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Learning Japanese through VR Technology. The Case of *Altspace VR*

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Abstract Through this paper, I intend to analyse the state of Japanese learning through virtual reality technologies, avoiding as much as possible the analysis of prototypes and laboratory experiments, focusing instead on a case study that implements software and hardware already present on the consumer market. After analysing the VR technology currently available to end-users and its hardware, which has lately increased in popularity due to the COVID-19 pandemic, and the specificities of virtual reality compared to other communication technologies, I will proceed to the analysis of the case study *Altspace VR*, a social VR software used also by an active Japanese learning community, to try to identify the characteristics that could make this technology particularly suitable for language learning.

Keywords Virtual reality. Japanese language. Digital humanities. Virtual worlds. Learning through technology. Informal language learning.

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1 Introduction

In the present work, I will try to analyse the opportunities offered by Virtual Reality (VR) for Japanese learning. The basic assumption is that the VR actual landscape is mature enough to provide affordable and reliable hardware and software to allow end-users to gain a substantial positive experience; it would therefore be useful to understand how it is already used for language learning purposes. In particular, this work will focus on Japanese learning.

The VR industry as a whole is growing at a fast pace. In the US, the market size of consumer virtual reality hardware and software has been projected to increase from 6.2 billion US dollars in 2019 to more than 16 billion US dollars by 2022 (Alsop 2020). Several types of software and hardware are already available on the market, mostly purchasable from the manufacturers' online stores. Thus, this present work will move beyond the analysis of VR for language learning from an experimental perspective (prototype hardware, software, lab testing) to focus instead on what currently exists on the market and how it is actually used.

Before anything, this paper will introduce what is meant by Virtual Reality, through a brief excursus of the development of this technology. Then, by analysing the process of communication through VR as a medium, I will identify what typology of software best allows language exchange and communication between users, and I will present my experience of one particular software (*Altspace VR*) with an already established community of Japanese learners. I will then try to identify reasons why this software and in general learning through VR can motivate learners and allow them to focus, more effectively than traditional technologies.

2 What is VR?

Burdea and Coffet (2003, 25) define Virtual Reality as

> a simulation in which computer graphics is used to create a realistic-looking world. Moreover, the synthetic world is not static, but responds to the user's input gesture, verbal command, etc.

One of the main aspects of VR is therefore real-time interactivity. But VR is not just telepresence in which a user shares the same virtualized space with others; the virtual world must be immersive. It must, in other words, surround the user and respond to his actions, for example his movements or his interaction with the objects present in the virtual world. VR also provides the opportunity of imagining and realizing answers to real human needs and desires, from language learn-

ing to video games. "Virtual reality is therefore an integrated trio of immersion-interaction-imagination" (Burdea, Coiffet 2003, 27). Also, Sherman and Craig (2018, 8, 10) stress the importance of the 'immersive' element for a VR experience. They define 'immersion' as "the possibility to perceive something besides the world you are current living […] the term immersion can be used in two ways: mental immersion and physical or sensory immersion". While the mental immersion is the state of being deeply engaged and involved and can be somehow related to the concept of *flow* (Csikszentmihalyi 2009), a mental state in which a person performing an activity is naturally immersed and focused, and can also be created outside the VR realm,[1] sensory immersion is a unique feature of VR technology where specific human senses, mainly hearing, sight and tact, are synthetically stimulated so to create the sensation of being physically present in a different world. The sensorial factor is thus an important key feature of all VR experiences that must provide real-time feedback to users according to their position in the physical space, as well as their head and hand movements. From a hardware point of view, there have been two main ways to realise this sense of immersion and interaction: stationary VR and headset-based VR. Stationary VR was introduced in 1992 at the SYGGRAPH '92, a computer graphic conference in Chicago, with the projects *The Cave* (DeFanti et al. 1992) from the Electronic Visualization Lab of Chicago and *The Virtual Portal* from Sun Microsystem. Stationary VR aims to realise a VR experience by creating dedicated spaces/rooms with 3D projectors that display the virtual space, generated in real-time by a computer and cameras that capture the movement of the user and change the virtual world according to his movements. By contrast, headset VR aims to recreate the entire virtual space inside a headset worn by the user. This approach to VR, which emerged in the sixties, became more economically viable than the alternative, especially for end-users, as it does not require dedicated rooms with sensors for its use. Therefore, many technologies were developed in the nineties around the concept of the headset, to recognize the movements of his head, hands and legs. However, the expensive hardware needed to create the VR experience and the lack of a global network connection have prevented these technologies from reaching a large number of users, and so it remains relegated to experimental studies or implementations in large-scale theme-park events.

