



The Intersection of Music and Cybernetics and Its Beginnings

: Alvin Lucier's *Music for Solo Performer* (1965)

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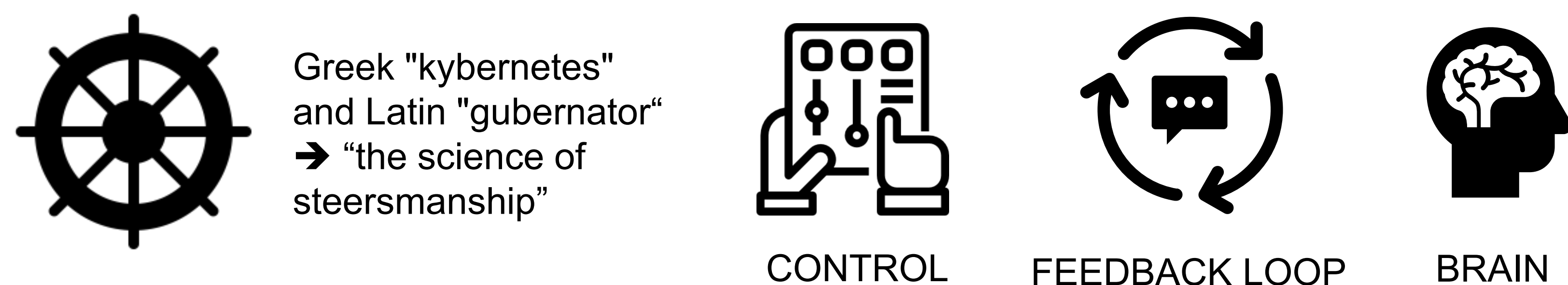
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Abstract

- When discussing biofeedback music, particularly neurofeedback music, Alvin Lucier (1931-2021) is the most frequently cited composer in this field.
- Lucier was significantly influenced by cybernetic theory that emerged from the 1940s to 1960s.
- The core keywords of cybernetic theory are "control," "communication," and systems related to the "brain."
- Gordon Pask's MusiColour machine (1953) demonstrated human-machine interaction possibilities [1].
- Lucier's *Music for Solo Performer* is recognized as one of the pioneering interactive music and performance pieces between human and machine, as its system adapts to the human participant's condition.
- Therefore, Pask's and Lucier's interactive approach laid the foundation for contemporary neurofeedback music and current Brain-Computer Music Interface (BCMI) developments, explaining Lucier's continued influence in the field.

