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ABSTRACT

The online social platforms known as *virtual worlds* present their users various affordances for avatar based co-presence, social interaction and provide tools for collaborative content creation, including objects, textures and animations. The users of these worlds navigate their avatars as personal mediators in 3D virtual space to collaborate and co-design the digital content. These co-designers are also the *residents* of these worlds, as they socialize by building inworld friendships. This article presents a social semiotic analysis of the three-dimensional virtual places and artifacts in the virtual world known as Second Life by the collaborative efforts of its so-called residents. The social semiotic perspective is used to develop a multimodal analytical framework and to analyze the co-creation of meaning potentials by various social actors who use the available semiotic resources as mediational means. The findings show that co-design and co-creation practices do not only depend on various actors and their mediated interactions, but also on a variety of tools, practices and resources that digital media platforms provide. Moreover, the multimodal analysis of these places demonstrates how the audio-visual characteristics of designing in multi-user virtual environments generate experiential, interpersonal and textual meaning potentials.

Keywords: co-design, virtual worlds, multi-user virtual environments, digital media, multimodality, social semiotics

INTRODUCTION

The multi-user online platforms known as virtual worlds (VWs) represent, and in many ways simulate, three-dimensional spatial experiences, and provide their users with resources to personalize their communicative environments. These online platforms

facilitate multimodal communication and real-time interaction in computer-generated representations of three-dimensional space by the use of avatars. The socio-technical characteristics of interaction in these virtual places provide specific affordances for verbal and non-verbal communication (Schroeder, 2011) and the use of avatars as personal mediators (Jensen, 2012). Furthermore, the visitors and creators of these spatial representations interact, socialize and cooperate for various purposes in VWs; thus, socially transforming them into meaningful places through their interactive experiences.

The present article is based on a social semiotic analysis of the collaborative design practices in the virtual world called *Second Life ®* (SL) , produced by San Francisco based IT company Linden Lab. SL is a community-authored VW made of connected virtual places that are designed by its so-called *residents*. The users of SL can navigate and interact with other avatars, communicate via text or voice chat, socialize in groups and collaboratively generate new digital content to co-create the virtual world's geography. The platform also offers relatively complex 3D modeling tools, a specialized programming language and various marketplaces for content creators to share and/or sell their productions, including artifacts, textures and scripts. The design of these user-generated virtual places and artifacts present a rich blend of meaning resources. Therefore, SL exemplifies how a so-called VW is co-constructed as a network of interconnected virtual places by the creative collaborations of its own residents. From a social semiotic perspective, which puts meaning generation into perspective, it is reasonable to ask how these users make sense of these virtual places in which their experiences in three-dimensional space is mediated by avatars and digital interfaces. Where do they find and/or generate the resources for making meaningful places to begin with? Are the existing visual codes applicable in the case of designing this hyper-real environment (Santos, 2009) where neither physics nor perception conforms to the conventional rules of the physical world? In other words, how do the residents of SL use their socio-culturally shaped associations with place-making to generate new meaning potentials in this so-called *world*?

Among several possible ways of analyzing the social construction of meaning potentials in SL, my primary focus will be on the use of VW as a collaborative design environment to build virtual places and artifacts. I consider these user-generated transformations from space to place as a social semiotic construction, and the outcomes of design processes as multimodal sign-systems. In this respect, I will first and foremost categorize virtual worlds as *places* which accommodate both functional and semiotic dimensions of user experience in computer-mediated, multi-user, persistent virtual environments (Bartle, 2004). This involves the *experiential* view of *space/place* relations (i.e. Tuan, 1977;

Stenglin, 2009). In Yi-Fu Tuan's phenomenological perspective on place as an organized world of meaning, experience has a central role which is framed by "the various modes through which a person knows and constructs a reality" (Tuan, 1977, p.8). In this perspective, digital platforms such as SL differentiate from both the places in physical world and the two-dimensional graphical environments of the World Wide Web, as they provide their users with a collaborative platform to experience both synchronous and asynchronous communication in a shared three-dimensional representation of space (Ondrejka, 2005; Damer, 2009). I have used this perspective to study two case-studies of collaborative design and co-production in SL as *social practices* in *situated contexts*. The overall research question guiding the study was: "How do the users of VWs generate meaning and action potentials through the collaborative design of virtual places and artifacts in SL?"

To begin the analysis of virtual place-making, the article aims to position SL as a collaborative design environment. Then the social semiotic perspective is explained to describe how multimodal arrangements in virtual places are systematically documented and analyzed as sign systems. The analysis of the two case-studies aims to discuss the similarities and differences in the co-designers' use of avatars and other mediational means as semiotic resources to organize the collaborative design practices and generate multimodal meaning potentials.

