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Lost and Found: Gaze-based Player Guidance Feedback in Exploration Games

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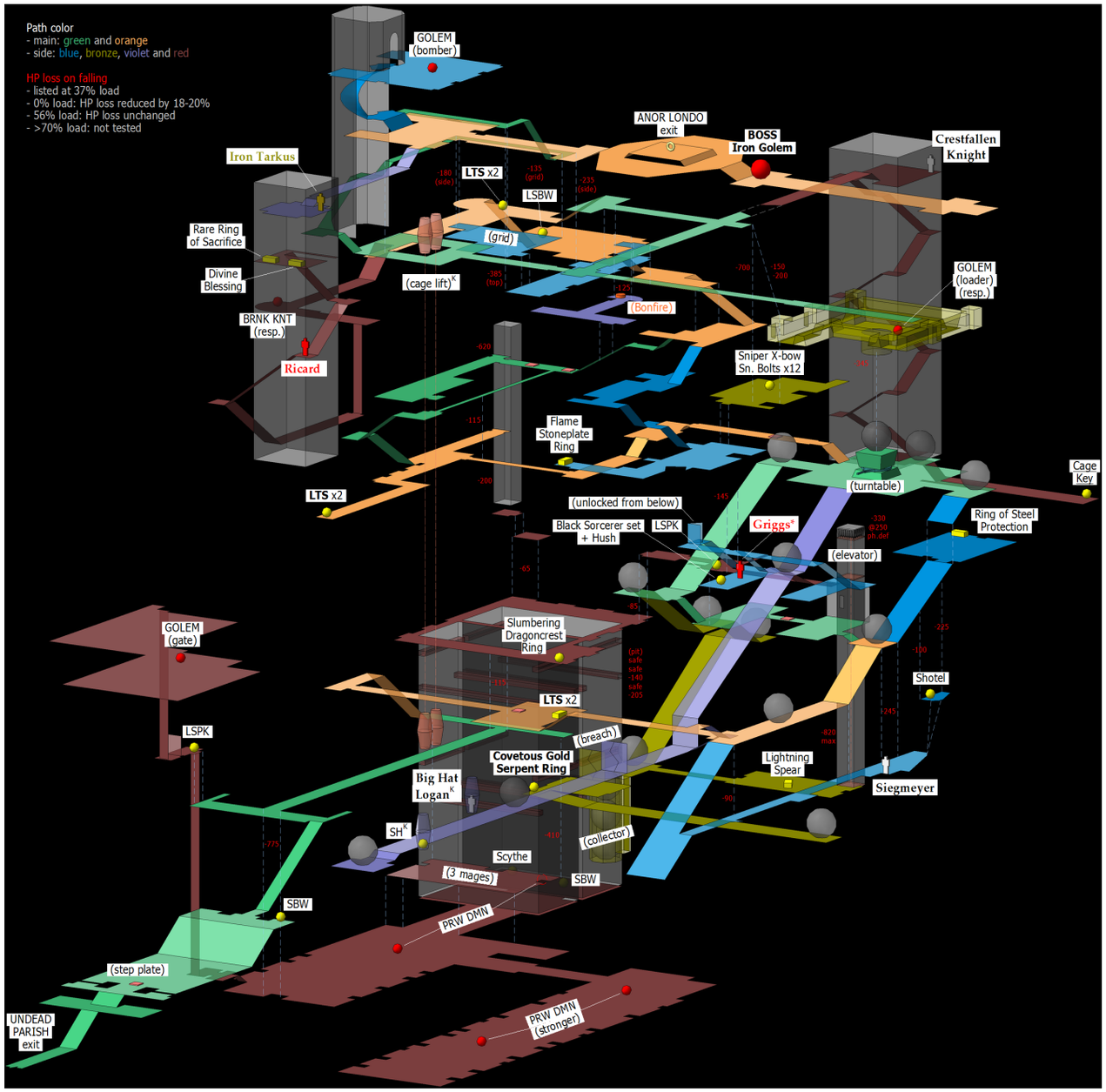
https://www.researchgate.net/publication/336733491_Lost_Found_Gaze-based_Player_Guidance_Feedback_in_Exploration_Games

Problem

- Navigating 3D space is difficult
- Even more so when it comes to finding objects within these environments
- Extra consideration must be given for exploration games, where finding small objects and clues are the primary game play loop



