POLYTROPOS PROJECT:
A MECHANISM FOR NEW MEDIA

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Abstract: Research in the field of computational media is gaining momentum as it explores the expressive potential of generative art. Our project seeks to build on previous work done in this area, exploring the creative possibilities of a hybrid form of
new media and its potential as a powerful new expressive tool which can lead to meaningful insights into the creative process and how we perceive.

**INTRODUCTION**

The expressive potential of computational media stems from the interplay between organic creations (subjective human meaning) and constructed mathematically (formally) derived self-propagating systems. Several applications can be combined and explored including visual, acoustic, linguistic, spatial, gestural, and mathematical. These self-propagating systems can be explored using the idea of conceptual blending which describes the human cognitive system by the fragmentary way it receives information and its capacity for blending this into a cohesive vision of reality [Turner and Fauconnier, 1995]. When this process is materialized as computational media, a new field with vast creative possibilities opens.

**1 BACKGROUND**

The human cognitive system is characterized by its ability to create new concepts, in particular by combining existing ones. Conceptual blending, stemming from cognitive linguistics is both of a generative and convergent quality, and its self-propagating potential is what is fundamental to creativity. Elements from diverse fields of perception and experience which the cognitive process receives as fragments are reconstituted and “blended”, producing insights which constitute products of creative thinking.

Formally encoding this system of blending – organizing and structuring information with a generatively flexible mechanized process based on allocated meaning – is the approach we plan to follow and apply as the basis of our study. Yet the potential of computational media as a novel expressive form capable of authentic creativity is certainly not straightforward. Breaking down a given piece of literature, art or music for example, to calculable parts that can then be reprogrammed in an organized rendition of randomized dis-organization as an attempt to mimic the human process of creation clearly carries challenges and inherent contradictions. The process of creation is itself elusive and delicate, functioning at times on the level of intuition or feeling, qualities difficult to capture in mechanized encoding. The GRIOT computational framework, based on a novel algorithm called Alloy [Goguen and Harrell 1993], has explored possibilities of automated creation, largely focusing on “poly-poems”, including some performance hybrids. Harrell has coined the term *phantasmal media* to refer to this type of meaning making computational media system [Harrell, 2009].

**2 GENERATIVE ART: POTENTIAL AND PRECEDENTS**

Computational media seeks to encode the balance and dialogue between structure and subjectivity which is a central component in creation. Consider for example Laurence Sterne’s (1759-67) [1980] where the process of avoiding the end by building tangent upon tangent builds a structure of explanatory diversions adding context and colour to
the story. Creating a computational program based on repetitive tangents and then using it in a meaningful way can build cross-medial perspectives that could yield a dynamically more complex expressive language. Formalized procedure set within the creative process has been explored by writers such as Italo Calvino (1923-1985) as he describes his own process in composing *If on a winter’s night a traveller*, as well as the work of the Oulipo group (Workshop for Potential Literature). On a visual platform, from the 1960s or so, modern art shifted and began to focus on process, where meaning lay in form rather than content. More recently, on a more direct computational platform, Philip Galanter has explored the aesthetics of digital generative art, using several general approaches including objectively/subjectively governed procedure, serial/combinatorial governed directive parameters, etc. [Galanter, 2012].

There is a distinction then that arises as creativity becomes part of a formally derived system: mathematically derived procedural systems propagating self-organized generative media as opposed to the combination of human meaning and intuition with computational structure. The central question, then, becomes not whether it is possible for a formally derived system to produce something that appears creative, but if what is produced in the end by such a system is aesthetically expressive, creatively interesting, and meaningful.

### 2.1 Challenges

Some of the challenges present in the field of “formally derived procedural systems” are apparent, for example, in the work of Yiannis Xenakis (1922-2001). Xenakis’ computer assisted musical composition of random recursive formulas created through mathematical systems such as probability theory anticipated that the ‘beauty’ contained in such mathematical concepts would be revealed in musical equivalents. However, the reliance on mathematics and algorithms resulted in a marginalization of the tonal system, including harmony, melody and rhythm, in order to exhaust the possibilities of self-organized compositions.