Virtual worlds as collaborative design environments

In addition to their experiential characteristics as places, community-authored VWs can also be considered collaborative design tools. As mentioned above, these platforms provide their users with affordances to collaborate in real-time to co-create 3D models, textures and animations by using primitive modeling tools or importing creations from other software.

Previous research on design and meaning-making in VWs have studied relevant issues such as the construction of *sense of place* in digitally mediated communication (Maher & Simoff, 2000), the relations between the design of VWs and architectural space (Bridges & Charitos, 1997), the underlying physical rules and their effects on user experience (Santos, 2009), or the effects of real-world spatial metaphors on the construction of the virtual environments (i.e. Book, 2004; Prasolova-Førland, 2008; Taylor, 2009). Leone (2011) focuses on the role of avatars as tools for mediated embodiment and spatial experience in his semiotic analysis of religious spaces in SL. Taylor (2009) outlines the dichotomy between the level of freedom to create without being restricted by physical constraints and the importance of visual metaphors to guide the users and make them

comfortable by providing "an identifiable foundation from which to build experiences, relationships and places" (Taylor, 2009, p.4). Similarly, Jensen (2012) uses the term *metaphoricity* to describe the social relations between actors and their avatars in meaningful places as experienced in world-making.

The field of VW research has also shown that presence in a 3D *virtual design studio* affords not only real-time object-based collaboration, but also other – synchronous or asynchronous – practices by co-designers who may be – and often are – globally distributed. Design and innovation scholars have studied various aspects of VWs to explore their affordances and creative potentials for 'thinking together apart' in distributed design teams (Larsson, 2003), the methods of verbal and non-verbal design communication (Wadley & Ducheneaut, 2009) and avatar based innovation (Kohler et al., 2009). From a professional design perspective, the collaborative environments in VWs have also been defined as *virtual* or *distributed design* studios (Maher & Simoff, 2000; Reffat et al., 2008; Weiley & Pisan, 2008). The user-generated VWs such as SL afford a shared virtual environment for synchronous design collaboration where "designers are physically remote but virtually co-located as avatars within their design representation in the form of a 3D model" (Gu et al., 2011, p.270). Keating and Sunakawa (2010) analyzes how *the new electronic spaces for human collaborative activity* influence communicative practices and generate *new habits of spatial reasoning*, while bearing shared elements with social life in *real space* and *technologically mediated space*. The *sense of presence*, or *psychological immersion*, while interacting with VWs make designers feel as being *in-the-world*, rather than being external observers of a 3D model, as in using *CAD* tools (Koutsabasis et al., 2012). The social affordances provided by the VW's places for mediated co-presence provide a 'collaborative co-design environment' (Piller et al., 2005) where the content generators can seek help from virtual communities and develop design ideas together (Phillips & Rodden, 2001). In fact, the two case studies that I have analyzed depend (either fully or partially) on such *inworld* partnerships.

These interrelated research perspectives on the study of communication and design in VWs emphasize the construction of user experience through the design of meaningful virtual environments; or, in other words, transforming the virtual space into 'inhabited place' (Weiley & Pisan, 2008). A multimodal semiotic perspective can contribute to the research field as it specifically focuses on the socially available resources for making these places, and the ways in which the co-designers make sense of their essential characteristics as multimodal sign systems, such as the orchestration of simple geometric shapes to generate meaningful artifacts or the use of avatars as social actors.

Social semiotics and the multimodal approach to virtual place-making

My meaning-oriented approach to the design of virtual places combines multimodal social semiotics with mediated discourse analysis to uncover both semiotic potentials in 3D organization of visual elements and the co-design practices of various social actors by using digital tools as mediational means. The analytical strength of social semiotics results from its *rhetorical approach* to the social dimension of sign-making which foregrounds the systemic choices made by the sign-makers. Among various perspectives developed upon Michael A.K. Halliday's (1978, 2007) socio-linguistic model of social semiotics, the *multimodal approach* is central to the methodology presented here, because it highlights the dynamic interplay of various modes in design of virtual places – including, but not limited to image, text, sound and 3D objects. The theories of multimodal discourse in visual communication by Gunther Kress and Theo van Leeuwen (i.e. Kress and & Leeuwen, 2001; van Leeuwen, 2005; Kress, 2010) and mediated discourse analysis (MDA) approach to study social actions by Ron and Suzie W. Scollon (i.e. Scollon, 2001; Scollon & Scollon, 2003, 2004; Lemke, 2005) have shape this methodological orientation.