Complete Dark Souls 1 Map

- Thus strategies to aid player in navigation and object location become necessary

- These include aspects of level design (such as colouring objects, careful use of light and diegetic landmarks) and external guidance (such as map markers, way points and proximity alerts)

Scoutflies in Monster Hunter World

Map in Minecraft

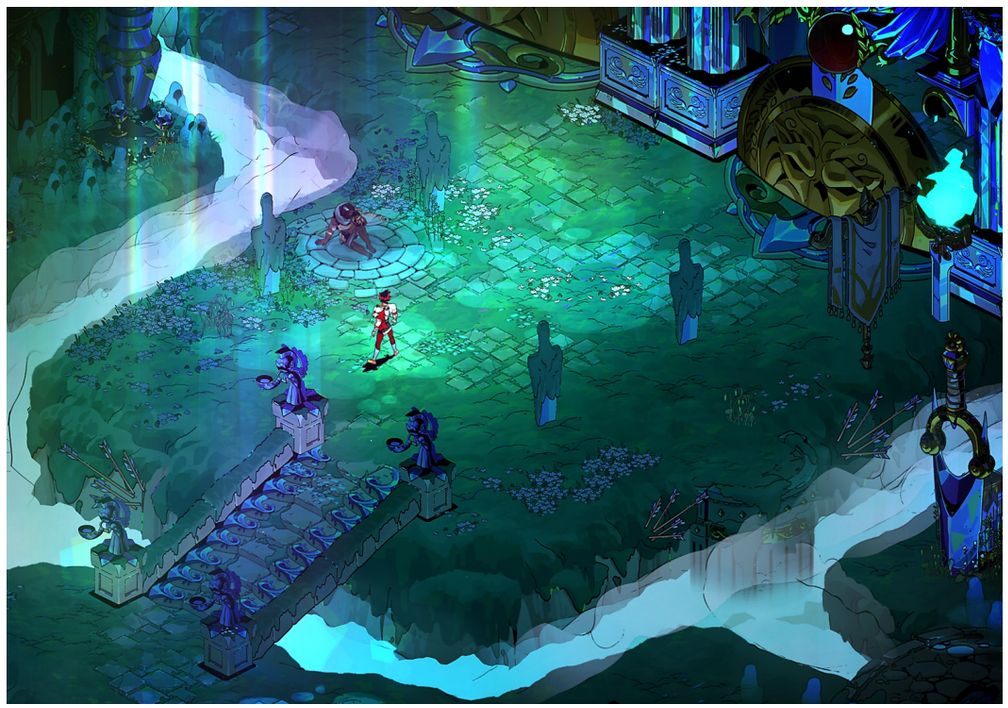
Shiny notes in Bloodborne

- However these strategies can pose their own issues

- Often one-size-fit all, doesn’t account for difference in video game literacy between new and experienced players

- Over-reliance of more obvious methods can create a disconnect between player and world which leads to boredom