Cybernetic theory

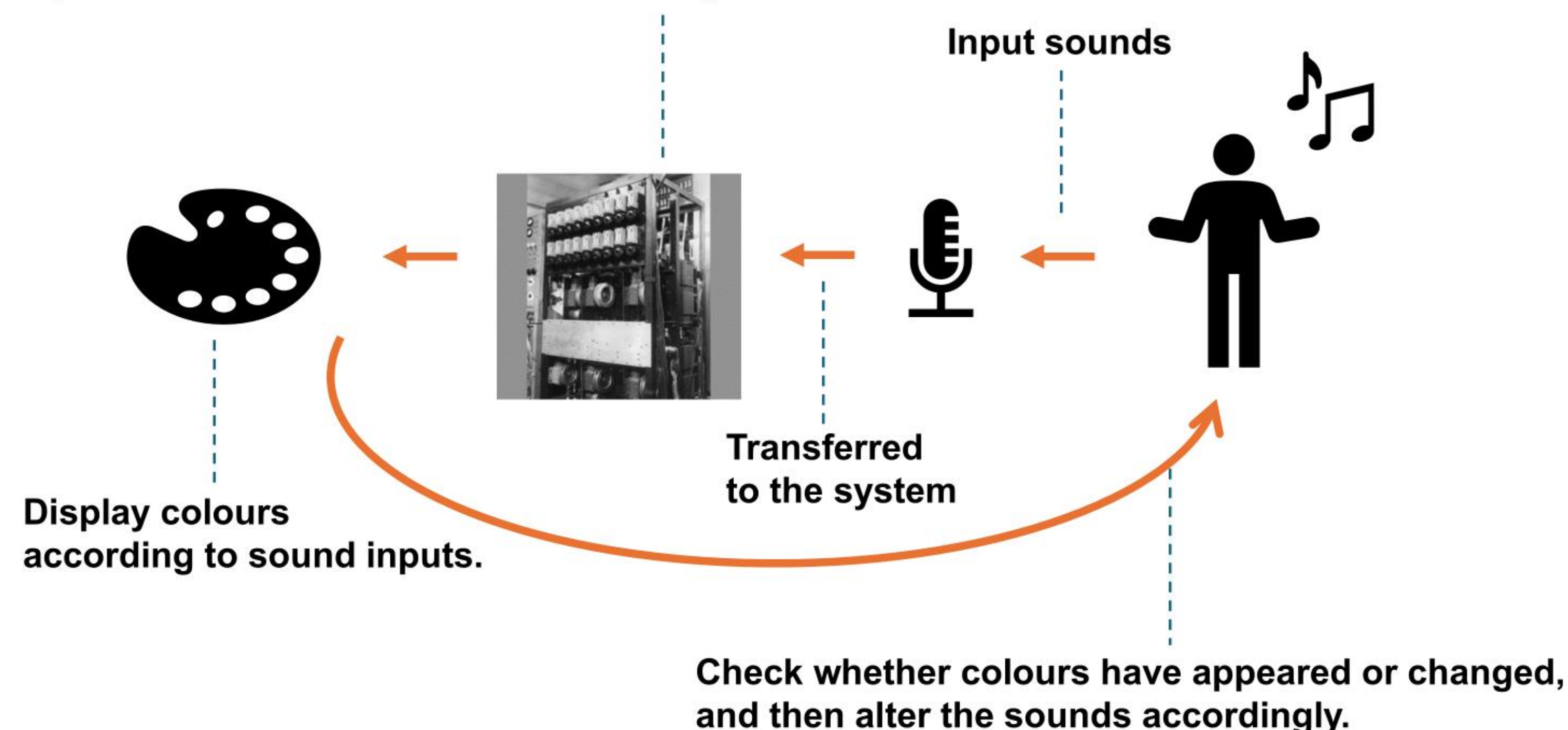
- What is Cybernetics?[2]



Gordon Pask's MusiColour (1953)

- "Conversation Theory" which has been estimated as an important kind of system genuinely interact and adapt to given circumstance in our environment [3].