Spatial practices in these worlds are facilitated by digital technologies and end-user interfaces. Therefore, construction of a virtual place depends on both the visual organization of spatial elements and the affordances of available digital means for mediated co-presence. In this perspective, the affordances of digital means for mediation, such as the content generation tools, refer to their uses as semiotic resources. As a result, understanding the ways in which meaning potentials are generated in virtual places requires the consideration of more than just the analysis of visual components in three-dimensional space (Stenglin, 2009). It requires the analysis of the virtual place as a system of multimodal meaning resources or - in other words - a purposeful orchestration of various modalities. Furthermore, the multimodal perspective to meaning-making can explain the ways in which the residents of SL use digital content creation tools to generate three dimensional virtual places as communicative environments.

Modes represent 'cultural technologies' for the transcription and inscription of semiotic texts which have different affordances and limitations depending on the context of communication. For Gunther Kress, a *mode* is "a socially shaped and culturally given semiotic resource for making meaning" (Kress, 2010, p.80). The designers of VWs often need to assemble various images, texts, music, as well as interactive and animated 3D objects in the making of mediated places for meaningful avatar experiences. Therefore, the study of place-making in which mediated social interactions take place is essentially

multimodal. In this perspective, virtual places and artifacts are meaningful *sign systems* that are constructed as multimodal orchestrations by the available *semiotic resources and mediational means*.

The aim of my social semiotic approach is to uncover the ways in which the platform's affordances for collaborative content generation shape the multimodal orchestration of the designed places, particularly in terms of their *experiential*, *interpersonal* and *textual meta-functions*. In order to conceptualize the meaning potentials in three-dimensional virtual places, I employ Michael O'Toole's systemic functional model of architecture (O'Toole, 1994, 2004). In a social semiotic framework of architectural design, these three distinct but interrelated meta-functions refer to the meaning potentials in a sign system. The three meta-functions correspond to the domains of meaning construction in systemic functional analysis and they ought to be conceptualized in reference to the type of semiotic object under analysis. Each identifiable mode in a multimodal sign system is required to fulfill the three semiotic meta-functions in order to contribute to the overall meaning of the sign complex. My main purpose with this analytical framework is to construct what O'Toole (2004) calls a "hypertext" as a tool for the analysis of the empirical data, which is "a non-sequential tool for exploring the hypertext of the building itself" (O'Toole 2004, p.26).

In terms of the *experiential* meta-function, I aim to explore how movement, functionality and presence in virtual places are represented. This meta-function primarily emphasizes the organization of structural elements, such as the objects in a scene. The *Interpersonal* meta-function includes the categories on social relations and their relations with design features, such as representation of co-presence through style and visual language. Within this meta-function, it is important to consider both the individual relationships with the semiotic objects, and the social practices which are constructed through interacting with them. The *Textual* meta-function is concerned with the "systemic choices that relate a building to its context as well as those that constitute it as a coherent text" (O'Toole, 1994, p.79). This third meta-function also focuses on how the place is organized through divisions, partitions and elevations, and how various spaces are connected to each other. The textual meaning potentials provide semiotic patterns of information so that the place-as-text 'hangs together' (Stenglin, 2009).

I include the social actors, their practices, and their interpretations of the context of these practices as analytical objects, particularly drawing on Ron and Suzie Scollon's concept of *nexus of practices* (Scollon, 2001; Scollon & Scollon, 2004). Scollon and Scollon (2004) define 'a nexus of practice' as 'the point at which historical trajectories of people, places, discourses, ideas, and objects come together' in order to facilitate social

action. I conceptualize the collaborative place-making in SL as socio-semiotic process with relation to its social context within the *nexus of practice*. Drawing on Scollon and Scollon's (2003) formulation of place semiotics, I propose four analytical themes for analyzing the *co-design of meaningful virtual places* in this study: (1) the use of avatars as personal mediators and social actors, (2) affordances and constraints of digital tools (mediational means) as semiotic resources, (3) the multimodal characteristics of computer-mediated collaborative design practices, and (4) orchestration of modes to generate meaning and action potentials in virtual places.

METHODOLOGICAL FRAMEWORK

Multimodal analysis essentially requires a meticulous documentation, deconstruction and interpretation of semiotic modes within different levels of a three-dimensional space, such as buildings, floors, rooms and interior elements. It is essentially a textual analysis of the three-dimensional environment as semiotic construct. On the other hand, I choose to extend the conventional semiotic tendency to rely too much on text as the analytical unit, and combined the textual analysis with ethnographic observations and interviews with designers to avoid a singular (biased) reading of meaning potentials (Poynton, 1993). The notion of *nexus of practices* provides a helpful methodological perspective at this point, as it emphasizes the social practices and the networks by which meaning potentials are produced. Nexus analysis requires active participation and collaboration of the researcher(s) and research subjects, and participants are not considered as 'objects to be studied' but 'co-researchers'. Therefore, I combined semiotic analysis with a participant ethnographic approach and took part in several design projects, spent time in sandboxes to meet designers, and taught courses and workshops on how to design in VWs.

