



Assisting VR Gameplay Through The Use of Iconographic Music

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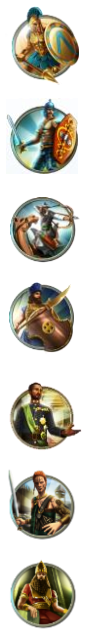
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The Problem...

- In VR, the player is *always* in control of “the camera” – specifically, where they are looking
- You therefore can’t force the player to look at something, you can only *invite* them to do so
- Inviting the player to look is a “solved problem” in traditional, non-VR games...





- New Day: Your people grow tired without food
- You have built your first barracks
- You have built your first temple
- Your HQ has been upgraded to level 2



42	61%	2 3 9		0%	BULL 42 / 200
AMMO	HEALTH	5 6 7		ARMOR	SHBL 0 / 50
					ROCK 0 / 50
					CBLL 0 / 300



The Problem...

- Screen space doesn't really exist in VR – these ideas have to be translated to world space
- 'Head-locked' static UI can be problematic but also not a great fit for many VR experiences
- Tracked/Moving UI, both diegetic and non-diegetic, is safer but prone to being off-screen





The Problem...

- If the player gets to choose *where* to look, and the player gets to choose *when* to look, and we can't rely on static UI *to the same extent*, then how do we alert and guide them towards important information and off-screen events?





Audio - *clearly part of the solution!*

- Sound is omnipresent and therefore incredibly useful for communicating information about things you cannot see (*'off-screen events'*)
- This was my starting point on *Tethered...*





TETHERED









Let's talk about...*Bikkuri* !





- It grabs your ear – through its place in the mix, aspects of its musicality (dissonance, movement), contrasting the synthetic against the naturalistic
- It is instantly recognisable, partly through its design, partly through context
- It is triggered at the same time as the event it represents, assisting the player to learn and ascribe meaning to the sound





- It is the same each time, assisting learning and recognition, and conveying information
- The event is represented both visually and aurally, assisting learning
- Visual persistence allows the player to respond *after* the sound has finished, even if they haven't seen the source of the event, assisting learning





- In essence, using sound in this way is about *creating a language* and teaching it to the player
- This is why I refer to the *iconographic* use of sound – iconography is *symbolic representation*
- Every game uses this idea in its sound to some extent, which is why the notion of pursuing and pushing this felt worth exploring





Handling Multiple Important Events

- The importance of differentiating between events increases with the number of events
- Patterns assist recognition and differentiation
- Music is therefore particularly well suited to the player learning and ascribing meaning





SFX vs Music

- Sound can be iconographic too
- Sound can also be non-diegetic
- Sound can be used in musical ways
- In reality, there is no binary “choice” between sound and music – they are a spectrum





First Steps...





- Adding a music ‘stinger’ helped massively with *noticeability* – catching the player’s ear
- Localisation (direction/location of the event) was ‘improved’ as a byproduct of this
- Repetition was problematic for the same event if in close succession (inc. concurrent events), solved with chord inversions





- Music stingers can clash (sometimes horribly) with underlying bed music
- My initial response was to standardise aspects of the music and stingers to minimise the problem
- I chose to standardise tempo across the entire project (which was tricky, but I made it work)
- I started out standardising the key too (nope!)





- Here's how things sounded with *better* temporal and harmonic consonance...
- Any temporal alignment is coincidental, any harmonic alignment is serendipitous
- This works surprisingly Okish most of the time
- But it is hard to sustain...





- Here's what happens when you try and break out of that super limited box...
- We're back to where we started :/
- Clearly, this needs a better solution...





Consonant Stingers!

- Not a new idea! See Brian Schmidt's [Interactive Audio in Black Knight 2000](#) Gamasutra post
- Good news – temporal alignment is relatively easy and has good support!
- Bad news – harmonic alignment isn't so straight forward and probably needs some code support





1	2	3	4	5	6	7	8
CHORD 1	CHORD 1	CHORD 2	CHORD 1	CHORD 3	CHORD 4	CHORD 2	CHORD 1





1	2	3	4	5	6	7	8
CHORD 1	CHORD 1	CHORD 2	CHORD 1	CHORD 3	CHORD 4	CHORD 2	CHORD 1
STINGER 1	STINGER 1	STINGER 2	STINGER 1	STINGER 3	STINGER 4	STINGER 2	STINGER 1





1	2	3	4	5	6	7	8
CHORD 1	CHORD 1	CHORD 2	CHORD 1	CHORD 3	CHORD 4	CHORD 2	CHORD 1
STINGER 1		STINGER 3		STINGER 5		STINGER 3	
	STINGER 2		STINGER 4		STINGER 6		STINGER 1





1	2	3	4	5	6	7	8	9	
CHORD 1	C2	CHORD 1	CHORD 3	CHORD 1	CHORD 2	CHORD 4	C3	C2	CHORD 1
STINGER 1			STINGER 3		STINGER 5		S7		
	STINGER 2		STINGER 4		STINGER 6			STINGER 8	





- We are making the assumption that our stingers can be delayed to start on the bar!
- Why? Because this sounds good :)
- We're also making the *HUGE* assumption that gameplay can be delayed to start on the bar
- Why? Because the iconographic technique requires good sync...