- More sophisticated methods rely on intentional and expensive design

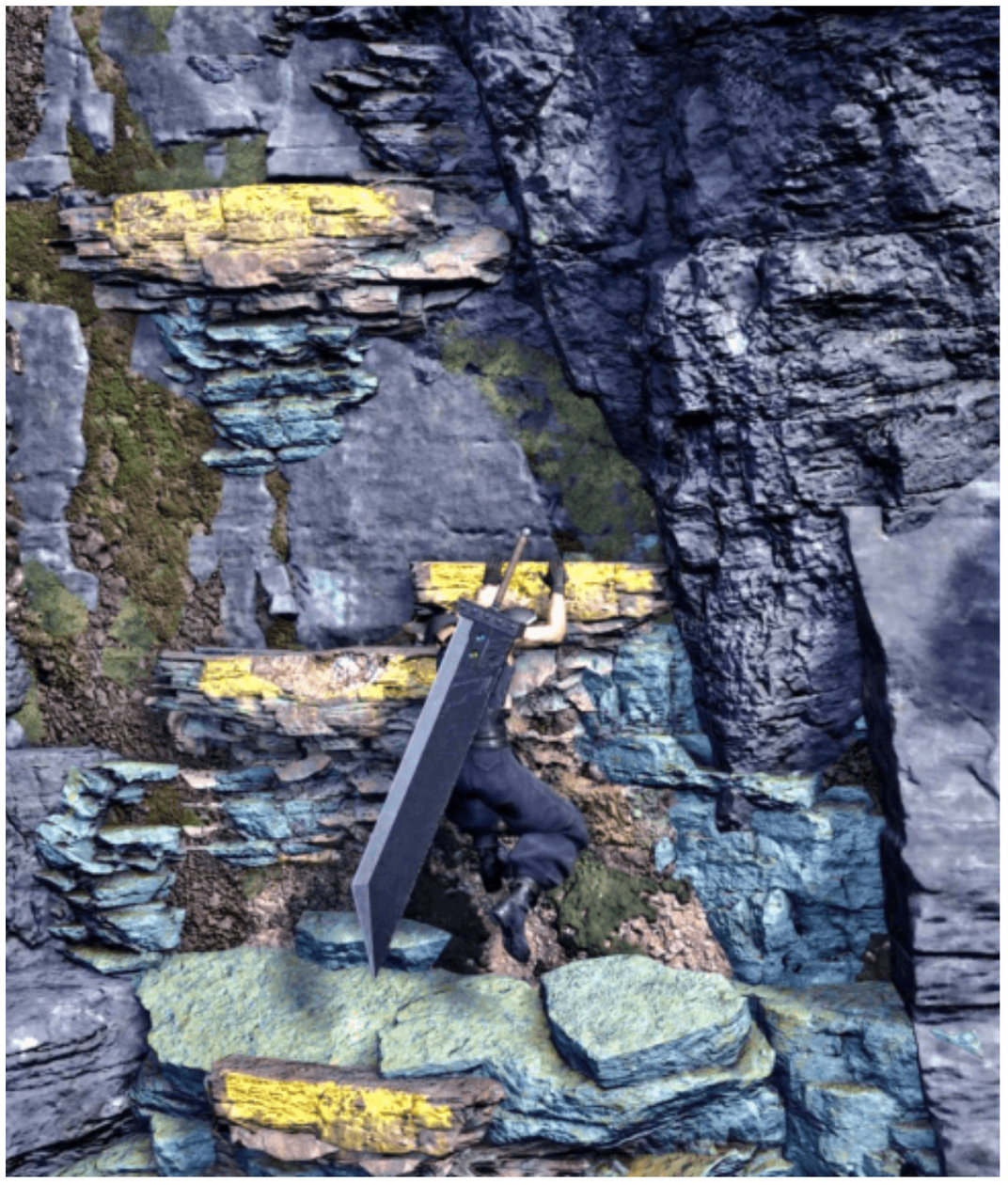


Use of light in Hades

Landmarks and light in Elden Ring

Yellow Paint

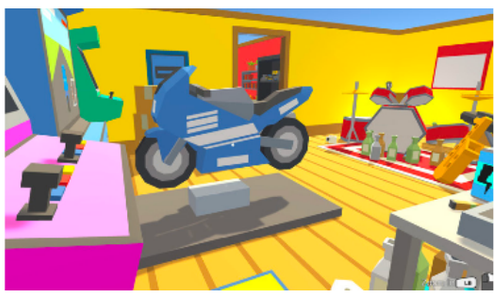
- “Controversy” a few months ago
- Frustrates experienced players due to trope, makes the world feel *game-y*
- Inexperienced players still might struggle as a very specific piece of design language



Yellow paint in Final Fantasy 7 Rebirth

This Study

- Pursues a relatively novel strategy of object location support
- Investigates the effects of gaze guidance on player experience
- Compares the different feedback types that can be used for gaze guidance: visual, auditory and haptic
- To test this study a prototype exploration game was created where a college student looks for 4 keys in their room






Gaze Guidance

- Gaze is tracked with an eye tracker
- When user looks a larger predefined area where the key is located, they receive feedback
- The area is intentionally left bigger as so to encourage exploration
- The intensity depends on the avatar distance from key as well as the difference between gaze and key within gaze area
- Visual feedback is a vignette effect, as the intensity increases the effect gets darker and smaller
- Auditory feedback is a sound cue, as the intensity increases the cue gets louder and higher pitched
- Haptic feedback is controller vibration (in this case an Xbox360 game controller), as the intensity increases the stronger the vibration

Figure 2: Gaze-supported player guidance in the game *Lost and Found*: if players (1) look at a gaze-sensitive area (2) where a game object is located (3), they get feedback via either visual, auditory, or haptic cues. The closer to the object, the stronger the feedback.