Research design and Second Life as field of study

I conducted two case studies, in which I observed, worked together and interviewed designers with varying levels of expertise and experience in SL. SL was selected as the field for observation and data production for two reasons: (1) affordances of the user-interface for content creation and modification, (2) the participatory socio-technical infrastructure that underpins the proliferation of significant design cultures (Julier, 2008). I aimed to take not only commonalities but also differences in meaning potentials between and within cases into account. The collaborative projects in each case of study show similarities in terms of environments and tools for content-generation, but also differences in terms of the contexts and products of designing. These two case studies are:

- The case of ***Metrotopia*****: The City of Superheroes and Heroines** includes participant observation of the multidisciplinary design process of a virtual laboratory (Figure 1) and interviews with its co-designers. The Metrotopia project was initiated by a group of communication and design researchers at Roskilde University for various research and teaching activities in VWs, and it was a product of collaboration between researchers and professional designers in SL, which makes the design process a valuable resource to explore how co-designers with different interests, capabilities and resources work together in order to build an interactive representation of a virtual city.

- The second case, ***Pop Art Lab*** **(PAL)**, includes observations and in-depth interviews with the co-designers of a streaming music sim (a virtual island) funded by a Danish national cross-library organization (Figure 2). The case of PAL differs from Metrotopia in that the project entirely depends on the personal and semi-professional participations of SL users in different geographical locations, some of whom know each other only through their inworld identities in SL. PAL's functional and visual characteristics also differ from those of Metrotopia, as the virtual place reflects the hyper-real aesthetics of the virtual realm (according to the comments of its creators).

The use of multiple methods for data production has provided an overall analytical mapping of how designers make sense of SL's affordances and enabled me to observe instances of idea generation, problem-solving and knowledge sharing. With this multiple case-study approach, I tried to understand how different designers make sense of their processes with relation to their general virtual world experiences, skills and intentions. In-depth interviews have served this purpose. Interviews with expert designers and novice users offered the chance to initiate discussions on past experiences and reflections. Follow-up interviews and long-term partnerships with some of the participants have allowed me to access cases during various 'moments' of collaboration. Furthermore, participating in collaborative design and learning activities made it possible to gain hands-on design experience. Participant observation also enabled me to examine the changing roles of various actors during several in world and offline stages of the process.

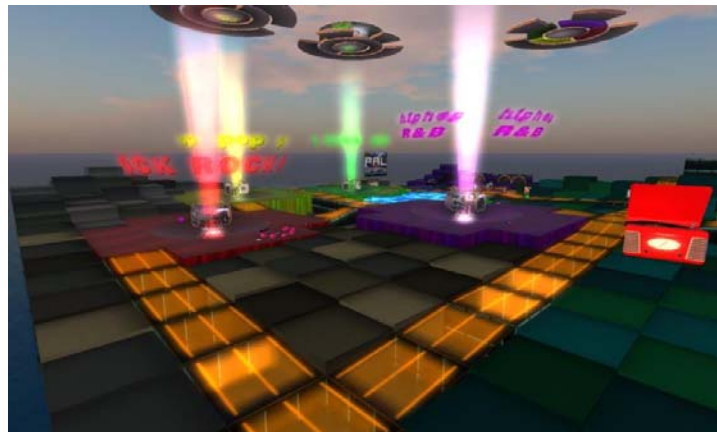Figure 1. View from Metrotopia: The City of Superheroes and Heroines

Figure 2. View from PAL (ground-level listening areas and upper pods with colorful paths)

Data resources included detailed still images and video captures of virtual places and avatars, researcher's notes from collaborative sessions, and written and/or sound recordings from designer interviews. The ephemeral and ever-changing nature of digital content was among the major methodological challenges for data production and long-term analysis. Therefore, this participatory approach was also helpful to capture the fluctuating socio-technical dynamics of user-generated content in virtual environments.