One important current VR application, on the other hand, is the realisation of collaborative virtual environments, systems where mul-

1 A well-designed user experience, for example, can generate a flow state in the user of a software ensuring a concentrated and relaxed use of the digital artefact. For details on User Experience and its psychological principles, see Garrett 2011 and Triberti, Brivio 2016.

tiple users connected through the internet may interact in the same virtual space. This feature transforms the VR artefact from a single-user simulation system to a medium allowing different people to communicate and share ideas while deeply immersed in a virtual environment. This VR + Internet combination provides new business opportunities and new possible applications in the fields of social communication and language teaching.

It is precisely thanks to the evolution of the Internet in terms of diffusion and speed, as well as the development of increasingly powerful and affordable hardware, that the birth of the second era of VR was made possible.

3 The Second Era of VR

The second era of VR began when information technology became mature enough to allow the production of affordable, non-obtrusive VR hardware available to the masses, and when internet connections became sufficiently stable, widespread and fast. The type of VR hardware representing this second era is the headset, in that it has proven to be less invasive and more affordable than the alternative. This era began roughly around 2004-05, with the development of smartphones powerful enough to be used with *Google Cardboard*[2] and other virtual reality viewers, created for next-generation smartphones. There are essentially three hardware approaches used by companies to deliver the VR experience. The first regards the use of a device small enough to be paired to a wearable visor. The viewer can be made with common cardboards like *Google Carboard* and appropriate lenses or plastic and other materials. In this case, the price is usually quite low, starting from a minimum of 15 euro for a cardboard-made viewer, up to about 90 euro for the *Samsung VR* designed for the Korean company's smartphones. The price difference depends largely on the construction materials and quality of the lenses, while all the technology related to image quality and head position detection is determined by the smartphone. While offering an acceptable VR experience, especially with the latest smartphones, this approach to VR does not allow motion detection for hands and other body parts in space. The difference in performance of the smartphones presently on the market also makes it impossible to provide a homogeneous experience. In 2019, an article of *The Verge* (Robertson 2019) declared that this technology has reached a dead end. The great merit of this inexpensive approach, however, was to make VR known to a very large number of users; in fact, *Samsung Gear* alone

2 For further information refer to the project page: `https://arvr.google.com/cardboard/`.

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produced and shipped at least 5 million units (Robertson 2019). The second approach to VR (from 2016 with *Oculus Rift*) is to use high-tech high-specs VR dedicated headsets connected to a high-performance PC or to a latest generation gaming console. In this case, the hardware of the PC or console together with the hardware of the headset allows not only the recognition of the head but also the hands (or feet with special devices) and movements in space. The quality of the headset is usually very high, offering a resolution of up to 2,160 × 2,160 pixels per eye[3] (*Reverb V2*). High-end hardware also allows for a very high-quality immersive experience. The problem with this technology, however, is twofold. On the one hand, the bulky cables are connecting the headset to the hardware, and on the other the cost is prohibitive. The gaming hardware may cost from about 300 euro for a PS4 (Sony PlayStation 4) up to over 1,000 euro for a decent gaming PC. The viewer itself also has a cost ranging from 350 to 800 euro. In addition to the prohibitive price, this solution mostly requires the use of a fixed location. Transporting it around the house or outside would involve moving cables, computer and headset as well. Therefore, despite its high specs, it has never become mainstream, but is designed for fans of the industry who have fairly high budget resources at their disposal.

The last approach, the so-called 'stand-alone', saw its first practical realisation with the market release of the *Oculus Go*, launched in 2017 by Facebook after it acquired the Oculus company. *Oculus Go* does not have particularly advanced hardware, but has one great advantage: it is a stand-alone wireless headset, with no need for external hardware such as smartphones, PCs or consoles. It does not have motion sensors yet, but in addition to the recognition of head movements, it recognizes the movements of the controller and of two fingers of the hand that grasps it. The price is about 200 euros for the basic 32Gb version. Two years later, in May 2019, Facebook released *Oculus Quest*. This time the hardware consisted of an OLED[4] screen with higher resolution than *Oculus Go*; moreover, it included four built-in cameras allow the recognition of both hands and spatial movements, granting a much more complete stand-alone VR experience than *Go*, and with a starting cost of about 450 euro for the 64Gb version.

Just after one year and a half, in October 2020, Facebook releases *Oculus Quest 2*, lighter, cheaper (350 euro), and with higher resolution and refresh rate. In the period between the release of the *Oculus Go* and the *Quest 2*, the market changed drastically. The release of a second headset in so short time after the release of the first *Quest* implies that the favour of the mainstream audience is starting to em-

3 At the time of writing this article (2020), the VR viewer with the highest resolution is the *HP Reverb 2* (`https://www8.hp.com/us/en/vr/reverb-g2-vr-headset.html`).

