

# ImprovCues: Musical Creativity and Ideation with Machine Learning

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ImprovCues is an installation that engages the audience with machine-learning generated musical cues for group improvisation. The audience helps to train the system by suggesting new cues and trading them with the system - for each cue suggested by the audience the system generates a new cue in return. A spontaneous performance is created through the interplay of suggesting, interpreting and attempting to play the prompts. Our aim is that the installation allows the hands-on exploration of machine-learning mediated creativity. In particular, rather than asking if machine learning can be as creative as a human musician, we instead ask if machine learning can be an equal partner in the stimulation of human creativity. ImprovCues explores how the act of training machine learning can in itself lead to a creative feedback loop, where participants ideas and machine generated ideas become inextricably tangled, raising questions about creative ownership and the locus of creativity.

The ImprovCues installation centres around a table full of musical instruments, objects and noise making artefacts and a projection alongside displaying the ImprovCue system and performance prompts. A variety of machine-learning personalities provide a diverse range of content for the prompts. An examples set of cues may consist of the following:

"Play the sound of wind in the trees." (poeticBot)

"Swap instruments with another player." (actionBot)

"Start of a solo for a player. No one else plays." (zornBot)

A keyboard invites the audience to help train the bots with new suggestions. Audience members are drawn in to become a rotating cast of performers, helping to realise the music suggested by the prompts. The person at the keyboard becomes the equivalent of the conductor, by suggesting new prompts to help train the bots and both guiding and shaping the development of the performance. Only a small selection of performance cues are shown at any time. Each prompt is colour-coded and labelled, showing it has been generated by a particular bot, trained on a particular set of data. When suggesting ideas, the 'conductor' gets to choose which bot they are training.

The form of machine learning used is Natural Language Processing (NLP) using Markov Chains, where the probability of the next word is calculated from the previous. Each bot works from its own corpus, pre-seeded with text that gives it its particular personality. For instance zornBot is trained on the musical prompts from John Zorn's game piece "Cobra".

ImprovCues iterates on a previous installation initially developed and exhibited at Schmiede 2019, a ten day long digital art event hackathon based on a "cooperative prototyping environment, focused on the arts, hacking and entrepreneurship". This previous iteration focused on the creation of novel digital art project ideas. In exhibiting this

installation at the Schmiede final show, The audience were asked to suggest new digital art project ideas and in exchange were given a new machine-learning generated suggestion project idea from the bot. The suggestions would quickly alternate between practical and serious to the absurd, and we found that this humorous aspect stimulated creativity, whilst encouraging a deeper debate around the topic of AI and its role in creative practice.