factors influence the appraisal process in terms of thresholds and decay rates for emotion instances, but also coping and planning as well as expressivity in an animation system.

Both the BDI framework and personality theory frame the configuration of an individual in terms that are still close to the authorial conceptualization presented above. For other theories and mechanisms, the matching is less direct. In the PSI theory and implementations that are based on it, such as MicroPSI [Bach, 2003] or ORIENT [Nazir et al., 2008, Mei Yii Lim and Paiva, 2010], another extension of FAtiMA, emotions are described as sets of modulators that influence processing directly: *Arousal*, i.e. the propensity for action; *resolution level*, i.e. the accuracy of internal processing; and *selection threshold*, i.e. resistance to change the current intentions. The actual effect of different situations on the values for these modulators can be seen as another set of parameters for an agent's personality. On a more general level, PSI theory introduces the individual settings of so-called *motivators* (affiliation, integrity, energy, certainty, and competence), homeostatic variables with an influence on behaviour based on the deviation from set-points.

Further affective architectures are built on top of cognitive architectures that

in themselves provide a wide range of possibilities for configuring individual differences. An example is Soar and the emotion models based on it, such as EMA [Gratch and Marsella, 2004] or PEACTIDM [Marinier and Laird, 2006]. Soar itself provides for a general processing cycle that selects suitable 'operators' in order to transform a representation of the problem state towards goal states. It can be used in different styles, e.g. relying on the hierarchical organization of goals, and is easily extensible, which in turn results in a wide range of configuration options. Corresponding to the BDI approach, the *utility of goals* and the *availability of operators* form the core of any configuration. Similarly, in Thespian [Si et al., 2005], which is based on PsychSim agents and closely related to EMA, goals, policies and beliefs about self and others are the determining factors of single agent behaviour. The extension with affective appraisal processes, however, provides additional levers to be controlled.

In EMA (short for emotion and adaptation) the overall affective assessment is an aggregation of single event appraisals, and an event is represented in a causal interpretation of the current state of the world from the viewpoint of the agent. This causal interpretation is divided into causal history, current world description, and a task network resulting in a subjective representation of what happened and what might happen. On a conceptual level, the *granularity of this representation* forms an important part of configuring the personality of an agent based on EMA. One focus of EMA are coping activities defined here as the inverse operation of appraisal. Coping thus involves the identification and influencing of the believed causes for the currently significant state. Different coping strategies can be available to a single agent and the selection of these strategies represents a new level of potential configuration and a suitable candidate for the author-suggested character creation system. *Availability and relative priority of different coping strategies* can be seen as linked to previous experiences.

Table 1: Summary of configuration options for inner states and whole agents.

Inner States	Beliefs, granularity of internal representation
	Availability of plans/operators/capabilities
	Utility and relative importance of goals
	Standards, evaluation of types of behaviour
	Thresholds and decay rates for emotion types
	Availability and priority of coping strategies
Traits	History considered for meta-level mood
	Weight of re-appraisal/double appraisal
	Qualities and constraints for planning/scheduling
	Openness, conscientiousness, extraversion, agreeableness, neuroticism
	Arousal, resolution level, selection threshold

	Importance of affiliation, integrity, energy, certainty, competence

Agent architectures that use planning and scheduling techniques based on hierarchical task networks are good examples of systems with further implementation-specific parameters that are very useful for configuring individual differences but comparatively far removed from the author's perspective. Apart from the choice of when and how often to perform (re-)planning, planning algorithms can use *quality measures* and *resource constraints* to decide between alternative paths of action. Classical quality measures in planning are for example computation time and path costs of solutions. Configuration of these mechanisms could then involve the relative weighting of different quality measures, which however may not be straightforward if context-dependencies need to be considered.