ANALYZING THE CO-DESIGN OF MEANINGFUL PLACES IN VIRTUAL WORLDS

1. The use of avatars as personal mediators and social actors

Avatar-based collaboration and communication in computer-mediated environments present different characteristics in two different cases, both in terms of representation

and social interaction. One key difference between the design teams in the two case studies is about the ways in which personal acquaintance plays different roles when co-designers meet physically or only in the virtual world. In Metrotopia's design, the team had the chance to meet regularly in both worlds. The team used their avatars mainly to signify their presence in the VW and collaborate with others in a 3D environment. On the other hand, PAL's design team met each other mostly via their inworld representations. Therefore, their identities as avatars played a more important role in their social relations and inworld friendships. The whole PAL team has never met in person, other than the two Danish members who met a few times in Denmark. According to Shaggy - a French engineer -, it was often hard to get the whole team together in a certain (inworld) location and this situation shaped the design process profoundly because "people will come here when they want to, and if they're not here then they're just not here." Shaggy adds: "this is probably because SL is not a priority for no one here. You go to SL just to have fun. It's not a job. So you do it when you have time, and you meet people when they are online".

In both cases, design tasks were shared and the places were assembled into their final forms as a collaborative effort through evaluations and modification by the team members. Both Metrotopia and PAL design teams had specific clients and chief designers. In Metrotopia's design, the roles and responsibilities of the participants, as well as the provisional schedules for various design tasks, were agreed upon and documented by a contract. Caitlyn – an American researcher working in Denmark - explains why she –as the client and primary user of Metrotopia – never found the chance and will to learn how to use the building tools (the design interface) and got frustrated by its complexity. She mentions that she "had to stumble (her) way" through trial-and-error, while "figuring out things as (she) went along". For Caitlyn, the problem is complexity of the interface and the facts that it wants her "to know numbers and to be able to do minute controls". Therefore, content generation was left to Aspen who is a professional SL builder.

However, in PAL's design team, being a relevant RL professional was not the major determinant in team configuration. The PAL team actually had a team leader, but this was the result of a more organic process, which developed throughout years of friendship and collaboration in SL. The 4-year-long evolution of the PAL design team gradually led the owner to organize the team, and assign AmyLee – a deaf student from England – as the 'chief of design', while the team tried to keep its amateur spirit. In time, decision-making in PAL's co-production became more systematized, and roles in the team became more hierarchical. For Xavier, who is a professional Danish architect, this leads to a self-inquiry about his social identity as a builder in SL. He reflects on his condition in this new

social context as "[m]aybe I'm a professional, but my idea doesn't rule over somebody else's, because I might be professional in RL, but in SL everybody's equal." Xavier also mentions the differences between designing real-world buildings and virtual places, and how he had to "forget what [he] learned as an architect" because "it becomes a limitation" when one wants to "invent a totally new approach" for designing virtual places. Therefore, the design team of PAL not necessarily formed by professional acquaintances; neither does SL limit participation to only professional designers. In fact, Xavier mentions "if you charged him [Curiza, the owner] with the usual wage by the hour of a creator, this sim would be extremely expensive".

Furthermore, as mentioned above, social roles can change in time and from situation to situation. Participation to the design process is shaped by social relations, internal power dynamics and decision-making patterns of design teams show variations in relation to the participants' conditions of and interests in engaging. For instance, AmyLee claims that "SL shows a lot of examples where amateurs are more creative than established professionals" and this is why she wishes "things would stay like this". For Shaggy, "if the creation process becomes technically more difficult, it would be more difficult for newcomers to build." Finally, he undecidedly adds: "If I was coming to SL now, maybe I wouldn't start building because it would all appear so complex".

2. Affordances and constraints of digital tools (mediational means) as semiotic resources

Multimodal analysis of SL as a frame of reference brings forth the two interrelated dimensions of designing virtual worlds: (1) affordances and constraints of the user interface and content generation tools, and (2) the three-dimensional social world of SL which presents affordances for co-presence by avatars, and co-production of 3D objects.

Two significant visual semiotic functions of avatar-mediated presence were observed within collaborative design: (1) providing users with a visual representation of their interests in participating in the world (interpersonal function), and (2) providing visual information about the sizes, scales, positions and actions of the actors in relation to each other and the virtual space (experiential function). In the PAL case, Shaggy claims what differentiates SL from other graphical interfaces for digital content creation is being able to "feel like you are inside the universe" and being able to represent visual presence as the way one wishes. He compares his collaborative experience in SL to Microsoft Office, and claims that the real difference is "that you really live inside the thing you're creating." For Xavier (PAL), importance of avatars in design process results from their roles as visual referents: avatars "make the scale", thus "you can actually walk around your building". In terms of the experiential perspective, these can refer to both the

spaciousness of SL, as it constructs a relative field for interaction, and the place-ness of SL, as it develops a sense of place through use and appropriation.

