A Musical Tension and Release Framework for Sonic Interaction Designers

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Research Overview. An accessible framework that combines tonal cognition and interaction design with opportunities for GenAI integration.

Review	Concept Tonal Cognition	Specified Musical tension and release	Method Roman Numoral Analysis
			+
	Interaction Design	Workflow	Hierarchical Task Analysis
Insights	Shared Point	Value Beyond single sound signals	GenAl App Figure.2
	Hierarchical Structure	Progressive Interface Beyond sound design and interpretation by intuition	How might practitioners access recommended
	Cognitive Flow	Explainable Design Beyond theoretical design framework	samples through their plain language inputs from the
	Practical Application	Accessible in Practice	GenAl system?



Demo for GenAI. The system features task setup, harmonic decisions, and advanced options for modulation and altered chords, with user inputs in green and GenAI questions in blue.

Study Design. Framework development for sonic interaction design via listening.



Α	Task Formation		
	rear parking	driver	
	4	Task Specification	

Provide a task specification about rear parking consisting of 4 actions aligned with hierarchical task analysis and considering driver as the user. Please simply list the tasks as bullet points.

- **Assess the Parking Space** - Evaluate the dimensions of the parking space - Check for obstacles and surrounding vehicles - **Initiate Reverse Maneuver** - Shift the vehicle into reverse gear - Use mirrors and rearview camera to monitor surroundings - **Steer and Control Vehicle** - Gradually turn the steering wheel to align with the parking space - Control the vehicle's speed using the brake and accelerator - **Finalize Parking Position** -Monitor the proximity to curb and other vehicles - Shift into park gear once the vehicle is correctly positioned



Provide 3 key modulation sets starting form C major for 6 parts following the tonal functions in the order specified by: tonic, subdominant, prolongation, relative or parallel, dominant, tonic key(s) Please simply list the options as bullet points. Here are three key modulation sets starting from C major for 6 parts based Here are three chord progression options in the key of C major for 6 on the specified tonal functions: ### Modulation Set 1: - **Tonic**: C major measures, following the specified tonal functions: - **Option 1:** - C (Tonic) **Subdominant**: F major - **Prolongation**: D minor (ii in C major) -F (Subdominant) - C/E (Prolongation) - G7/B (Nonchord) - G (Dominant) - C

Tonic) - **Option 2:** - C (Tonic) - F (Subdominant) - Am (Dm7 (Nonchord) - G (Dominant) - C (Tonic) - **Option 3:** - C (Tonic) - F (Subdominant) - C/G (Prolongation) - E7 (Nonchord) - G (Dominant) - C

rovide 3 harmonic note arrangement options (including inversions for 4 voices based on G B D with suitable octave numbers. Please mply list the options as bullet points

ere are three harmonic note arrangement options for 4 voices based on the notes G, B, and D, including inversions: - **Option 1:** - Voice 1: G4 - Voice 2: B4 - Voice 3: D5 - Voice 4: G5 - **Option 2:** - Voice 1: B3 - Voice 2: D4 - Voice 3: G4 - Voice 4: B4 - **Option 3:** - Voice 1: D3 - Voice 2: G4 - Voice 3: B4 - Voice 4: D5

elative or Parallel**: A minor (relative minor of C) - **Dominant**: G majo - **Tonic Key(s)**: C major ### Modulation Set 2: - **Tonic**: C major **Subdominant**: F major - **Prolongation**: E minor (iii in C major) Relative or Parallel**: A minor (relative minor of C) - **Dominant**: G majo **Tonic Key(s)**: C major ### Modulation Set 3: - **Tonic**: C major -Subdominant**: F major - **Prolongation**: B diminished (vii° in C major) Relative or Parallel**: A minor (relative minor of C) - **Dominant**: G major 'Tonic Key(s)**: C major These sets provide a structured approach to the nal functions specified while maintaining coherence within the tonal framework of C major.

Altered chord

Advanced Options

Provide 3 altered chord options for Gmaj based on classical style in (ajor key. Please simply list the options as bullet points.

Gmaj7 (G - B - D - F#) - G6 (G - B - D - E) - G7 (G - B - D - F)

Introduction

Background Sonic interaction design can benefit from music cognition principles like tension and release, but current models lack practical guidance.

- **\Purpose** We propose a framework for sonic interaction design that connects tonal cognition and interaction design by functional harmony with workflow.
- **\Method** We provide an overview of key concepts, synthesise them into a design strategy, and introduce a framework with GenAI opportunities.
- **\Result** We developed a three-step guideline, extendable for advanced practitioners, and explored how generative AI can support the design process.
- **\Contribution** This work offers guidelines to encourage musical tension and release in sonic interaction

Theoretical Review

Embodied music cognition links bodily experience to tonal structure, using concepts like *functional harmony* and workflow to align sound with user behaviour in sonic interaction design. Generative AI further enhances accessibility by translating jargon and generating samples from plain-language input.

\Functional Harmony Functional harmony organises chords into tonic, subdominant, and dominant, creating cognitively structured, hierarchical progressions.

\Roman Numeral Analysis Roman numeral notation reflects these functions, providing an intuitive way to understand tonal structures.

\Workflow Optimising user interactions requires understanding context of use through workflows.

\Task Analysis Hierarchical task analysis aligns tasks and goals with cognitive workflows.

Framework

Guidelines

• The **first step** is task formation, which involves defining the purpose, phase, user, task, and plan.

CST Design

- The second step is assigning harmonic functions to tasks based on the user's cognitive flow.
- The **third step** is determining chord details based on the assigned functions.

Advanced Options

- Scoping Structures This allows for macro and micro analysis of tasks and harmonic functions, enabling detailed, layered sound design.
- Managing Musical Variables This involves adding complexity through chord variations, timbre, dynamics,

design, paving the way for future research.

and key changes to enrich tension and release.

Discussion

Sonic Interaction Design Framework

We proposed a practical framework for sonic interaction design, with guidelines, advanced options, and GenAI integration for enhanced accessibility.

Further Readings

Initial research overview Choi (2023), need finding with designers Choi, Andres, and Martin (2024), design tool prototyping Choi et al. (2024), and two prior design models Newbold, Gold, and Bianchi-Berthouze (2020) and Roddy and Bridges (2020).

CST Development and Evaluation

The next phase involves creating a creativity support tool as an intuitive interface for the framework, with user studies to refine and enhance accessibility.

References

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