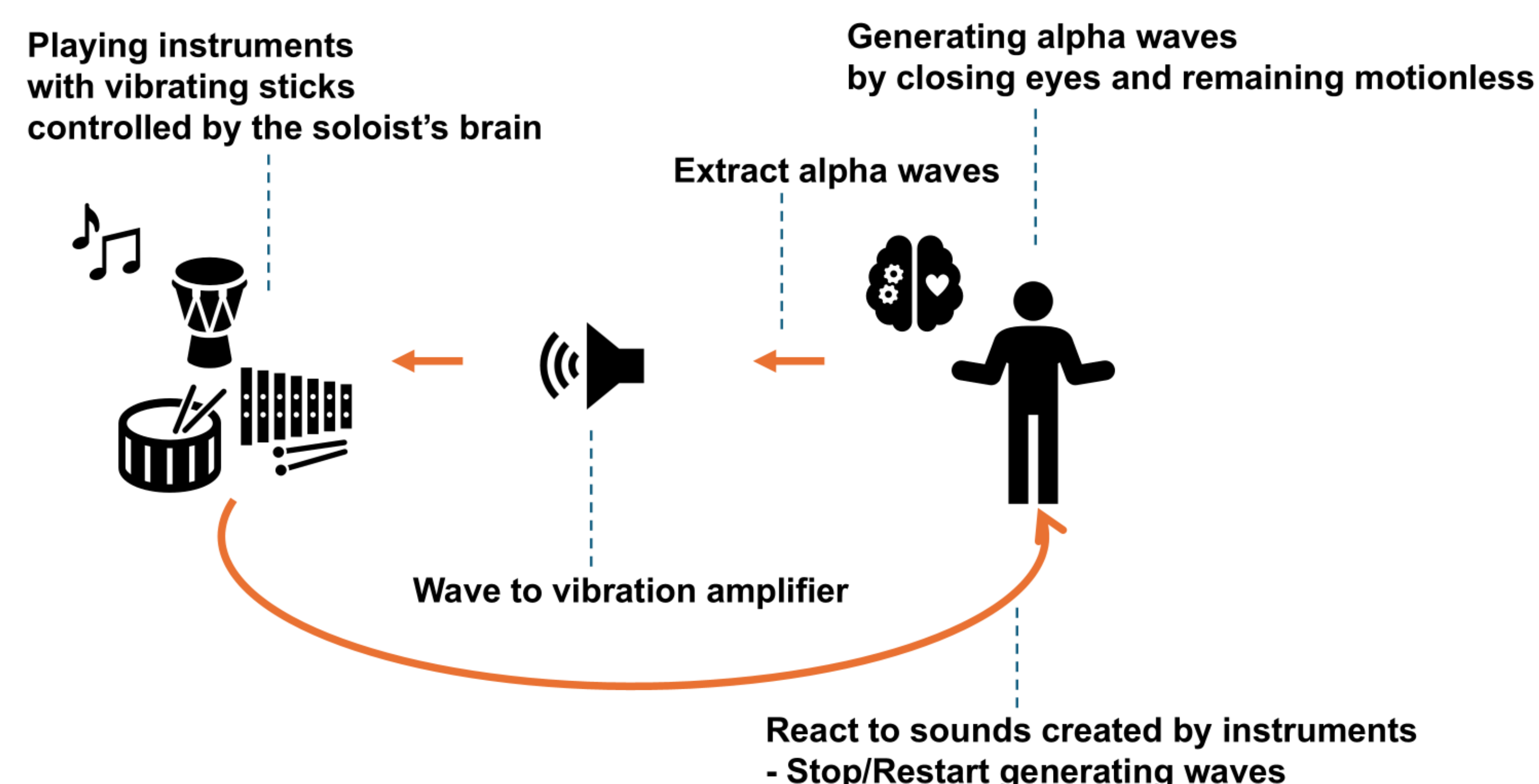
Colour choice depends on what the system has already encoded.
This procedure is based on learned memory.



- It is a kind of "performance system" that shows various colour of light through input data of frequency and rhythm of traditional instruments [3].
- This machine has two keywords of cybernetics: **control** and **feedback(communication)**.
- This system could be one of the emergence of machine player which has an interaction with human players, which is called "participant interaction" [1].

