

The ‘No-Interface’ Interface for Research VR

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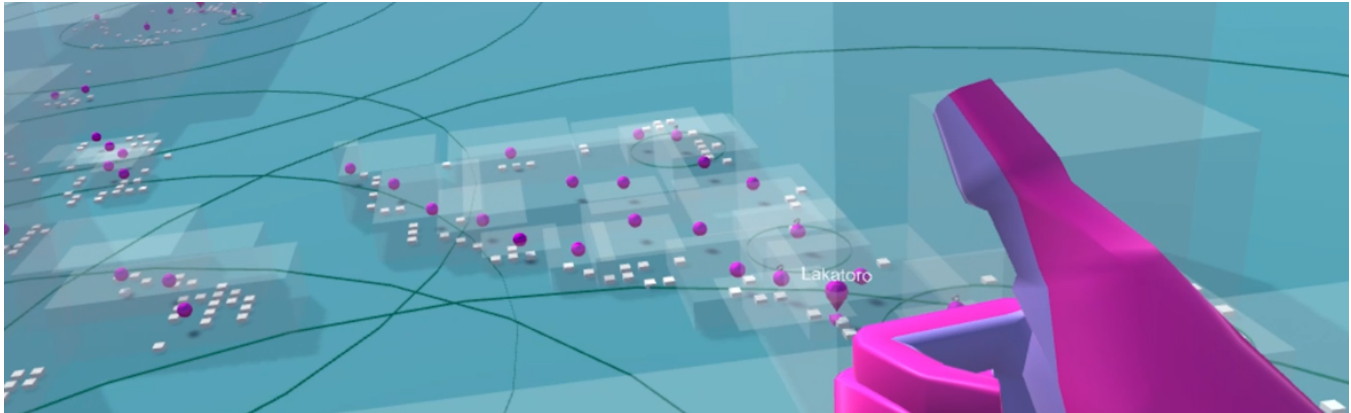


Figure 1: Thumbs up: a gesture-based interaction in Layered Horizons

ABSTRACT

In this paper we outline a paradigm that has existed in interface and interaction design for Virtual Reality (VR) since the first wave of VR in the 1980s and 90s. Focussing in particular on VR as a research tool, we argue that the field has moved away from immediate, embodied interaction towards interface paradigms adopted from desktop software and computer gaming. We introduce a VR experience we have developed for use in a research project, *Layered Horizons*, and discuss how it fits within the alternative tradition of the ‘no interface’ interface, where interaction is triggered by body movement and natural gestures. We discuss what this means for our project. We argue that this kind of interaction design in VR takes full advantage of the media’s affordances, without relying on metaphors from other interactive media, yet being familiar enough as to engender intuitive and meaningful use.

KEYWORDS

interfaces, gesture, leap motion, virtual reality, languages, research platform, data visualisation

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1 INTRODUCTION

The potential to create innovative and immersive systems for interaction within Virtual reality (VR), as suggested by the VR pioneers, would appear limitless, and bring rise to a whole new paradigm of interface and interaction design. In 1989 Jarod Lanier highlighted this point when he said “[t]he point is that in Virtual Reality there’s no need for a single metaphor” [Kelly 1989]. Couple this with Brenda

Laurel’s motto of “no interface” [Laurel et al. 1994] when speaking about the seminal VR work *Placeholder* we begin to piece together an understanding of the emerging shape of this paradigm. Yet over a quarter of a century later, in the so-called second-wave of VR, most of the standard metaphors for creating interfaces in VR are extension of either the desktop metaphor of the personal computer or the Heads Up Display of the first person computer game. How do we then design for interactions in VR that take full advantage of the media’s affordances, without relying on these familiar metaphors, yet being familiar enough as to engender intuitive and meaningful use? We will explore this question by introducing our *Layered Horizons* information visualisation as a case study alongside a survey of important voices from the history of VR interface design, including virtual reality pioneers such as Lanier, Laurel and Char Davies.

