

# Automated, real-time, predictive generation of musical accompaniment for interactive experiences.

**Christodoulos Aspromallis** 

VEIV Away Days, 16 May 2017

1<sup>st</sup> Supervisor: Dr Nicolas E Gold 2<sup>nd</sup> Supervisor: Dr Simon Julier





## **UCL**

## **Interactive Experiences**

Interactive Partly determined
 & Episodic

- Computer generation
  necessity
- Musical requirements

Continuity Coherent Repetition transitions avoidance	Existing style replication	Large-scale form
---	----------------------------	---------------------



Theme parks



VE

Improvised / interactive Theatre





Interactive film

www.fiveminutes.gs



	Continuity	Coherent transitions	Repetition avoidance	Existing style replication	Large-scale form
Precomposed passages-once			X	X	

https://www.youtube.com/watch?v=zz6GL6AFphU#t=17m15s



	Continuity	Coherent transitions	Repetition avoidance	Existing style replication	Large-scale form
Precomposed passages-once			X	X	
Precomposed passages- consecutive / looped	x			x	X



	Continuity	Coherent transitions	Repetition avoidance	Existing style replication	Large-scale form
Precomposed passages-once			X	X	
Precomposed passages- consecutive / looped	x			X	X
Precomposed layers	X		X	X	X

<u>https://www.youtube.com/watch?v=EwSqLFPV\_uY#t=04m30s</u> (merely stopping) <u>https://youtu.be/naniX7m2zOs?t=6m41s</u> (formless) <u>https://youtu.be/naniX7m2zOs?t=29m51s</u> (non-coherent-modulation) <u>https://youtu.be/naniX7m2zOs?t=33m5s</u> (non-coherent-fadeout-unfinished elements) <u>https://youtu.be/naniX7m2zOs?t=37m43s</u> (non-coherent-fadeout-unfinished elements)



	Continuity	Coherent transitions	Repetition avoidance	Existing style replication	Large-scale form
Precomposed passages-once			X	X	
Precomposed passages- consecutive / looped	X			X	X
Precomposed layers	X		X	X	X
Note-level procedural generation	X	X	X		

*Journey*, 2012 (stings):

https://www.youtube.com/watch?v=bkL94nKSd2M#t=03m52s https://www.youtube.com/watch?v=bkL94nKSd2M#t=06m01s

Spore, 2008 (I-s-f): <u>https://www.youtube.com/watch?v=utioaqgVKmw#t=11m15s</u>



	Continuity	Coherent transitions	Repetition avoidance	Existing style replication	Large-scale form
Precomposed passages-once			X	X	
Precomposed passages- consecutive / looped	X			X	X
Precomposed layers	X		X	X	X
Note-level procedural generation	X	X	X		
Note-level morphing of loops	X			(X)	





	Continuity	Coherent transitions	Repetition avoidance	Existing style replication	Large-scale form
Precomposed passages-once			X	X	
Precomposed passages- consecutive / looped	X			X	X
Precomposed layers	X		X	X	X
Note-level procedural generation	X	X	X		
Note-level morphing of loops	X			(X)	
FATE	X	X	X	X	X

+ Correct time placement of transitions



#### **Real-time interactive transitions**







#### **Real-time interactive transitions**

Pros:

- Continuity
- Coherent transition
- Time placement

Cons:

- Case-specific
- Deterministic
- Repetitive

https://www.youtube.com/watch?v=Q8DogS1AhDM&index









- ENDING = EWMA of Minimum Remaining Time < 4 bars &&</li>
  Approaching the goal
- 2. RECOVERING = !ENDING && post-ENDING
- 3. GOAL\_REACHED (irreversible)













## Examples

Plain ending

Ending -Recovery



١

Multiple recoveries





## Predictive & probabilistic Transitions

- Dynamic grammars
- Hierarchical mixing of musical properties





#### UCL Petrie Museum of Egyptian Archaeology







## UCL Petrie Museum of Egyptian Archaeology

Map:





## UCL Petrie Museum of Egyptian Archaeology

# Interactive music map:





#### **Penny Dreadful Productions**







#### **Future of the field**

- Refined transitions in Video Games
- FMOD / Wwise integration
- Improvements of my work..
  - Style modeling
  - Transition / recovery optimisation
  - Prediction optimisation



## Thank you!