4 Acronym for Organic Light-Emitting Diode. Cf. Morrison 2019.

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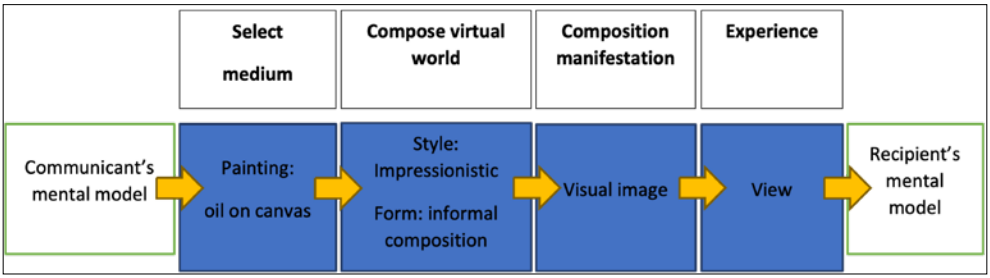
brace VR. Accomplice is certainly the period of pandemic caused by the threat of COVID-19, which has forced a large number of users to stay at home, not only in Italy, but also worldwide, has certainly aided his process. As Skandalis reports, "Virtual reality has been boosted by coronavirus […]. There appears to have been a significant rise in such VR offerings this year, aiming to deliver safe, accessible experiences during the pandemic" (Skandalis 2020).

4 VR as a Medium

As Sherman and Craig state, VR is a medium, in other words, an intermediary between two entities, the human and the virtual world.

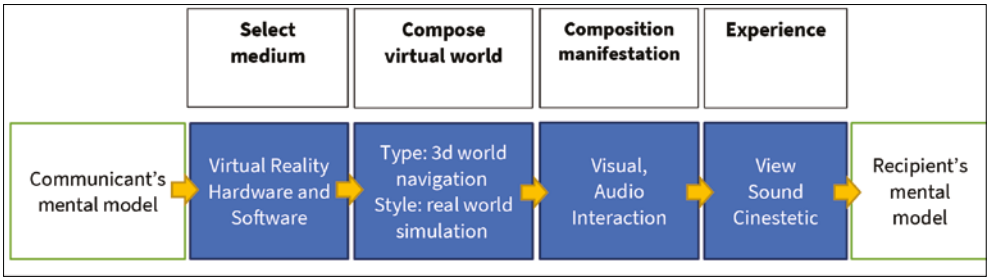
> A virtual world can be thought of as a simulation of a domain manifested in some medium where the simulation is driven by rules of behaviour programmed or imagined, simple or complex. (2018, 89)

These rules can be implemented not only as a computer programme, but also as the rules of board games, colours in an image, the imagination of a child. "The domain is the extent of the space, participants, objects and rules of the virtual world" (89). In short, the content conveyed by a medium is a virtual world. The communication process between the Communicator's mental model and the Recipient's mental model is normally structured in several steps as: 1) selecting the medium, 2) composing the virtual world, 3) the manifestation of the composition, and 4) the experience. For example, in the case of a painting, the medium might be 'oil on canvas' and the composition of the virtual word may be 'impressionistic' with a particular technique and genre. The manifestation of the composition is a visual image, and the final experience is a visual one. Indeed, Communicator and Recipient may also be the same person.



Scheme 1 An excerpt of mediated communication according to the Sherman & Craig's mediation scheme (2018, 66)

If we use the same scheme to describe a VR experience, the content of each step may depend on which type of content or software the Communicator intends to provide, and the Recipient to use. For example, a previous study on Japanese learning using VR considered the interaction of several human players with non-human entities in basic Japanese communication and social gestures, such as bowing. The software used in this study is a VR version of *Crystallize*, a 3D world where players can freely move around (Cheng et al. 2017). It is possible to represent the communication between the Communicator and Recipient mental model by using the following scheme.



Scheme 2 Mediated communication with Crystallize VR (Author's scheme)

In this scheme, the Communicator, through various steps, creates an experience that should reach the Recipient's mental model. The scheme has almost the same steps as the first scheme, and it is centred on the Communicator's intention to transfer information to the Recipient.

However, compared to traditional art, digital and online products deal with different user expectations in terms of time and performance. These expectations represent the difference between art and craft.

As Becker (1978, 862) states:

> Art and craft are two contrasting kinds of aesthetic, work organization and ideology [...] craft can and does exist independent of art words [...] consists of a body of knowledge and skill which can be used to produce useful objects.