Layered Horizons is a Research through Design and Digital Humanities project that brings together disparate data sets from linguistics, anthropology, geography and archeology—within virtual reality—to create visualisations that investigate the extent and nature of ancient contact between First Peoples of Australia and the Asia-Pacific region. It is part of an ARC-funded project, *Waves of Words* (DP180100893), which aims to better understand the nature of this contact. The project aims for *Waves of Words* are outlined in more detail in Hendery [2018]. In the *Layered Horizons* VR project, designed for the HTC Vive, we bring together these data sets by spatialising them in a relatively abstract map of the Asia-Pacific, and allowing the user to move through the region and interrogate data points with natural gesture by use of the LeapMotion¹. Semi-transparent volumes can be used to connect regions of the map, i.e. to represent relationships between islands or languages, or the extent of a feature or a language. The data points can be associated

¹The LeapMotion is a device used to track hands in space for use as natural input within a virtual environment.

with audio snippets. In some experimental versions, the geographical space can be warped to represent relationships between places, e.g. bringing islands closer together if the data suggest they have a closer relationship, and further apart if not.

As the VR project is intended as a research tool, we have designed these affordances without locking them to specific kinds of data or use cases, so that a researcher can choose what kinds of data points to display, what to represent with the transparent volumes, and what to base the warping of space on, for example. All data are imported from csv files.

In the following section we will trace the development of thinking about VR interface design through the 1990s to the present day, in order to situate *Layered Horizons* in that intellectual tradition. We will then turn to a more detailed discussion of the design choices in *Layered Horizon's* interface.

2 A BRIEF SURVEY OF A PARADIGM FOR THINKING ABOUT VR INTERFACES AND DESIGN

A recent tweet, where he makes his position on the design of interfaces in VR clear, John Carmack (chief technology officer of Facebook's Oculus Rift Virtual Reality division) states, "3D interfaces are usually worse than 2D interfaces" [Carmack 2019b]. In the related Facebook post he goes on to say, "Obviously when you are dealing with a 3D object, as with Medium, Quill, or a 3D data visualization, then you have a 3D interface, but I contend that the majority of browsing, configuring, and selecting interactions benefit from designing in 2D." [Carmack 2019a]

It is our proposition then that, in this case, the use of VR may be unwarranted (for example the often promoted VR Theatre experience). We would like to suggest an alternate paradigm, that while not new, perhaps has been somewhat sidelined, and explore the potential for VR to be more than just a slide-in replacement for all other preceding technologies. We know from McLuhan that this is the 'natural flow' of media technologies, though it is also what we need to move beyond to utilise the true potential of a medium.

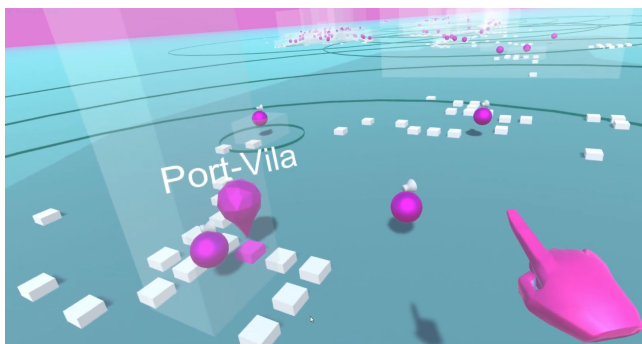


Figure 2: An example of a gesture based interaction in one iteration of *Layered Horizons*

"The 'content' of a medium is like the juicy piece of meat carried by the burglar to distract the watchdog of the mind. The effect of the medium is made strong

and intense just because it is given another medium as 'content.' The content of a movie is a novel or a play or an opera. The effect of the movie form is not related to its program content. The 'content' of writing or print is speech, but the reader is almost entirely unaware either of print or of speech." [McLuhan 1964]

If then, the content of cinema is the novel/play/opera and the content of screen-based new media is cinema (as suggested by Manovich [2001]), then it could be extended that the content of VR-based new media is screen-based new media. This is to say that all of the affordances of screen-based new media such as interactivity, sound, immersiveness, image, touch become the "content" of virtual reality as a medium. In addition to this we find that virtual reality also has as its content a number of other preceding media including spatial and landscape architecture and their artistic counterparts, environmental and installation art practices.

A small survey of language surrounding VR from the late 1980s and early 1990s suggests a certain level of both idealism and hope for this emerging medium. But in this brief sketch, we also find clues to a potential paradigm for working with VR as a material. For example, we find the ability (speculative or otherwise) to transform into pretty much anything an experience creator may imagine for their users. Jaron Lanier would seem to have have imagined an unlimited range of possibilities including:

"You might very well be a mountain range or a galaxy or a pebble on the floor. Or a piano...You could become a comet in the sky one moment and then gradually unfold into a spider that's bigger than the planet that looks down at all your friends from high above." [Lanier 1989, P.110]

while Brenda Laurel talks about the possibility of 'joining' with one of the animals (critters) of Placeholder's virtual world:

"As a person moved closer to a Critter, its narrative became more elaborate and persuasive, urging the person to "come closer." ... [H]e or she would join that Critter, taking on its appearance, voice, perceptual characteristics, and means of locomotion" [Laurel et al. 1994]

We find that the user is enhanced with new powers that are spoken of in a direct and embodied manner. This is not a the language of providing a simulation of an experience, but in providing *the* experience.

