

# A Conversational Framework for Emergent Collaborative Storytelling

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## ABSTRACT

This paper proposes a framework that incorporates shared narration through the design and evaluation of a creativity support system that promotes meaning and sense-making for collaborative storytelling in a situated context. The approach is to develop a holistic system that enables the processes during a group conversation, or the situated modalities associated with oral storytelling.

## 1. INTRODUCTION

In group conversation, experienced storytellers seemingly bring together a range of situated factors with flexibility and timing. Instinctively they know how to engage their audience with empathy, while understanding differing views and narrative exchange. This paper proposes a framework that incorporates shared narration through the design and evaluation of a creativity support system that promotes meaning and sense-making for collaborative storytelling in situated contexts. The approach is to develop a unified and holistic system that incorporates our cultural and historical ways of telling stories while creatively supporting new collective narratives from the many sources online. (see Figure 1.) This system is classed as a 'conversational information system' [1], or one that structures knowledge to manifest coherent collaborations by amplifying the supportive processes during a group conversation, or in this case, the situated modalities associated with oral, tactile and visual storytelling. A holistic storytelling architecture requires a tangible interface that supports the group role the collaborator wishes to play or enact as narrator or audience, while building upon a knowledge base of template themes that appeal to existing metaphors and accrued knowledge patterns that are extended or breached [2]. Its through the enactment of conversation, that participants can form an agreement surrounding several themes and reach a shared understanding. 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, therefore support of these shared models should be the central feature of collaborative systems that seek to maintain narrative coherence.

Pask's Conversation Theory (CT) [3], a 2nd-order cybernetic theory of learning and social interaction, can demonstrate how to maintain narrative coherence within a set of assembled themes, while taking into account the collective viewpoint and interpretation of collaborators. This places group conversation central to its process and outlines a formal method of conversation as a sense-making network or a negotiation of shared agreement given differing perspectives surrounding several interrelated themes, that lead to eventual action or procedures that clarify the context. Pask defined conversation based on two distinct levels, description of knowing 'why' (cognitive or conceptual) and

knowing 'how' (procedural or performative). This cognitive distinction is useful in identifying the learning styles of participants that are classed as either 'serialist', understanding topic relationships through steps, or 'holist', taking a global approach. Both styles can be incorporated into the same network, as typically most learners used some combination of both. From a storytelling standpoint, this allows a focus with which to take a particular narrative perspective and compare that to the other collaborators, globally or locally within a story world.

CT coheres themed worlds by 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, known as entailment meshes [4], are said to introduce cyclicity and achieve a conceptual coherence. Cyclicity produces multiple entry points for collaborators to understand the relationships, providing a rich set of possible narrative structures [5] within the entailment structure, while remaining flexible and domain independent that is suitable to collaborative storytelling.

## 2. STORYTELLING FRAMEWORK

The proposed framework is constructed as a multi-tiered unified architecture including, a database of narrative templates containing a range of cultural based themes, the application tier consisting of two layers, *Storyworld* and *Storyline* that models the conceptual and procedural relationships derived from CT 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.

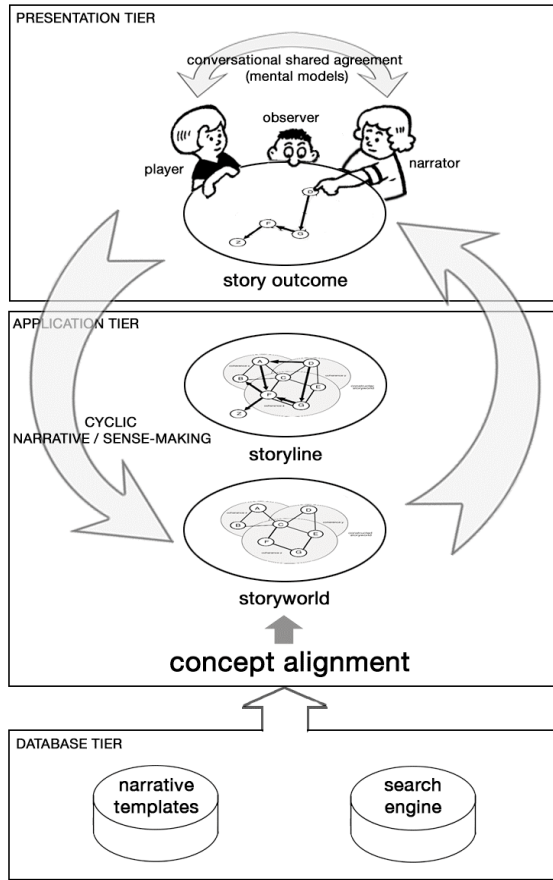


Figure 1. 3-tiered architecture

## 2.1 Template Database Tier

To support a range of creative outcomes in a visual storytelling context, the database tier contains a wide yet shallow domain of multi-representational themes with predetermined associative concept relations and CT entailment networks. These are sets of ontology templates drawn from a corpus of motifs [6] transformed into a story grammar to ascertain common story relations such as narrative consequences or events. Ontology templates are considered a useful technique [7][8] and these are typically stored as semantic web languages, OWL or RDF, for their flexibility and interoperability. Participants add to the existing templates by seeding their own narrative themes that are aligned with existing templates. Once new relationships and stories are generated, they may be added to the corpus to form new templates.