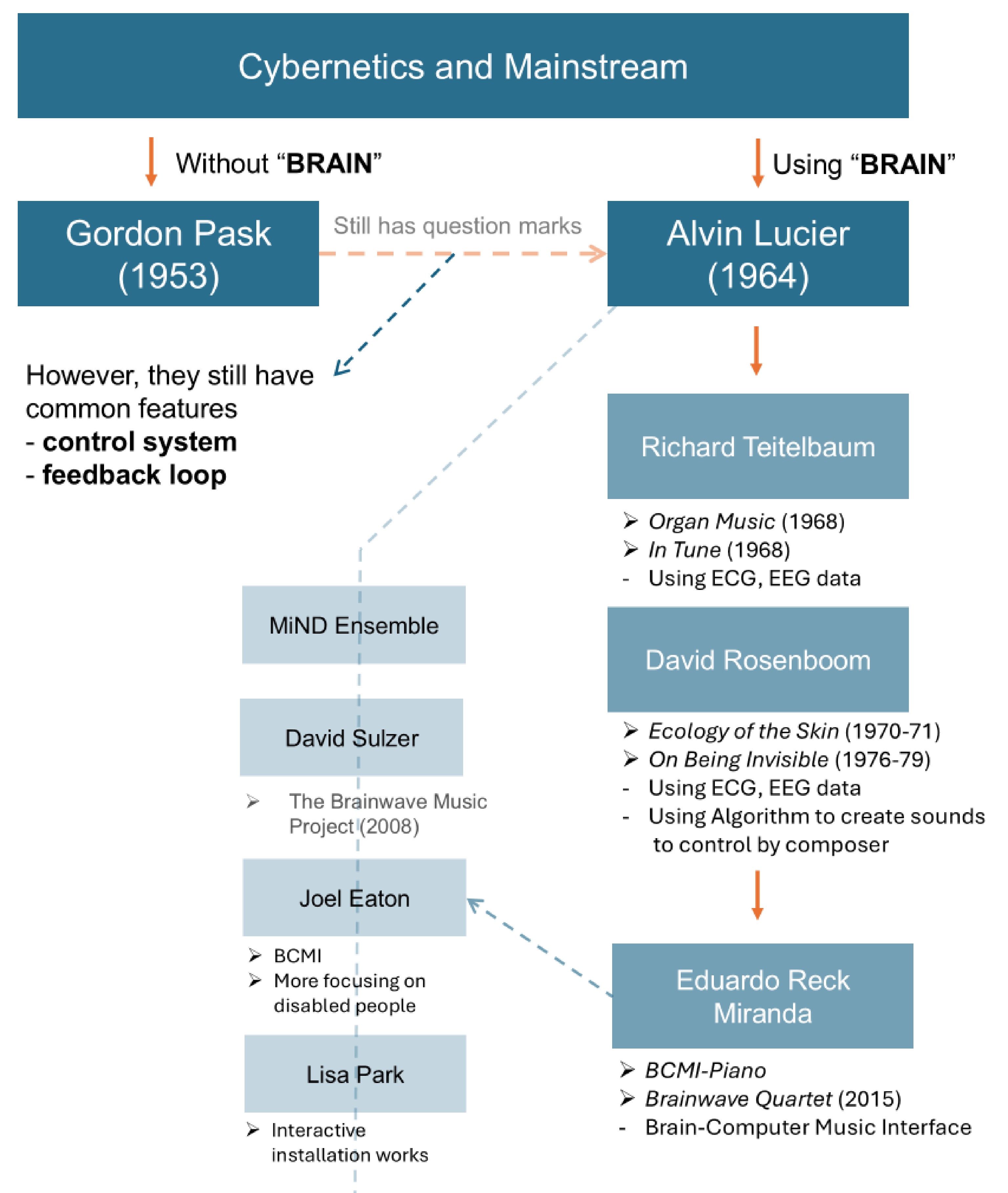
Alvin Lucier's Music for Solo Performer (1965)

- "Alvin Lucier's Music for Solo Performer was influenced by the method of extracting alpha waves from the human brain developed by Edmond Dewan [4] and John Cage's concept of "indeterminacy" [5].



- Lucier's work is a kind of "interaction" musical piece because it mainly consists of brainwave data [6].
- This work involves three keywords: **control**, **feedback loop**, and **brain**.

Conclusion



Further Research

- Technical Collaboration:** Collaborate with technical researchers to examine the detailed procedures and mechanisms of neurofeedback music systems.
- Pask-Lucier connection:** Investigate the deeper relationship between Gordon Pask and Alvin Lucier to understand their mutual influences and determine which work has been most influential for subsequent generations.
- Pask's broader influence:** Explore Pask's impact on contemporary live electronic music and interactive installations, particularly focusing on his non-brain-based interactive systems that may have influenced current practices.
- BCMI artistic analysis:** Compile and analyze a comprehensive list of Brain-Computer Music Interface artworks to derive meaningful insights about the evolution from early cybernetic works to contemporary BCMI practices.

References

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