Figure 3. Primitive geometries (prims) in Second Life

The prim system (Figure 3), which provides the basic building blocks for producing virtual objects in SL, represents a specific set of tools and interfaces such as the object-texture-script model. The co-designers use primitive geometric shapes (i.e. cubes, sphere, cylinders) and other content generation tools for their communicative purposes, often transforming the intended functionalities into new meaning and action potentials. In the Metrotopia case, the 'prim-limit' was an effective limitation; and for Aspen "a good SL builder can create an object with very few prims, and that includes picking the right prim type". The analysis also shows that the rhetorical content is constructed through the interactions between a variety of social actors, including vendors, outsourced freelance designers, and the Linden Lab Corporation as the developer of the platform who controls, but cannot always definitively limit, which affordances and constraints will apply to content generators. The co-designers often use of various other tools and resources in cases where SL could not accommodate their choices or in cases where they have prior experience and better skills with another content generation tool (i.e. graphic or modeling software). To support their ongoing collaborations, the co-designers collect virtual objects, ask for help or outsource their design tasks. The ways in which semiotic and material resources are collected and used (or not used) often became a design strategy that affects the contents, forms and methods of designing. Although PAL includes some elements that are appropriated, the co-designers describe the overall design as one-of-a-kind. AmyLee also mentions how she "tweak[s] some open source scripts" although she is not a programmer herself. Tweaking, or appropriating and re-using, is also a method she uses for applying textures that are found online, as "usually you need to rework them. at least, resize and clean". Therefore, organizations of the design processes are shaped by not only the social and individual profiles of the design teams, but also the socio-technical environment in which collaborative practices unfold.

3. The multimodal characteristics of computer-mediated collaborative design practices

The changes in the collaborative working methods and the decision-making process also have certain consequences about the final visual language of the design. The discourses on design and representation are negotiated, evolved and often transformed to new

potentials through collaborative action. Rhetorical intentions of the social actors diverge, and formations of design teams are often in flux. The design methods show variations depending on the structure of teams and preferences of each individual co-designer. Similarities also exist in terms of collaborative evaluation and modification of designs, and the ways in which the co-designers conceptualize the needs for avatar interaction. In both cases, several participants met in both physical and virtual places for different purposes during the process. In Metrotopia, the physical meetings were used for concept generation and project development (Figure 4). As mentioned above, the entire PAL team has never met in person, and all of their collective decision-making processes are organized in SL (i.e. Figure 5).

Figure 4. Metrotopia design team members in an inworld design meeting

Figure 5. Interviewing with Shaggy Homewood at PAL's Electronica Zone

In the Metrotopia case, the design decisions were evaluated and agreed upon by the co-designers according to an official contract which gave Caitlyn the last word. The needs and interest of the research team had priority. The roles of each participant were decided in a more structured way, and within a strict time-schedule, because the research-

oriented needs formed the first design principles, and formed a relatively strict framework for co-designers to formulate rhetorical strategies. Not only the process and time-schedule but also the form and content of various interaction spaces were evaluated in relation to the researchers' requirements. However, the collaborative design of PAL emerged as a volunteer-based project and this provided each co-designer with more flexibility and decision-making power. The design team was formed through inworld relations and the project was initiated by personal interests. Therefore, PAL's time schedule and division of tasks within the project were more flexible. This allowed each co-designer to generate ideas, test and evaluate these with other co-designers, and build their designs in various locations within PAL. Each member of the team was given more freedom to create their own styles. The two Danish co-designers of PAL, Xavier and Curiza, describe the unorganized design processes –where everybody is able to build and change others' builds – as "*anarchistic*" experiences, which had to be changed due to growing problems in their group. This was especially a problem during the earlier stages of PAL's design, when a member of the original team was expelled because of these personal conflicts between the co-designers. According to Curiza, the girl was "*kicked out*" because of a stylistic conflict based on "*replicating RL architecture*". For AmyLee (England) , who describes the overall design of PAL as "*SL-like*", the distinction between conceptions of these two dimensions is clear, and effective in her design decisions: for her "*RL is RL, definitely (…) SL is just additional fun*", therefore her interest in SL is directed towards doing "*what (she) cannot do in RL.*"