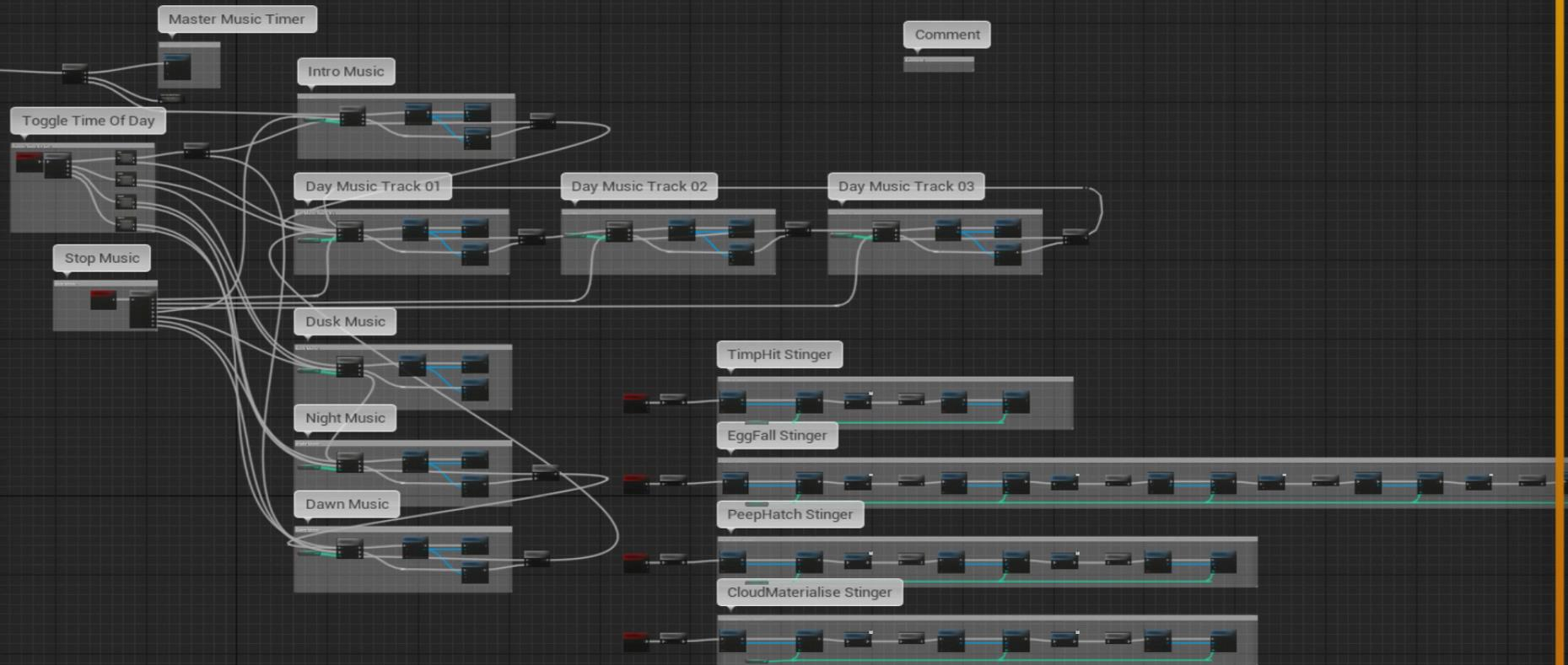


- Worst case scenario, bar boundaries at 60bpm 4/4 have a 4s delay – unattractive for gameplay
- Triggering music stingers on beat boundaries helps to address this...
- Worst case scenario, beat boundaries at 60bpm 4/4 have a 1s delay – we can work with that!
- But this creates a new problem for us to solve...





SIMULATING



LEVEL BLUEPRINT



Under The Hood...

- Each stinger is cut up in to individual one beat phrases
- Each phrase has a suite of variants which match up with any chord in any piece of game music
- When a stinger is cued up to play it looks to see “when am I playing, what chord(s) am I playing”





Samples!

- Bad news – EULAs prevent you from using samples as samples :(
- The most efficient workflow uses samples
- Memory use is another consideration
- Bespoke sampling allows for crafted phrasing at the desired tempo





Stinger Semantics & Aesthetics







Stinger Semantics & Aesthetics

- Strong sonic characterisation assists the player with event learning/association and recall
- It's not *just* a music stinger – sound plays a role too...







Stinger Semantics & Aesthetics

- I generally lead with the music and end with the sound
- The sound is synchronous with the event even if the music is a-synchronous
- In the heat of gameplay, the sound is under the radar in a way that the music stinger is not







Closing Thoughts







- ‘Noticeability’ is *intrinsic in the design* and essential for the use of iconographic music
- This is a primary concern when contemplating the applicability of this technique to other gaming genres and experiences
- Perhaps there is a more sophisticated half-way house that offers the best of both worlds?





- There's a whole world of brilliantly subtle but magical musicality unlocked by pursuing this...
- Any “musical” one-shot sounds can be made harmonious with the underlying chord *in ignorance of timing*
- Temporal matching is awesome & underutilised in game audio despite ease of implementation





- This is, fundamentally, unexplored territory
- Cross-disciplinary collaboration is key to pushing this forward
- VR offers opportunities for Cross-disciplinary collaboration that audio folks should exploit!





Q&A

Thank You :)

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