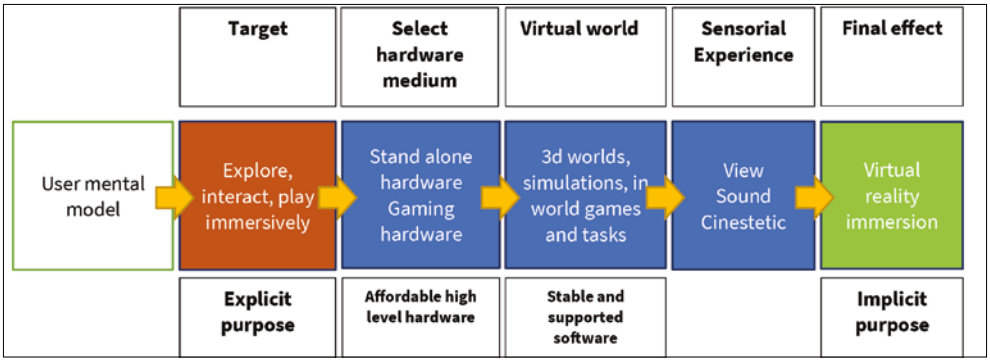
Even if we agree that VR virtual worlds may be a work of art in the aesthetic sense, the process is different. Art has value in the experiencing of creating, the craft (the product) in its final result. If the Communicator has good intentions with his communication, but certain pitfalls not only in his intent to communicate or in his skill but also in the underlying technology environment prevent his message from reaching the user, the Communicator's intention itself cannot be satisfied.

The participants of the *Crystallize* project, for example, experienced difficulties with the virtual reality experience ('compose virtual world' level), which suffered from some technological defects. In fact, according to the user experience feedback, 27.9% of the comments revealed user interface problems, such as a difficulty in reading words in the inventory. Moreover, another 23.5% experienced dizziness and sickness caused by the headset (virtual reality hardware, 'select medium level'). Even despite such problems, the overall result of the study showed "a statistically significant increase in the participants' sense of cultural involvement". However, "there is no obvious evidence that the language learning outcomes improved thus far" (Cheng et al. 2017, 550). The test, furthermore, was carried out with particularly expensive hardware within the reach of only a few users: *Oculus Rift* together with external hardware. The software used was a prototype (Culbertson et al. 2016) not normally available to end-users and forcedly adapted to VR, which caused bugs and interface problems.

However, in the last three years (2018-20), the VR landscape has evolved considerably. Not only has hardware improved, as discussed in the previous section, but also software has. *Oculus Quest* sold around 633,653 units in the period May 2019-March 2020 (Boland 2020), surpassing the *Rift*'s previous year sales and the expectations of the producer (Matney 2020). It has also been estimated that around 800,000 software units have been sold in the same period from the Oculus Store alone. These figures indicate that VR software has increased in number and quality as well (only professional software is sold through the store), and that along with the demo, experiments and unsupported prototypes, a considerable amount of well-tested and dedicated free and paid VR software, purchasable through dedicated online stores, is already present on the market. Given that the VR market has evolved so much, it makes sense to design a scheme **[scheme 3]** centred around the user and his needs, presuming that the Communicator's intent is fully realised thanks to well-tested software and stable technology.

Scheme 3, as applied to a social VR software, reveals two purposes, one explicit and one implicit. The explicit purpose is the purpose for which the user uses the VR, and this can vary: e.g. playing games, exploring worlds, watching 3D movies or working out through training simulations. The implicit purpose, which is also the last step of the diagram, is the optimal immersion in virtual reality. There is intentionally no reference to the Communicator, because the Communicator is not normally in the thoughts of the user. This is also corroborated by the three fundamental corollaries of the Platt user experience (2016), as exemplified in Platt's summary: "users don't care about your program or you either. Never have, never will" (Platt 2016, 28). In other words, to achieve a fully working virtual reality immersion, the hardware medium, the software and the sensorial ex-

perience must work so well that the user is naturally embedded with the hardware and the software, and enters into a dimension of *flow* (Csikszentmihalyi 2009) with the new virtual reality.



Scheme 3 Mediated communication through a Social VR software. This scheme focuses on the user's mental model

In the next section, I will examine the status of Japanese learning through VR by using a Social VR software called *AltspaceVR* (`altvr.com`) that respects the elements of the above scheme. It is a mature social VR software recently acquired and supported by Microsoft, it can be used with latest generation stand-alone hardware, and it allows a remarkable virtual sensorial experience. The reason I have focused on this software among others (*VRChat*, *RecRoom*, *VTime*) is that this software is more stable and has better graphic quality, and hosts existing Japanese learning groups.