## 2.2 Application Tier

The application tier consists of two layers, firstly the *Storyworld* constructed as CT entailment structures, and the *Storyline* forming the possible procedures of that world represented as event relationships. Entailment nets are activated as collections of themes that contribute to the narrative in question (why), while simple event relations form the procedural or possible sequences of events that can take place (how). This is represented as a graph model that bootstraps entailment nets, that are inherently non-directional, with a directed graph of procedural relations. Knowledge represented in entailment meshes is bootstrapped with semantic relations, these refine the ambiguous asymmetric

relations of the mesh [9]. The event relations offer procedural ways to navigate the context while ambiguity is largely regulated or extended by group consensus.

### 2.2.1 Storyworld Construction

The construction of the *Storyworld* is a continual sense-making process where thematic ideas may be assembled collaboratively. These concepts are narrative themes that dynamically assemble through participant selection and arranged into CT entailment structures. The main advantage of the entailment structure is its ability to form 'coherence'. Given a network of three or more themes (A,B,C), the context of theme A entails the context of B and C. 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. (see Figure 2.)

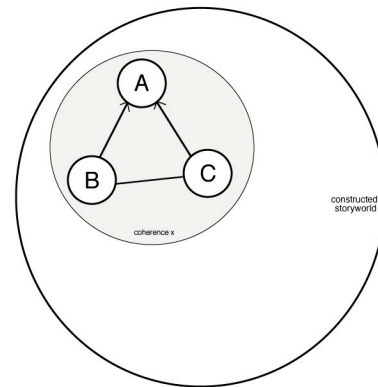


Figure 2. Simple Entailment Structure

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.)

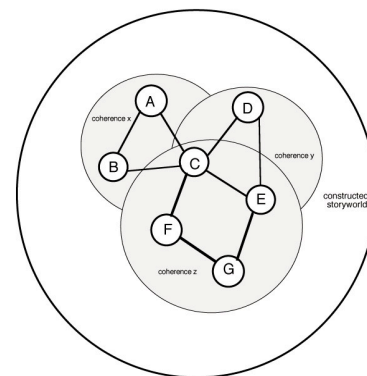


Figure 3. Storyworld Construction

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. Since entailment structures are cyclic in their dependencies, narrative themes may be revisited for further elaborations or forming new storylines.

In CT, entailment networks allow for the process of pruning, or reducing, the ambiguity by merging related themes or separating them by analogy. Common sense databases [10] contain many such analogous relationships that can associate everyday meanings with the example themes. Following CT's entailment structures, the themes contain derivable relationships are supported by at least two others, in this case 'fire' may be supported by two other themes, 'sun' and 'heat' that stem from other myths in the corpus. (see Figure 4.)

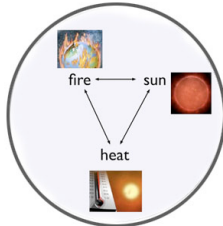


Figure 4. Entailment Theme Relationships

### 2.2.2 Storyline Construction

The *Storyline* is the possible event sequences that may take place. These are the relationships between the assembled themes in the form of event relations or consequences and 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. (see Figure 5)

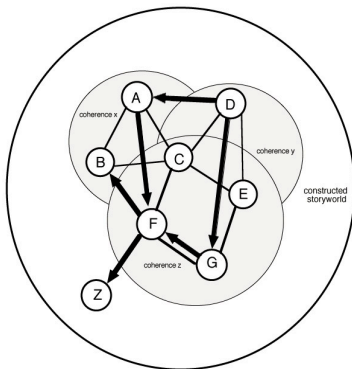


Figure 5. Storyline Construction

### 2.3 Interface Tier

The presentation tier consists of a 3D multi-participatory interface that facilitates the collective choice of procedural content as assembled by the application tier. Participants seed themes by entering a key word that retrieves content from online sources with associated annotations. A series of templates are retrieved that are matched through semantic alignment with the search result annotations. Collaborators are able to regulate the thematic context by selecting and removing key words while the salient narrative content is rendered visible and progresses through the procedural events associated with the narrative relationships.