Avatars can meet and work synchronously in shared places in SL, or work individually in separate locations, share objects or leave them around for others to see, and work asynchronously on different parts of the design. Similar to Aspen from Metrotopia, Shaggy also refers to "the ability to let people create live" as a main characteristic and advantage of SL. For Shaggy, real-time modification and shared virtual places are helpful in their collaborative practices: "That is a really great idea because when you are with someone and you say 'ok, look at that cube. Don't you think it's a bit too high?', then you just lower it a little and instantly say 'ok, it's better like this' or 'no, it's not better like this'". On the other hand, Shaggy also describes the collaborative design process in SL as a "sequential process", in which they "haven't been really working together as you could understand it in real world, like being all 3 of us [Shaggy, AmyLee and Xavier] around a table." Similarly, AmyLee mentions the notion of real-time building affordances, but immediately adds that it is not the norm here. For her, collaboration in "large-scale constructions" is "more a matter of sharing the tasks (this or that part of the sim, prims for one and texture for the other, etc.)" According to AmyLee, the co-designers build at their own paces and places, as they "don't necessarily have the same hours". She says her preference of working alone also has personal reasons; as she doesn't like people see

her building, especially when she needs to "test things, stop it, think about it, come back to it, etc." Shaggy explains that they "built another place just to be quiet and not be bothered by visitors that are lost in PAL", so that they could work "discreetly, with nobody around." Design, testing and evaluation of initial design concepts were done in this other sim. In this way, it was also possible to keep the actual PAL sim running, while they worked on the new design without intrusion.

For Xavier, an important advantage of SL is the availability of immediate feedback. For Xavier, collaborative design in SL requires a certain "kind of a dialogue" because "it's not like RL, you have to sketch it all first and then you build it. In SL, you can build, then discuss and then change it." According to AmyLee, "when you work with someone, you can show how an idea looks like, not by telling or describing, but by building" because "that is the base in SL, it is so easy to build, test, destroy and try again." Therefore trial-and-error is an important part of the design process. In both cases, the emergent meaning potentials of design features surface as dominant visual elements, upon which the social functions of other modes are emphasized. An example of this is the overall visual concept in PAL's design, which emphasizes the 'digital/pixel landscape' idea by the spatial organization of prims with various colors (Figures 2 and 5). This is also how the cubic landscape was designed. As Shaggy already had the overall idea of "cubes with different heights like a digital landscape", he and AmyLee had to improvise and imagine "what it would feel like being there". The experienced content creators in the design teams could often have insights about how people navigate, interact and socialize in a virtual place in SL, and the unpredictability of the SL users was mentioned as a serious motivation to include as many activities as possible in the place.

4. The orchestration of modes to generate meaning and action potentials in virtual places

By re-formulating Michael O'Toole's multimodal analytical framework for architecture to virtual places, my analysis of SL includes four consecutive scales of structural design: (1) sim or virtual place as a whole, (2) divisions and elevations (i.e. floors, regions), (3) interaction spaces (i.e. rooms, interiors and public spaces), and (4) artifacts or information surfaces (elements).

The design of various places and artifacts in SL emphasize the multimodal logic; in that, the co-designers integrate 3D models with textures, animations and sounds to produce semiotic arrangements by available modes. In other words, virtual places and artifacts communicate not only through their visual qualities but also by their organizations and interactive elements in three-dimensional space. The places can also be analyzed in

terms of their functional associations, which bring forth the experiential meta-function. The design of these functional areas often refers to the social affordances and determines places to meet and socialize. Multimodal compositions of meeting areas and the artifacts that constitute these places usually refer to their meaning potentials as experiential and interpersonal agents. The analysis of particular divisions and elevations of the place foregrounds the use of designated areas for facilitating social presence and avatar interaction. In such places, certain design elements are used to signify potential social activities.

Metrotopia's layout illustrates the division of space into a group of places that emphasize particular mediated actions, such as avatar customization, fighting or content-generation. Caitlyn, whose needs and specifications primarily led the design process, mentions that one of the principal ideas was to replicate an urban city landscape that is commonplace to the specified genre. Similarly, Aspen explains why particular areas were designed with conventional urban aesthetics.

> Caitlyn: [I]t is just a *big city* with skyscrapers and a residential area, and a warehouse and a museum and a park. It's got all of your *basic urban structures*. (…) So that reflects all of the various, well not all but some of the various genre conventions for superheroes, such as the costume. The whole island then is constructed to reflect superhero genre conventions. *It is a metropolitan area, hence Metrotopia.*

> Aspen: We decided to use an old warehouse to *make it look scary*. This is also very close to the harbor, so this is *where all the bad guys hang out*. So you don't see any shining skyscrapers around here, this is *a different part of town*.