"With a Saxophone you'll be able to play cities and dancing lights, and you'll be able to play the herding of buffaloes made of crystal, and you'll be able to play your own body and change yourself as you play the saxophone." [Lanier 1989, P.110]

We also find a deep and cross disciplinary understanding that what they were dealing with was a medium that could fundamentally change the way we see and understand ourselves in the world. In an interview in CTHEORY, Myron Krueger hinted at this:

"Rather than denying the body, virtual reality reconnects it to the life of the mind." [Turner 2002]

255 With Michael Heim taking it further in handing the artist/creator
 256 of a VR experience the power to transform reality. In doing so, he
 257 also highlights McLuhan's progression of media.

258 "VR will enhance the power of art to transform reality.
 259 The picture frame, the proscenium, the movie theater
 260 all limit art by blocking it off as a section of reality. VR,
 261 with its augmented reality, allows a smoother, more
 262 controlled transition from virtual to real and back.
 263 This capability, which may frighten psychologists,
 264 will offer artists an unprecedented power to transform
 265 societies." [Heim 1993, P.128]

266 And in a continuation of this theme Char Davies could see pos-
 267 sibilities that would allow her to shift her users' (immersants')
 268 awareness

270 "I have come to believe that full-body immersion in
 271 an "unusual" virtual environment can potentially lead
 272 to shifts in mental awareness. That this may be pos-
 273 sible has many implications, some promising, some
 274 disturbing." [Davies 1998]

275 And finally (as we return to reality) we see a sense of disappointment
 276 and an understanding of crossed purposes in the VR industry

277 "What went away when the hype died? The hype
 278 positioned VR as a technology with the potential for
 279 creating a radically new entertainment. medium al-
 280 most instantaneously ... Many people hypothesized
 281 that this new form of entertainment would replace
 282 both videogames and TV. The more hopeful among us
 283 declared that it would transform the very nature of hu-
 284 man communication. But it quickly became apparent
 285 that VR as entertainment was going to be extremely
 286 difficult to 'monetize.' " [Laurel 1993, P.185]

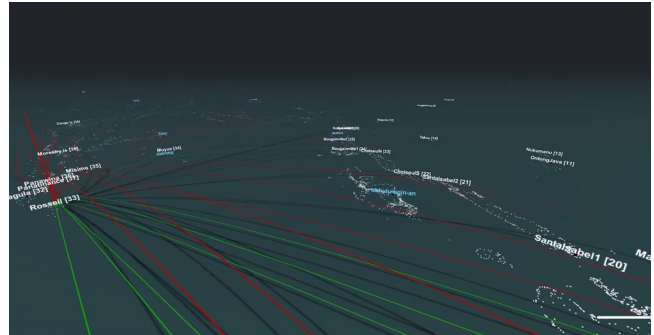
288 This is not to say that contemporary commentators do not un-
 289 derstand this, or are even interested in VR with the same paradigm
 290 as model (see for example the "Voices of VR" podcasts by Ken Bye),
 291 but that the potential tends to be missed by the forces driving the
 292 consumer end of the VR market and hence the outward-facing
 293 dialogue at this consumer/everyday level.

294 This paradigm provides a model or way of thinking about work-
 295 ing with the material of VR; rather than a place we are currently
 296 at, it is something we are working towards. This way of working
 297 provides its challenges, and perhaps it is because of these challenges
 298 that an easier road is being pushed such as the path suggested by
 299 Carmack in his tweet. It also may be the reason why, when we look
 300 at a many of the contemporary VR-for-research projects, it is hard
 301 to see what affordances of VR they are taking advantage of, and
 302 easy to see how they might just as well be suited to display on a
 303 2D screen.