5 Japanese Learning through Altspace VR

Social VR software is often present in the form of an online 3D world, a place where different internet users can access the same meeting area and socially interact by exchanging messages and multimedia contents. Voice chat is frequently supported too. Users portray themselves as avatars, a customizable graphical representation of each user. The first online virtual world that received considerable media attention was *Second Life* (SL), launched in 2003; in its heyday (2007), it reached seven million virtual inhabitants (Crudele et al. 2017). The same multidimensional world idea employed in SL has been applied to *Altspace*, with the addition of VR implementation.

Altspace VR started as a private company in 2013 and was acquired by Microsoft in 2017. The software is downloadable free of charge directly from the Oculus products store.

Figure 1 Screenshot of the Altspace VR home and the event menu

I have been using *Altspace VR* since 2019 with *Oculus Go*, then with *Oculus Quest* and recently with *Oculus Quest II*. The overall experience is similar, and it is possible to use three fingers of both hands, as well as to move in the room to a certain extent (the system first requires the user to delineate the area he can walk in, using the controller). It is also possible to move in the virtual space with the micro-stick of the controller, without the need of physically walking through it.

By entering the application, the user appears in his personal area, a house and a terrace where he can move freely. It is also possible for him to change the environment around him by adding elements like furniture or trees and plants.

From the main menu, it is possible to select one of the events of the day or a different world to move to. *Altspace VR* hosts various events for language learning, especially English and Spanish. Until October 2020, there were also two Japanese language learning events, but presently only one of the two still exists and is actually maintained: *Free Conversations in Japanese and English*, created and maintained by a Japanese native user with the nickname of Kii.

Kii is not a language teacher; he created the group in July 2020 for the purpose of English and Japanese language exchange. The event is held twice weekly, and there are about 15-20 participants at a time, but this may vary.

By accessing *Altspace VR*, the user can select the events of the day the from the list. As shown in the image below, the conversation event is present in the list and can be selected **[fig. 1]**.

Figure 2 Screenshot ofa classroom of the school building

Figure 3 Screenshot of the school hall. Communication is casual both in English and Japanese, according to the needs of the participants and their level of Japanese

Figure 4 On the left, a screenshot of posters used by the host to give a brief explanation of colours nature elements and Japanese writing. On the right a classroom with meals on the desks

Figure 5 Talking about how to speak of family members in Japanese, and writing their relative roles on pictures of families (real or from the cartoon world) taken from the Internet

By selecting the event, the user is transported to the event location, a two-floor Japanese school building with two classrooms per floor. It is possible to move freely from one classroom to another using the corridor or the stairs to the second floor. Every avatar present in *Altspace VR* represents a real user and not a computer-generated bot. Communication can be made by moving the hands and head or by speaking (a hidden mic is normally present in the VR headset) **[figs 2-3]**.

Sometimes the host gives brief Japanese Lessons by pointing with his virtual hands at the posters in the hall and teaching the names of its elements or of the colours present there. In other cases, he takes the users to a classroom with lunches on the desk. By pointing at the meals on the desk and saying their names in Japanese, the host encourages discussions on the components of the meal, which often depend on the culinary habits of the users (like miso soup or a bowl of rice) **[fig. 4]**.

After about half an hour, the host opens a portal to a new world (a sushi restaurant). The idea of going to another world after a while stems from the fact that users start to get tired of being in the same place all the time. In the sushi restaurant, they are introduced to the cultural aspects of *kaiten zushi* (conveyor belt sushi). The conveyor belt transports various types of sushi around the restaurant. It is also possible to visit the back of the restaurant with the kitchen and the food in preparation, as well as the bathroom.

Inside the restaurant, the host focuses more on Japanese learning topics. In one of the latest events (10 November 2020), for example, Kii took some random family photos from *Google Images* and wrote, with a virtual pen, the Japanese names for father, mother, brothers and sisters, as well as for daughter and son. Participants actively participate, as they are the first to ask, for example, how to say 'daughter' or 'sister' in Japanese and to ask questions in a relaxed

and familiar environment. However, participants are not forced to stay there and listen to the 'lesson'. They are free to move around the restaurant and to explore it or to engage in conversation in Japanese with other speakers. There is no fixed end to the event. After a couple of hours participants usually start to get tired and disconnect. The event generally ends when everyone leaves the area **[fig. 5]**.

6 Informal Learning and Sense of Belonging

Virtual spaces are not necessarily only those mediated by virtual reality technology; even through normal technologies such as computers and monitors it is possible to create virtual environments intended for language learning. For example, according to a study by Koyama, English learners may learn the spatial meaning of English prepositions more effectively if they visualise and manipulate them in a particular virtual space generated by a special 3D software (Koyama et al. 2007). In this case, then, the interaction with the grammatical elements in the virtual 3D world, even through a 2D device such as a monitor, foster the learner's ability to contextualize and memorise.