These narratives are considered the fittest based on collective ratings calculated from the relevance given by the participants. The focal point of narrative fitness and viewpoint is the navigation ring. (see Figure 6.)

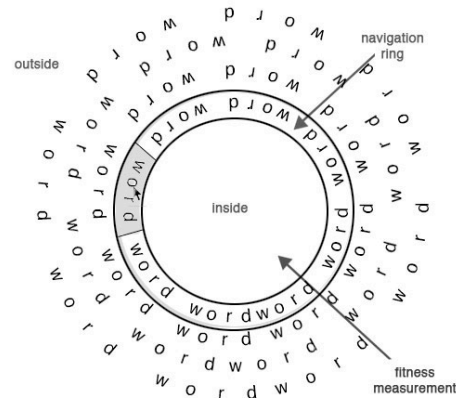


Figure 6. Theme Fitness Rating

The interface ring contains a physical model that responds to gesture inadvertent or intended and allows for each participant to form a viewpoint by the creation of their own ring that resizes depending on the amount of visible media. They may also grab and remove visible elements from the inside to the outside and use other gestural means to shift their ring around the search space. Interface rings may also merge as a result, combine contexts and form new outcomes and from this, facilitates the moderation of global and local relationships associated with thematic content. Tangible interaction is central to the systems relationship with its collaborators as it supports the role the participant wishes to play or enact through conversation by verbal, non-verbal or gestural means and allows switching roles dynamically between narrator, player and observer.

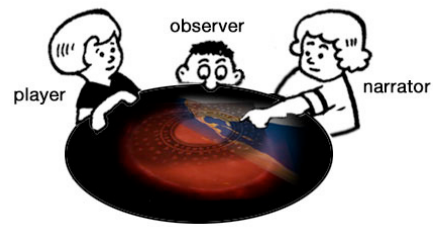


Figure 7. Interface Tier

These situated actions complete the systems reliance on participant engagement to guide through a coherent narrative space offloading contextual ambiguity open to interpretation or a possible space for generative meaning.

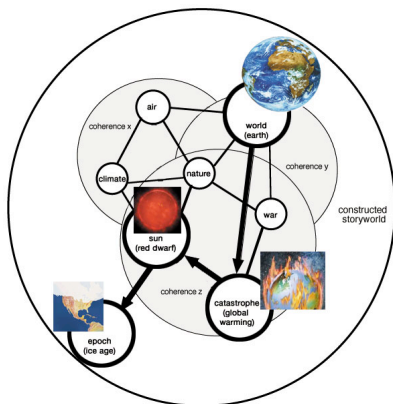
### 2.4 Example Scenario

The following outlines a possible case of the collaborative process and the details of the user interactions involved. As outlined above participant interaction begins by seeding the experience with keyword(s) associated with an initial theme of interest. In

this scenario they enter the theme 'global warming' and the search engine retrieves sets of images, videos, text and other media with attached annotations that are contextually associated with this theme. These annotations appear on the outside of the ring while selected or fittest themes appear inside as shown in Figure. 6. Once annotated keywords appear inside, the media associated with the keyword appears in 3D space along with a set of behaviors that dictate its appearance, movement and duration. In this case the images might include an earth, the planet on fire, a red dwarf sun and an ice age covered landscape. Annotations are fed into the template database to retrieve a set of narratives that contain analogous concepts. The fittest template is selected that is weighted closest to all the annotations:

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

In this case an Indian myth regarding world catastrophe can be associated with the modern issue of global warming and presented as a symbolic event in the template's event structure. Other derivable relationships such as 'nature' and 'war' can elaborate into further episodic content ending at an inevitable 'ice age'. (Figure 8.)



**Figure 8. Example –‘After world catastrophe, new sun reappears and starts new epoch.’**

### 3. DESIGN RATIONALE

The proposed framework places emphasis on sense-making and collective viewpoint to maximise creative potential. For this reason a simplified story grammar is favoured over narrative systems with complex rules and circumstances. Arguably, the system may be more suitable narrative modes that develop as 'streams of consciousness' rather than highly structured stories, however participatory narration allows for the possibility for a larger scope of generic themes and outcomes to emerge with rich collaborative experiences.

The advantages of a holistic design incorporates elements of our own embodied forms of conversational exchange and innate methods of story delivery and attempts to springboard or support the intentional aspects of collaborators. Furthermore, the dynamics of participant intentionality with the system's agency, or agency play [11] is open to interpretation from the metaphors found within the template motifs, relying to some degree the canonical recognition of well known narratives, or universals.

Collaborative emergent narrative systems must continually aim to provide coherence. Second order cybernetic systems, such as CT can potentially provide this within a specified and authored domain. The cyclic properties of these systems are inherently adaptive to collaborative input and potentially can cover a range of narrative styles and modes.

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