Computational media, however, can provide a platform that explores concepts, not just mathematics and their direct equivalents. Restructuring expressive forms to allow for meaningfully formulated polymorphic concepts (polyconcepts) such as “harmony”, “rhythm”, “pace”, “colour”, etc. creates a more dynamic and flexible language. These polyconcepts are then blended in various ways to mimic (imitate/emulate) the expressive developments of form, content, style and structure found in works of art created by humans. So computational media must remain an instrument guided by human intervention, rather than a self-propagating machine that is self-organizing. The discomfort and provocation created by the ultimately “static” compositional developments by Xenakis, then, could be reformulated so as to respect central variables of music and mathematics (symmetry, harmony, melody, rhythm), as they would be constructed as poly-concepts and function as blocks. These blocks are the basis for what Harrell terms polymorphic poetics, which isolate how expressive meanings arise and structure a platform for their function in computational media [Harrell, 2009].

### 3 BLENDING PRINCIPLES
The evolution of conceptual blending builds on frame-based theories formulating a system to define and constrain polymorphic conceptual blocks, categories and characteristics. Conceptual and structural blending theory provides a framework for examining the possibility of isolating the mechanism of creativity largely by focusing on style and metaphor as governing guidelines. As computational media is developed, broader terms are devised and structured to include processes and concepts of consistency, homotopy, proximity, transformation, mapping, semiotic morphisms, similar/dissimilar assimilation, meaningful blending, randomized probabilities, etc. Current work and research based on the theory of style as blending principles [Goguen and Harrell, 1993] focuses on specific related structures and maintains an assumption of smoothness and similarity (or ‘a kind of symmetry’). Challenges and creative potential lie in research regarding the possibility of blending dissimilar components and the active application of these concepts on a multi-media platform. Mixing media (dissimilar structures) provides a technical, logistical and structural challenge, but its process is what would reflect the mechanism of perception most closely and give us possible insights into the nature of consciousness and how we receive and organize perception.

4 POLYTROPOS PROJECT
A novel computer program will be specified, designed and developed in order to generate self-propagating systems focusing on conceptually integrating dissimilar structures. Producing new conceptual structures by integrating other, already existing conceptual structures will create a platform of generative media with the following applications: visual, acoustic, linguistic, spatial, gestural, and mathematical/symbolic. (Current program made in collaboration with the programmer Marios Leivaditis).

4.1 Blending operations on new media platform
Blending can be described as the result of the output of many operations including gluing, rotating, transforming, concealing/revealing, overlapping/overlaying in relation to the various factors defined. This application will focus on combining dissimilar parts including combinations of images, sounds, movements/gestures, spatial configurations/architectural renditions, words/phrases/letters and numbers/symbols. Our approach will be able to examine the problems of blending dissimilar concepts/spaces by integrating many different kinds of “conceptual inputs” using certain “patterns” of composition, which can be algebraic, random or self-similar. We will extend and enrich the ideas of conceptual composition and blending by allowing “conceptual experimentation”.

4.2 Means and Methods for Conceptual Experimentation
The architecture of the system will include inputs, layers, and possible outputs based on articulated organizing principles such as metaphors. “Conceptual experimentation” can give rise to metaphors, which may or may not be logic based. This can give rise to a new expressive form consisting of large families of novel conceptual structures having a common theme, but varying content.
The initial rendering will involve creating a recognizable visual landscape from not readily recognizable or incoherent parts. Figure 1 depicts components of a visual landscape and the diagrammatic relationship of one of several of its possible configurations. Figure 2 depicts some variable configurations with one of the twelve panels flipped and shifted, buttoning into a cohesive parallel visual landscape.

The basic prototype will involve matching each visual part/panel to a dissimilar counterpart. As the parts are combined to form a whole, the related parts also combine to form wholes. As each related part shifts, so do the rest – so a visual landscape will have an acoustic, linguist, gestural, etc. equivalent. As the project develops, mechanisms will allow for the equivalent parts to begin converging – integrated dissimilarity – creating the possibility to reconstruct a hyper-form.

CONCLUSION

Formally derived procedural systems integrating computational structures of meaning drives current research towards new media with dynamic expressive potential. Our project looks to creating a device for artistic invention that is expressive in a more accurate way as it mimics the way we experience the world.

REFERENCES