assimilate.net: Creativity Support For Situated Collaborative Storytelling

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ABSTRACT
How we assimilate stories into our common experiences and shape culture is the field of study known as narrative intelligence. By following this hypothesis and investigating theories of conversation modeling, this research outlines a creativity support system for collaborative storytelling that invites participatory narration and shared understanding in a situated context.

Keywords
Interactive Digital Storytelling, Narrative Intelligence, Conversational Information System.

ACM Classification Keywords
H.5.1 Multimedia Information Systems

INTRODUCTION
Current research of interactive narrative systems is largely focused on a maintaining narrative experience with some form of participant control, creating a direct conflict with coherent delivery of story. Therefore management of this relationship remains an important factor in any design.

This research proposes an alternative strategy that invites shared narration through the design and evaluation of a creativity support system that promotes meaning and sense-making for collaborative storytelling in situated contexts. Placing emphasis on participatory narration allows for the possibility for a larger scope of generic themes and creative outcomes to emerge with rich collaborative experiences.

The system design accounts for how narrative manifests in our community and the mental models we form from those influences and can be broadly classed as a 'conversational information system' [1], or one that structures knowledge to manifest coherent collaborations by modelling the supportive processes involved during a group conversation, or the situated action [2] associated with oral and visual storytelling. Through the enactment of conversation, participants can form a shared agreement surrounding several themes and reach a shared understanding.

The storytelling system is devised as a multi-tiered unified architecture including, a database of narrative templates containing a range of cultural based themes, a generative storytelling system that self-organises salient themes selected by participants and an expressive multi-touch table interface that allows participants to collaboratively construct visual or symbolic narratives in an abstract 3D virtual space while promoting gestural, verbal and non-verbal communication.

Storytelling system design can benefit by offering a rich set of events and relationships that appeal to existing metaphors and accrued knowledge patterns. The narrative intelligence hypothesis [3] investigates our capacity to accrue canonical narrative themes through our communities and cultural experiences. By placing emphasis on human intention in narrative, a distinction can be made between narration (sjuzet) and story plot (fabula) [4]. The assumption is the enactment of narrative, or the act of the telling through conversation, is the means by which mental models of narrative are formed and shared. These models, are layers of constructed metaphors that are shaped from our existing conceptual structures [5]. Essentially, any knowledge structure is a result of metaphorical associations from existing conceptual domains that are said to originate from our affective experiences.

Conversation Theory (CT) [6], a theory of learning and social interaction, shows how such knowledge structures can be modeled to support embodied conversation and shared agreement surrounding assembled themes, taking into account the collective viewpoint and interpretation of collaborators. Knowledge in this form is collectively constructed in a cyclic manner to achieve conceptual coherence while remaining flexible and domain independent that is suitable to collaborative storytelling.

The approach is to develop a unified and holistic architecture that incorporates our cultural and historical ways of telling stories while creatively supporting new collective narratives from the many sources online.

BACKGROUND
The field of study known as narrative intelligence can directly inform the design of interactive narrative and storytelling systems. Asking how we assimilate narrative into our common experiences and form an understanding of each other and our experiential world is to understand something of our inherent narrative psychology. This area of research places narrative at the centre of human development and shapes our meaning and understanding of mind, where our intentional states are organized into a 'folk

psychology'; an accrued set of canonical meanings that are extended or breached by story telling [7].

This is a communal process where a sense of belonging to a shared social environment, aids the balance between the canonical and unexpected deviations. An understanding of community and its intersubjective processes can point to methods of representing knowledge that manifests thematic sense-making and narrative coherence. A system that represents knowledge in this way, would mediate the processes through the typical way communities exchange narrative knowledge, and that is through embodied conversation.

Conversation Theory

In mid-70s, cybernetician and psychologist Gordon Pask set out to develop a general theory of human communication and social interaction he named, Conversation Theory (CT). This theory is largely developed as a theory of learning that places conversation as central to its process and outlines a formal method of conversation.

Conversation is defined as a sense-making process or a negotiation of shared agreement given differing perspectives surrounding several themes. The framework developed for CT is essentially a self-organising system where sets of themes may be arranged coherently or whole leading to eventual action or procedures that clarify the context. This defines conversation based on two distinct levels, description of knowing 'why' (cognitive or conceptual) and knowing 'how' (procedural or performative) [8]. CT is a generalised model for representing the structure of conceptual and procedural knowledge and it is this distinction that allows it to create an adaptable framework that is open to collective viewpoint and interpretation.

The central feature of CT is the construction of the entailment mesh. These are concept networks that embed interrelated knowledge, such that each concept that can be explained or understood by its relationship to at least two others. Such networks are said to introduce cyclicity and achieve a conceptual coherence. Cycling in this manner provides a rich set of possible narrative structures within the entailment structure.

SYSTEM OVERVIEW

The system is constructed as a multi-tiered unified architecture including, a database tier containing a pre-processed set of templates with recognizable narratives, the application tier consisting of two layers, storyworld and storyline that models the conceptual and procedural relationships found CT, and finally the presentation tier, an expressive multi-participatory interface that visualizes collaborative ratings of salient narratives (see Figure 1.)