304 Ultimately it is Brenda Laurel who will be given the last word in
 305 this small survey, and it is a last word that has come to be sort of
 306 mantra in our way of working with VR. In describing *Placeholder*,
 307 she states:

308 "The other issue was the question of the interface—
 309 thinking about how people were being sensed and
 310 how they were being constrained to behave. Our motto
 311 was "no interface," expressing our desire to maximize

naturalness, to enable the body to act directly in the
 world, and to minimize distraction and cognitive load."
 [Laurel et al. 1994]



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Figure 3: Locations as data points in Layered Horizons, which can be manipulated to demonstrate new relationships in space and time: here distances remapped using canoe time

3 CASE STUDY: LAYERED HORIZONS

Our *Layered Horizons* project therefore sits in the tradition of this 'no interface' design. Movement is controlled by pointing, with a single finger for slow travel, and a flat hand for a faster speed. The user can also walk around the space when it is set up as a room-scale experience.

A crucial element is the use of natural hand gesture for controlling the experience rather than having it mediated by a controller of some kind. Pointing at a location brings up its name, and scooping a data point up with the hand reveals associated metadata: for example, for a data point that represents a language, this would generally at least be the language name, location, and number of speakers.

In an earlier project, out of which this one grew, we used an Xbox controller, and were concerned that this both put the user at a remove from the data and also created a 'game-like' experience less well-suited to a research tool. In on-going user testing, we have asked a number of questions of users who tried *Layered Horizons*, and of some who tried the earlier project with Xbox controller. We do not yet have sufficient data for statistical significance, but half of the users who tested the version with Xbox controller have selected a 'low' rating (1 or 2 out of 5) on the question of how important they felt it was to experience this information in VR form rather than a map or flat screen-based experience. Such a low rating is rare among the users who tested *Layered Horizons* (two users out of 18).

Another difference between the earlier project and *Layered Horizons* is that the earlier version had a more realistic art style, while *Layered Horizons* is deliberately more abstract. This works together with the no-interface approach to avoid the feeling of being in a game. In observation of users of the earlier version we found that many were looking for a goal to achieve, rather than simply exploring, and in the absence of a given goal, would sometimes instead simply test the limits of the experience (e.g. fly as high as possible,



Figure 4: Interacting with controller in an earlier project and interactive with Layered Horizons (shown in background) using gesture based interface

as low as possible, as fast as possible). For researchers using *Layered Horizons* as a scholarly tool, we wanted them to be able to explore the data, or to set their own goals, but not to feel like there were externally imposed expectations on their behaviour.

Moreover, the ‘no-interface’ approach creates a more immediate, immersive engagement with the data, which the more abstract look and feel then balances out somewhat, serving as a kind of alienation or distancing effect [Brecht 1995] to remind the user that the data is not a part of the natural landscape, but rather a human-interpreted artifact, with all the limitations that this implies. This more abstract approach to the design also helps avoid the trap of equating high-fidelity, realistic graphic representations with *truth*.

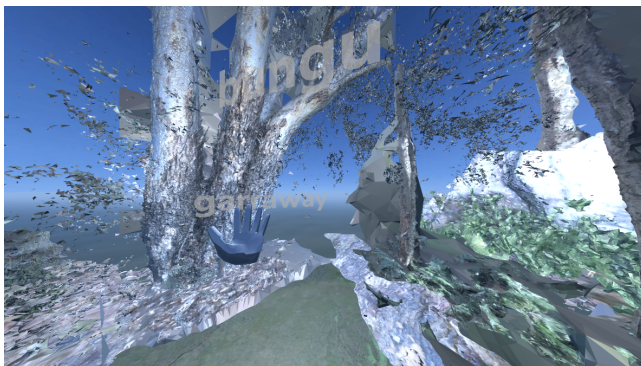


Figure 5: Barrawao. A VR project exploring connections between Language and Country in the Sydney region utilises the research in VR design of the Layered Horizons platform. Burrell, Foster, Hendery, Hromek and King 2019

4 CONCLUSIONS

In this paper we have outlined some of the historical precedents of the ‘no interface’ approach to VR interfaces and shown how we are using this approach to inform the design of our VR visualisation

as tools for researchers and research outcomes. We would argue that the no-interface idea is innovative in this space, because it is a route that many VR games and other mainstream experiences have not taken, and that most VR tools as research platforms have not explored, hence missing out on much of the full potential the material qualities of VR affords.

It makes sense to adopt this approach for experiences that use VR as a research platform: we want immersion in terms of an embodied experience, yet we want the user to realise that the data is an interpreted representation of the real world, not the real world itself.

As we move forward in this research, the emerging framework based in this paradigm is proving invaluable in creating new experiences, not only for research itself, but for the dissemination of research and other information, as is exemplified by our new *Barrawao* project (5). As we make the code and project frameworks publicly available we believe they will be valuable to many other research and visualisation projects in the future.

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