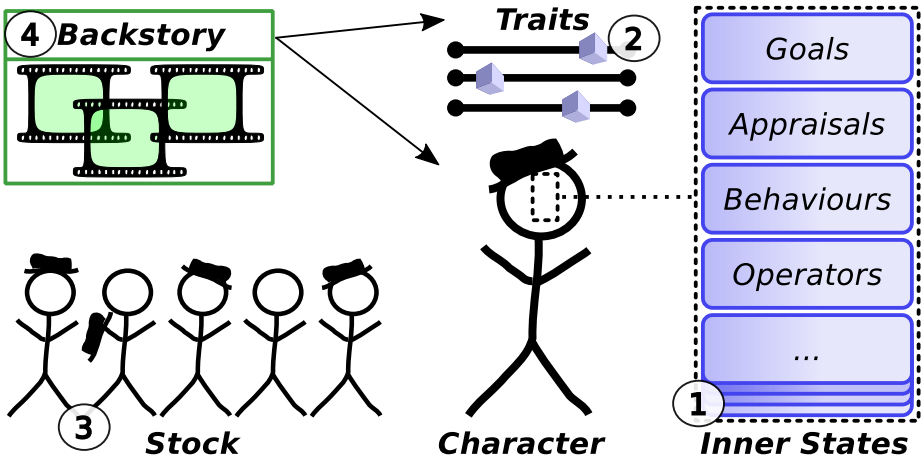

Figure 2: The levels of presenting configuration of characters in IDS.

Independent of the actual agent architecture that is employed, we can distinguish three partially overlapping levels of presenting configuration:

1. Direct changes to or selection of sets of initial *inner states* of agents. As exemplified above, this can range from relatively intuitive concepts such as the specification of goals, beliefs, and available competences or plans to elements that are closely tied to the internal structure of an agent architecture. Practically ubiquitous in available affective agent architectures are the notions of goal utility, as well as numeric thresholds and decay rates for emotional reactions.

2. Parameter settings that influence the inner working of an agent in correspondence to a theoretically persistent characteristic of the agent as a whole: *traits*. This can range from implementations based

on personality theories such as the five factor model over quality criteria for planning processes to the motivators and modulators stemming from PSI theory.

3. Complete *stock characters* with a particular personality that can be selected and used as a basis to start from for customization. This corresponds to a notion of prototypes but does not imply that the resulting characters need to be 'stereotypical' in the pejorative sense.

Figure 2 illustrates the different levels mentioned here. Table 1 summarizes the different options for configuration mentioned above that are relevant for affective behaviour. In particular, it distinguishes between options in so far as they pertain to levels 1 and 2, i.e., they modify the working of particular inner states or of the agent as a whole. Practical and intentional examples for the third level are rare to non-existent. However, most architectures have naturally been designed for specific purposes and therefore the specific characters that have been used are available, at least in principle. To the best of our knowledge, no exhaustive set of character configurations to be used as a starting point for authoring affective characters exists to date. Based on the authoring experience reported above, we offer a suggestion for an additional level:

4. Configuration of background beliefs and emotional parameters such as coping style based on the selection of *backstory experiences*.

7 Conclusion

In this paper, we juxtaposed the conceptualization of character creation from the viewpoint of authors and the different levels of configuration that current affective agent architectures used in interactive digital storytelling systems provide. In order to relate results to general authorial practice, future extension of this work is planned by using what we learned as a seed: Both the development of extended approaches for character configuration in technical systems and the further study to authoring practice.

Based on the suggestions from authoring experience, no straightforward mapping of authorial notions to configuration options currently offered was found. Rather, due to the original scenarios for many affective agent architectures in areas other than IDS, parameters are often far removed from the author's perspective on character creation. One of the aims of this work is to explicate the discrepancies of internal parameters of affective agent architectures and the conceptualization of roles and characters in narrative authoring. Even so, different candidates for higher level configuration that more closely fit the suggestions of our author have been found, e.g. operationalizations of coping styles. In general, it also seems valuable to provide methods for approaching abstract parameters such as personality traits in terms of defining episodes or ready-made sets of trait constellations, in particular given the overall trend towards understanding personality as situation-dependent [Mischel, 2009].

On the other hand, we see the potential of parameters that stem from theoretical and practical considerations in agent architectures and computational modeling of psychological theories as new sources of inspiration for authors, both in terms of details of modeling and in terms of additional factors of influence that implementation-specific configurations expose. Extending and improving affective agent architectures for the purpose of supporting the creation of autonomous characters in a more natural way thus promises to be a valuable enterprise for both the author's and the implementor's perspective.

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