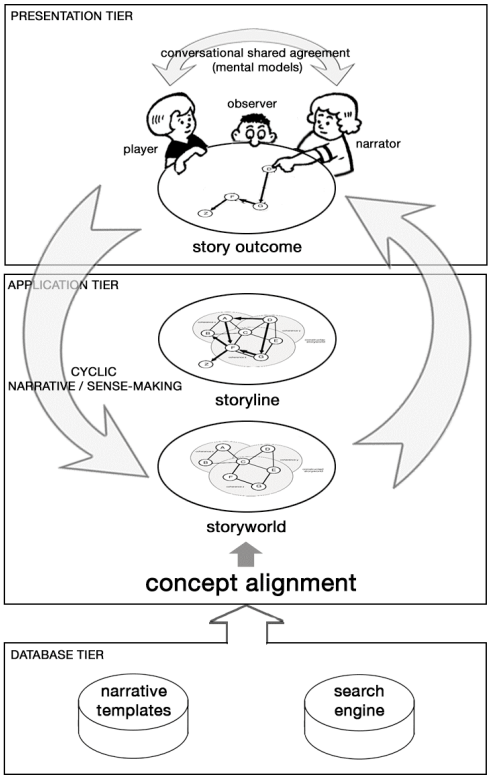

Figure 1. 3-tiered architecture

Presentation Tier

The presentation tier is supported by a multi-user touch table that promotes gesture, verbal and non-verbal communication. The interface manages a collaborative environment that allows participants to visually construct narratives in an abstract virtual space. Narrative themes are assigned visual behaviours that are regulated by collective ratings. The system is a visual search engine that aligns participant themes with template stories drawn from a database of mythology and folklore [9] and springboards new collaborative narratives based on those themes. (see Figure 2.)

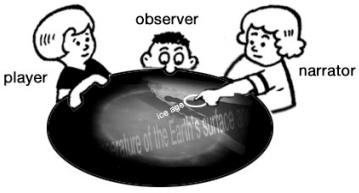

Figure 2. Visual story construction

The collaborative process takes place in a situated context where gesture and conversation are mediated by the themes presented and allows participants to shift between roles as narrator, player and observer while maintaining a coherent narrative. The situated action promotes the shared narration and intersubjective processes that complete the narrative outcomes.

Application Tier

The application tier consists of two layers, firstly the *Storyworld* constructed as CT entailment structures, and the *Storyline* forming the possible sequences and outcomes of that world.

Storyworld Construction

The storyworld concepts are the narrative themes that are assembled by participants selected from narrative templates and arranged into CT entailment structures. Entailment networks are collections of themes that make up the contextual relationships and contain common or logically inferred relationships. In this model it is seen as the context for the story world.

Techniques of clustering and coherence checking are fundamental to participatory conversational networks. Ford [10] states the desire for a flexible collaborative system that allows for negotiated shared agreement. The main advantage of the entailment structure is its ability to form coherence. Given a network of three or more themes, the context of any theme entails the context of the other two. This simple idea shows that each theme can be explained on its relationship to at least two others, such a network is known as coherent.

A coherent entailment network is considered 'operationally closed', or cyclic, in its dependency. This is advantageous for collaboration as it allows participants to adopt several viewpoints or perspectives. It also collectively shapes the network's meaning. Participants construct the narrative themes in this manner to form any arbitrary number of coherent networks that are assigned ratings dependent on the contextual strength of their associated theme relation. (see Figure 3)

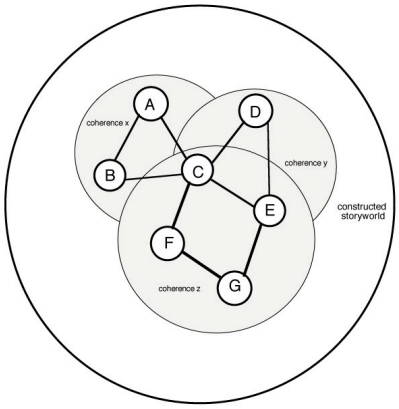

Figure 3. Storyworld Construction

The construction of the storyworld is a continual sense-making process where collected thematic ideas may be assembled collaboratively. However for the requirement of storytelling, this context alone cannot explain how the narrative manifests. This leads on to the selection of procedural ways the themes may be arranged into one or more storylines.