Moreover, adding to a 3D virtual world the ability to interact with users through avatars and participation in cooperative activities, as in *Second Life*, allows learners to refine their linguistic actions through attention to others. Free interaction between learners may encourage them to share their interests or aspirations through a sense-making process, i.e. a process whereby learners build a narrative about their experiences and whereby their interaction helps them to make sense and form long-term memories. Human experiences are in fact stored in the episodic memory, a category of long-term memory (Anderson 2015). Making learners solve pre-made quests in *Second Life*, for example, proved to be effective for beginning Chinese language learners in the process of sense-making through communication and problem-solving, and thus in forming experiences that foster long-term memorization: "the learners expressed their emotions and developed a bonding relationship on their questing journey by way of expressing humorous and caring statements" (Zheng 2012, 549).

Other advantages in the use of 3D virtual words with learner interaction features is the fact that learners may practice language in a stressless environment. The results of the study conducted by Boellstorff (2008, 155) on SL, for example, suggest that "some non-native speakers of English enjoyed its ubiquity because it allowed them to practice English in an environment where grammatical and typographic errors were the norm". Vickers (2009) also suggests that SL allows learners to improve their language skills, since they can communicate without fear of losing face.

Figure 6 Spontaneous creation of discussion groups in an *Altspace VR* world

Therefore, virtual worlds may foster language learning in different ways (contextualization, memorization), especially if they have certain characteristics that encourage communication among learners (experience creation, sense-making).

This concept applies to *Altspace VR* as well, as it is a virtual 3D world where the communication dynamics between characters and navigation concepts are very close to SL. Moreover, thanks to VR technology *Altspace VR* may offer a greater immersivity that could enhance the experiential process of the learner.

In fact, while in SL, apart from basic movements in three-dimensional space, it is only possible to communicate with the body through predetermined animations such as dances or patterns of hand, head and body animations, in *Altspace VR* it is possible to communicate directly through free body movements, as VR headsets such as *Oculus Quest* and *Rift* allow not only the recognition of body movements in space, but also the movement of the head and hands.

It is therefore possible to use a large number of non-verbal messages that enrich the communication process. In addition, since it is possible to move within the environments both physically and through the movement features that can be activated through trackpads (very useful, especially in the case of small rooms or when you do not want to walk physically), it is easy to move away from a group of users who are communicating and start another communication with other users. The audio in VR worlds is spatialized by default, i.e. as in the real world, it is influenced by the distance and position of the speakers.

Figure 7 Writing kanji in the air

It often happens that some avatars move away from a discussion group to start a new communication not far away, while maintaining a spatial and auditory connection with the original group. In other words, VR technology permits free action, interaction and communication in a virtual space, allowing the users to perceive the sense of the common space they share and of the objects that surround them **[fig. 6]**.

In *Altspace VR*, it is also possible to grab certain objects present in the world and to play with them by moving and tossing them around. Normally, it is possible to interact with objects like fireworks or balls, if present, but it is also possible to create new extensions through certain programming languages. One member of *Free Conversations in Japanese and English* created a system for entering Japanese *kana* and *kanji*[5] characters into the 3D space. By selecting a *kanji*, the shapes appear in the 'air' and can be moved and resized. All shapes are three-dimensional and thus have a sense of solid presence. The display of kanji characters that can be rotated, enlarged, and almost touched, and at the same are shared with other learners in the same space, was for me a new and original experience. Although there are no studies suggesting whether this technology can help Japanese students to learn

5 *Kana* refers to 2 phonetic syllabaries while *kanji* refers to logographic characters originally imported from China used both for the phonetic and semantic meaning. Both *kana* and *kanji* are part of the Japanese writing system.

kanji better and faster, the sensation of the immersion I had by moving the characters around gave me the impression of playing with something physical, a sensation impossible to obtain through other media.

Kii used this function in the November 28, 2020 event. He explained some basic *kanji* like 夏 *natsu* (summer), 村 *mura* (village), 月 *tsuki* (moon) to some newcomers who were attracted by the Japanese writing. He enlarged the characters so that they were clearly visible in the space, and then started to explain their origin and readings. The explanation occurred while other groups in the same space were discussing convenience stores in Japanese, and a third group was talking half in English and half in Japanese about the differences between Chinese and Japanese. No discussion theme had been decided beforehand: group gatherings and the topics of discussion arose spontaneously **[fig. 7]**.

