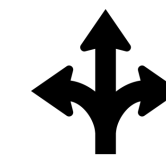




A Minimal Computational Improviser Based on Oral Thought

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Abstract

Our “Chain Reaction Time” (CRT) system plays a minimal improvisational game in a group with humans. The game, Chain Reaction, involves chaining word pairs or solid compounds. It is rooted in oral tradition and emphasizes memory and rapid improvisation; absurdity and humor increases as the chain grows.

CRT is grounded in the principles of oral culture noted by Walter Ong, an early scholar of orature. We show how a simple computer model can be designed to embody many aspects of oral poetics, suggesting design directions for other work in oral improvisation and poetics.

Problems with the Direct Approach

It would be simple enough to download a large textual corpus, create a list of word pairs from this data, and sample uniformly to create an automated Chain Reaction player. This system, however, would lack human nuance and any basis in the principles of orature or cognitive operational constraints. A corpus would not represent how a language is spoken unless it is based on accurate speech transcripts, given the many differences between speech and writing noted and theorized by Ong, Halliday, and others. Humans also do not have perfect recall, nor do they uniformly sample from a fixed database of word pairs.

Our Approach

Primary oral cultures encompass a broad span of human history. Aspects of oral thought persist today, as do new oral practices that are now situated in a largely textual and literate culture (such as freestyle rap). We believe in the importance of understanding this aspect of human culture, and have thus worked to create computational models towards this end. CRT is a simple prototype system for playing Chain Reaction based on oral principles. CRT has learned from purely spoken-word corpora, and has a model of pairs that allows for the system to treat words as oral tokens rather than textual ones (allowing homophony, for instance).

Example Game Transcript

- Player 1: new year
- Player 2: new year book
- CRT: new year book club
- Player 1: new year book club sandwich
- Player 2: new year book club sandwich bag
- CRT: new year book club sandwich bag clip
- Player 1: new year book club sandwich bag clip art
- Player 2: new year book club sandwich bag clip art studio
- CRT: new year book club sandwich bag clip art studio apartment
- Player 1: new year book club sandwich bag clip art studio apartment building
- Player 2: new year book club sandwich bag clip art studio apartment building code
- CRT: Hmm... Nope, I don't know.

In *Orality and Literacy*, Ong outlines characteristics distinguishing primary-oral cognition from textually-based cognition. The Chain Reaction game and CRT embody these:

1. Additive rather than subordinate
2. Aggregative rather than analytic
3. Redundant or “copious”
4. Conservative or traditionalist
5. Close to the human lifeworld
6. Agonistically toned
7. Empathetic and participatory; not objectively distanced
8. Homeostatic
9. Situational rather than abstract

Our first interface had an on-screen, ephemeral text display. We developed a second interface with text to speech, though human players still need to type. We plan to use modern machine learning models for both speech synthesis and speech recognition to remove these current limitations.

Current Status, Limits, and Future Research

The CRT system does work and can play with humans. Including one or more computerized players in a group of human players can inflect gameplay in an interesting way, as the computer player is competent but sometimes noticeably nonhuman. Its pace of recitation is unusually regular. It is capable of forming good continuations, but currently, not ones that are influenced by pairs earlier in the chain or by the human context. The current system's breadth is not near a human level, so games often end with the automated players unable to find obvious continuations.

The success of CRT given its current limited scope proves that even a simple system can embody major theorized principles of oral poetics. CRT highlights the aspects of orality that are most challenging to model, including those that rely on physical, temporal, and social contexts of play. We hope that this design points to other directions for work in oral improvisation and poetics, specifically, indicating (1) what aspects of orature are easy to model and should be implemented, and (2) what aspects are challenging and should be a focus for future research.

Additional opportunities for our system's further development include creating culturally-specific automated players; situating play in different temporal, physical, and social contexts; and constructing a more elaborate improviser to participate in different verbal situations.

References

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