Storyline Construction

The storyline is the possible event sequences that may take place. These are the relationships that make up the procedural content of the narrative. Pask defined these procedures as task structures or the operational methods by which to understand the context of the network. The CT entailment structures allow for any number of tasks and numerous ways to perform them. In this storytelling model, the procedural task is translated as one possibility of a storyline. (see Figure 4)

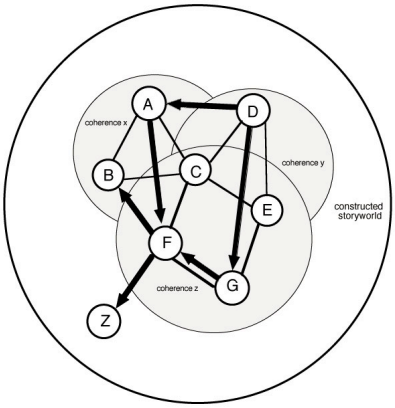

Figure 4. Storyline Construction

Database Tier

The database tier stores sets of story ontology templates containing predetermined associative concept relations, used to service the application tier. The template corpus has been transformed into a story grammar to ascertain common story relations such as narrative outcomes or events. Each theme is associated with a series of analogies with weightings that allow search themes to be aligned contextually. This example shows a narrative from the database:

A719.2. After world catastrophe, new sun reappears and starts new epoch. S. Am. Indian (Chiriguano): MÇtraux RMLP XXXIII 154ff.

In this case, a centuries old Indian myth surrounding a 'catastrophe' can be associated with modern issues such as 'global warming' and presented as a symbolic event in the template's narrative structure. Following CT's entailment structures, the themes contain derivable relationships are supported by at least two others, in this case 'catastrophe' may be supported by two other themes, 'nature' and 'war' that stem from other myths in the corpus. These themes are then added to the storyworld to further episodic content to the existing narrative, forming sub-plots or differing outcomes that break with the canonical. The assembled themes then reveal the possible procedural outcomes of the storyline, such as 'war' might be seen as an episodic elaboration to the 'catastrophe' theme. Since CT entailment structures are cyclic, narrative themes may be

revisited for further elaborations or forming new storylines. (Figure 5)

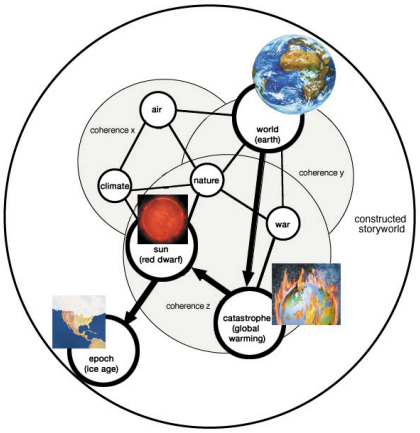

Figure 5. Example – 'After world catastrophe, new sun reappears and starts new epoch.'

DISCUSSION AND RESEARCH AIMS

This research aims to demonstrate an original contribution to knowledge in the area of computer supported cooperative work (CSCW) with a focus on how storytelling systems can enable collaborations with creative and educational outcomes.

The system design should support the situated action associated with storytelling, where participant enactment of narrative is mediated by the conversational knowledge generated by the system. Such systems look to holistic paradigms of information retrieval that incorporate narrative mental models that are understood by collaborators, yet not necessarily by the system itself.

Narrative psychology offers a set of general theoretical features from which to investigate how narrative coherence can emerge from systems in collaborative environments. Combining aspects of our inherent narrative intelligence and the mental models we form around stories shows how a modern theme is derived from the myth or a hidden truth from our cultural history that is reinterpreted and enacted. Modeling the thematic relationships in a conversational form with CT entailment structures, allows for a cyclic interpretation that may be suitable to a range of narrative styles in a domain independent and scalable way. Given these research aims, a study of the narrative intelligence hypothesis may reveal design methods for storytelling systems that are modeled on Pask's CT.

The research can benefit from attendance in the symposium by refinement of a pratice based methodology that suits the holistic aims of the system, and by identifying a suitable qualitative interpretation from the experimental data results. Furthermore, the research is at a sufficient stage where it can benefit from exposure to a larger community of experts in the area of creativity support, and this conference and symposium has been identified as specialist in the field.

ACKNOWLEDGMENTS

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REFERENCES

1. Ford, N. "Conversational" information systems - Extending educational informatics support for the web-based learner. 2004..
2. Suchman, L.A. *Plans and Situated Actions: The Problem of Human-Machine Communication*. Cambridge University Press, 1987.
3. Mateas, M., Sengers, P., *Narrative intelligence*, J. Benjamins Pub., Amsterdam; Philadelphia, PA, 2003.
4. Bruner, J. *Actual Minds, Possible Worlds*. University Press, 1986.
5. Danesi, M. *Vico, metaphor, and the origin of language*. Indiana University Press Bloomington, 1993.
6. Pask, G. *Conversation theory: Applications in education and epistemology*. Elsevier, Amsterdam, 1976.
7. Bruner, J. Acts of Meaning, 1991.
8. Pask, G. *Conversation, cognition and learning : a cybernetic theory and methodology*. Elsevier, Amsterdam ; New York, 1975.
9. Thompson, S. *Motif-index of Folk-literature: A Classification of Narrative Elements in Folktales, Ballads, Myths, Fables, Mediaeval Romances, Exempla, Fabliaux, Jestbooks*. Indiana University Press, 1997.
10. Ford, N. "Conversational" information systems. *Journal of Documentation*, *61* (3). 2005, 362-384