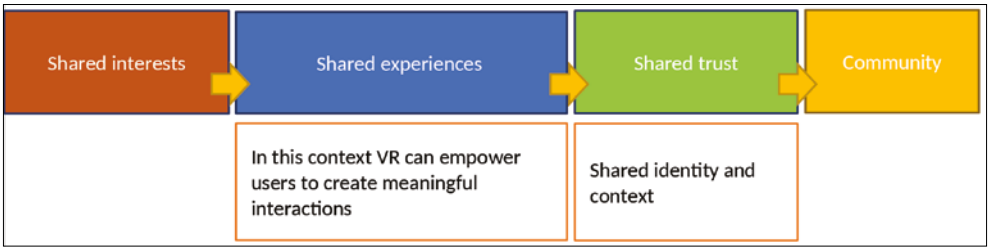
The above examples are meant to indicate how *Altspace VR* is currently being used in spontaneous Japanese communication groups with native and non-native speakers, and to show that the current state of consumer VR has already seen the creation of spontaneous language-learning communities, including for Japanese. Since the meetings are open to everyone, each time a new event takes place, some new first-time users enter, often out of curiosity. However, it was possible to identify six regular attendees for questioning. Respondents ranged in age from 19 to 39. Three of them live in Japan, where they work in the IT field and are married to a Japanese citizen.

Table 1 Results of the survey to six regular attendees to the Free Conversations in Japanese and English group

	Question	Res. Num.	Answer
1	What do you expect from these meetings?	3	Casual talk
		1	To make friends with Japanese native
		2	To learn Japanese
2	How long have you been attending these meetings?	1	About 1 month
		2	About 3 months
		2	About 4 months
		1	About 5 months
3	Do you feel that your level of Japanese has increased as a result of these meetings?	1	Can't say
		1	Not in terms of grammar, but I feel more confident
		2	Yes, a little
		2	Yes, definitively
4	What is the advantage of VR over regular language-learning technologies?	2	It is easier to get acquainted with people
		1	I feel a deeper connection with the participants
		1	The feeling of immersion in the world
		2	I see the world around me and feel like I'm in a place with real people

The data so far collected is not sufficient to confirm that language learning actually takes place through VR (question 3). However, the answers to question 4 are noteworthy because they communicate the idea that through VR-mediated virtual worlds there is a feeling of being more connected to others. Discussion about the potential of VR technology to connect with others and being part of a community has become prevalent in recent years (De la Peña et al. 2010; Jones 2017; Nash 2018). Also, software developers and producers have realised that Communities are the key to the success of a Social VR product. In the *Oculus Connect 6* convention, Tyler Hopf, product designer manager at Facebook, postulated the following four statements: "Virtual Communities are real, Communities are essential to VR, VR has the power to create a sense of place, Design can catalyze communities" (Hopf 2019).

The following diagram summarises Hopf's view of how user communities are created through the use of VR:



Scheme 4 Scheme of community creation through VR based on Hopf's theory

Sharing interests is empowered by the peculiarity of the VR technology thanks to the immersive experience that this technology can provide, regardless of the distance that separates users. Eventually, strong shared experiences result in the development of shared trust. Shared trust means that:

> we have shared identity, we can relate to each other. It means that we have shared context which means that when we are picking up a conversation we are not starting from scratch. It means we have shared social norms so interacting becomes easier. All of a sudden, if I don't know you personally but I know you are in my community, it is much easier to interact and pick up conversation and dive deeper into what we want to talk about. (Hopf 2019)

Facebook Oculus hardware and software also allow "Capture and Share", i.e. capturing the best moments within the community by taking pictures and recording video. It is also possible to engage out-

side of VR, by chatting on *Messages* or posting on Facebook or other social media.

Shared trust is gained from shared experiences through VR, as these experiences are not decontextualized from the environment in which they occur. While traditional text chat, audio, and video only share certain channels (text, audio, and video), the VR experience shares the users' very environment. In other words, this experience allows the sharing of a sense of place. Places have a location (how you get there), a landscape (the characteristics of a space) and a personal investment (you care about the place and you want to contribute to the community).

Every week in *Altspace VR* more than 70 different events are held, each driven by a distinct community.[6] The reason for such a high number of different communities is the perception of having a place in the virtual world you have built together. This is precisely the reason why VR can foster communication and consequentially language exchange as well. Another reason why it is easy to catalyse communities in VR virtual worlds is that virtual places are designed to encourage communication (Design can catalyse communities, Hopf 2019). *Altspace VR*, in fact, provides areas in the world for playing basketball or setting off fireworks and throwing snowballs. Users can grab objects (balls, fireworks etc.) and play with them. These micro games work as icebreakers and encourage users to interact and start a conversation. This is the beginning for the formation of many meaningful relationships, especially when users try to speak in a foreign language. Other important elements are walls and space: if I feel overwhelmed by the conversation, I can move outside the group into a different area or go behind a wall for a while. I can thus modulate the level of my participation in the conversation through the use of these spatial elements based on my state of mind at a specific time.