Figure 3: Condition *Visual*: Gaze-supported player guidance was combined with visual feedback.

Experiment

- 22 Participants each answered demographic questions including experience level
- Each participant would be randomly presented with one level out of three and one feedback scheme out of three
- After which they were asked questions about their perceived game experience and what they like and disliked about the interaction form
- This repeats for all three levels and all three feedback types, after which an interview is conducted
- Participants were ask to fill out the immersive experience question (IEQ) as laid out in the research paper by Jennett et Al.
- Additionally they were asked open ended questions about their experience such as *“What did you like most about the game interaction?”* and *“What did you dislike most about the game interaction?”*

Results

- The IEQ measures 5 factors: cognitive involvement (CoIn), real-world dissociation (ReWo), emotional involvement (EmIn), control (Cont), challenge (Chal), and a single question to indicate the perceived immersive experience (Imer)

- Because the tests were conducted repeatedly on the relatively small number of subjects, repeated-measures analysis of variance (rANOVA) was used to control for individual differences

- Additionally the reliability of scales (how closely related a set of items are related within a scale) was calculated using Cronbach’s α

	Visual	Auditory	Haptic	Cronbach's α
CoIn	5.30(1.29)	5.15(.93)	4.57(1.09)	.92-.80
ReWo	4.62(1.44)	4.38(1.44)	3.83(1.44)	.91-.81
EmIn	3.08(1.35)	2.95(1.07)	2.41(.77)	.90-.72
Cont	5.20(.99)	5.08(.98)	4.48(.89)	.91-.71
Chal	3.89(.99)	3.68(1.18)	3.27(1.09)	.92-.71
Imer	7.27(1.52)	6.59(1.40)	3.77(1.15)	.82-.73

Table 1: Means and Standard Deviation for *CoIn*, *EmIn*, *ReWo*, *Cont*, *Chal* on a scale from 1 to 7. *Imer* on a scale from 1 to 10. Internal consistency of scales is shown by Cronbach's α.

- Visual was best rated for all metrics closely followed by Auditory with Haptic trailing behind
- With the exception of challenge (Chal) were all three were rated roughly equally.
- In terms of open-ended feedback, subjects mentioned that haptic feedback made them aware that they were playing a game, that it felt that something negative had occurred like taking damage so it was hard to logically connect it with gaze and that the intensity was either too weak or too strong.
- Visual feedback was praised for its subtlety and fitting with the world in comparison with the other feedback types as well as for reducing the complexity of the 3D environment. But the effect was seen by one player as too intensive.
- Auditory feedback was broadly liked but sometimes perceived as too dominant in a game with not a lot of sound. Additionally players sometimes struggled to logically connect the sound with their gaze.

Limitations

- **The paper acknowledges some limitations in their approach**
- Only evaluates one genres, cannot necessarily be applied to gaze-based guidance in other genres
- Number of participants was relatively small and demographically similar, particularly finding a variety of people with different video game experiences should be important
- Didn’t consider the combination of feedback and how that would effect player experience
- Didn’t consider a more adaptive system for triggering gaze-based guidance
- **However I feel there is some more limitations to the paper**
- Didn’t directly compare gaze based guidance against no guidance, proximity guidance, and avatar direction guidance
- Additionally in term of my research, the method presented here is not particularly computationally complex

Applications

- While application in real-world games is currently limited due to eye trackers not being a common piece of hardware, it stills gives some insight into not gaze-based object location aids

- Most importantly quantifies the value of the relatively uncommon vignette effect as well the issues with omnipresent haptic feedback

Haptic Feedback outfit in Ghost of Tsushima

Novelty

- Previously most research on gaze-input in context of games was on using it as a replacement for other game input devices

- Most research on the topic of gaze-based guidance was in the context of other forms of media such as images or video

- There is also a lot of papers roughly on the same topic that came around the same time particularly in the context of VR

- There is also a more recent paper that proposes a two step solution to object location aids that heavily cites this paper, but it currently has no citations

Conclusion

Thank you for listening!