In *Altspace VR*, every user can also create a world and hold events, and in this way be an active part of an existent community or the creator of a new one. The power to design can catalyse communities. The creation of the world can be made using the same *Altspace* 'create world' functionalities through the editor control panel, where complex worlds with urban and natural elements can be created. Moreover, by accessing the *Altspace VR* home page, it is possible to program one or more events to be held in the personally created world, or to select one of the pre-created events that suit several types of different events. In this way, even an educator with no coding skills can create and manage events in the *Altspace VR* community. Events, if public, are automatically presented in the event menu, but it is also possible to create private events accessible only by invitation.

6 Data gathered by counting the distinct community events in the *AltSpace VR* home page (`altvr.com`).

Altspace VR however is still lacking important features like the perception of the physicality of spaces; the ability to interact with all surrounding objects is also still limited. It is possible to handle and move some objects, but these manipulatable objects are still very few in number. Embedding words in Japanese into objects in the virtual world and associating them with an action that could be performed with that object represents an example of a concrete way to create a kinesthetic-based system for language learning, a method that has been proven effective for increasing learner vocabulary (Machado 2018). Moreover, the user can sometimes walk through people and walls, and in these moments the sense of perceived reality falters and the technology becomes manifest.

Other VR virtual world simulations such as *Rec Room* are more oriented towards kinetic experiences, but some bugs and a less detailed world simulation do not enable an optimal immersion in the virtual world. Facebook is particularly interested in this kind of simulation, so much so that it has developed its own social VR software, called *Horizon*, which is currently in beta and not testable. However, the first public videos released show worlds with high resolution and many opportunities of interacting with surrounding objects.

7 Conclusions

In this article, after outlining the state of current VR technology and its diffusion in the consumer market, I have identified hardware and software through which to verify the existence of VR in Japanese-learning communities. The goal was to choose a relatively inexpensive and easy-to-use hardware, as well as a supported software, while avoiding demos or prototypes. I have chosen a relatively inexpensive stand-alone headset (350 euros) and free VR software (*Altspace VR*) currently supported by Microsoft, and verified that, in addition to events for other languages such as English and Spanish, there is an event related to Japanese learning that is presently actively maintained. I have reported my personal experiences within this Japanese language exchange community, in which I have participated for about six months, and through the analysis of the peculiar qualities of the virtual world, I have speculated on the reasons that this technology might facilitate language learning. *Altspace VR* also has advanced features that allow anyone without computer skills to create dedicated worlds and events, and this should help instructors and educators to easily build new spaces for language exchange and education.

As stated in the present paper's introduction, the VR industry as a whole is growing at a fast pace; however, in Italy there are still little knowledge and little experimentation with it.

According to Retail Transformation 2.0 research conducted in 2019 by the Digital Transformation Institute, "75 out of 100 citizens are familiar with Virtual and Augmented Reality technologies, but only 37% have tried them at least once" (Cotec Fondazione per l'innovazione 2019).

To check the perception of VR of the students of Japanese of the Department of Asian and North African Studies (Ca' Foscari University of Venice), I delivered a survey to 54 students of Japanese, and the results show a worse outcome than the Digital Transformation Institute's research. According to these survey results, 61.1% of respondents have never used a VR visor, and 30.4% are not familiar with the concept of VR at all. Furthermore, of the 61.1 % who do know about VR, only 30% own a headset. None of the respondents has ever used a visor for Japanese learning. Regarding the cost of the technology, 50% of respondents suggest that, in order for it to be affordable, the cost of the viewer should be between 100 and 200 euro, and 30% between 200 and 300 euro. Therefore, it is to be assumed that the cost of current viewers would have to drop further if a greater proportion of users are to purchase it. But most striking is the fact that no student has ever considered using VR for language learning. However, this type of technology and its relative favour among people is developing so fast (remember that stand-alone viewers are only two years old) that the VR landscape will likely undergo more changes by 2022, granting projected growth of about $16 billion by that year (Alsop 2020).

Therefore, through the results of this research, I intend on the one hand to raise awareness among scholars and educators, especially those interested in learning through technologies, about the current state of VR technologies and the potential of social VR worlds as learning environments, and on the other to establish a foundation on which to continue further studies on learning through these technologies. In particular, my future studies will deal with the implementation of virtual environments dedicated to Japanese learning and the realisation of learning sessions in a group of learners, to verify the validity of the instructional design strategies that have been implemented.

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