PAL's layout also shows similarities in terms of the division of space and use of semiotic elements to signify particular types of activities, though the functions of designated meeting areas are different (i.e. dancing, live music and parties, beaches and intimate rooms). The design elements, such as seating units or private pods, are used as multimodal signifiers to represent potential meaning and action potentials, and aim to reinforce the overall rhetorical purpose. The use and organization of design elements produce representations of affordances and constraints for practical functionalities, thus support the experiential meta-functions about practicality and navigation. However, the design of the virtual place in the PAL case is significantly different in terms of its visual style. PAL is designed to emphasize the distinguishing features and affordances of virtual places, and freedom from certain real-worlds constraints, such as gravity and limitations of bodily presence. The co-designer interviews showed that the dominant concern in the

design of PAL was to be 'not Real-Life (RL) like'. As the chief co-designers explain, the emphasis on being unrestricted by so-called real-world constraints was a definitive factor in shaping of design style:

> Curiza: PAL is a world, it's a fantasy land (…) It's a fantasy space where you should forget everything and just focus on listening to music, and relax (…) I would define it as a *news channel* to come and hear new music. You could call it a *music library*.

> AmyLee: [T]here is really nothing that *looks like RL* here, we dont really need to comply with the *rules of building in RL* … so we made profit of it. (…) It was very important, right from the beginning, not to offer a RL replica. We really wanted to offer people a unique experience, something they can't have anywhere else. (…) I know some people are almost upset when they don't recognize the place as something they could see in their everyday life. But, anyway, this choice was natural, we all (Curiza, Shaggy, Xavier, me) wanted something totally SL.

> Shaggy: [J]ust making something that is totally different and just the opposite of what you could see in the real world. But you don't have to be too much surprising. I mean, people must understand quickly where they are and what this place is about. So there's a balance to be found, at some point. (…) You'll have some people who will definitely need SL to be SL and some other people who will need to find in SL what they know in RL. You have all these kinds of people. So, you've got to please everyone. (…) So I had to think about *what music is*, and how to reflect music visually because SL is mostly about visuals. And here the idea was to make a good visual about music. And to me *music is rhythm*. And so, lining cubes was a good idea to *make a visual rhythm*. (…)–Basically the idea (was) an array of cubes with different heights like a digital landscape. (…) When I had the sim filled with these cubes, I've done hills and valleys.

As the analysis has shown, some designers were more interested in experimenting with the affordances and test the boundaries of limitations. SL may present particularly convenient affordances to resist norms and conventions in the so-called RL for design, and expand the boundaries of their imaginations. Several factors –including lack of gravity and other physical constraints on bodies and the prim system that allows complex forms to be comprised of geometric units – contribute to the visual representation of the notion of *virtuality*. On the other hand, in both Metrotopia and PAL cases, co-designers also refer to the use of particular *signs of realism* mainly to accommodate the experiential and interpersonal meta-functions, such as the urban landscape of Metrotopia with streets and high-rise buildings (Figure 1) or the use of '*natural*' colors on cubes that

form PAL's ground plane (Figures 2-5). Furthermore, these interpersonal relations, such as Shaggy's metaphorization of 'hills and valleys', lead Xavier to imagine it as a real-world landscape. In Curiza's comment, semiotic effects brought by the appropriation of multimodal signifiers (including the choice of colors and the landscape) are described as metaphors for the combination of nature and future.

> Xavier: The design is very abstract. It's like a landscape but it's made out of boxes. So it's like a "pixel-landscape", I think we can call it that. And that was the main idea.

> Curiza: if you look actually in the sim design right now, (…) you will see that AmyLee have actually put in a lot of those nature textures. You have brown (…) You have green-like plants and stuff. You have blue like the water. If you look at it, all the colors on all these cubes are actually based on nature colors. So it was to make a balance between the superficial, the futuristic stuff and then try to put nature into these environments.

Textual semiotic choices on the selection and organization of various modes as multimodal arrangements also lead to construction of both the experiential (i.e., direction, functionality) and the interpersonal (i.e. genre, message) features in design. These multimodal design elements also support the experiential meta-function, as they provide the visitor with not only a visual concept but also a navigation path. *Navigability* (as experiential meta-function) is as important as the visual attractiveness and information richness (as interpersonal meta-functions) in construction of the semiotic experience. In the two observed cases, various strategies were used by the co-designers to afford particular types of movement within the place, while constraining others. One example of these types of arrangements is the division of streets and blocks of buildings in Metrotopia. The design of Metrotopia aims to guide the visiting avatars, by allowing the avatars to move, walk or fly, through determined passages, in addition to allowing them to teleport from one location to another. The movements of avatars between places and the entry points to the virtual environments are important considerations, as they determine the flow of experience. The entry point (or the 'landing spot') designates how the first-time visitors will be introduced to a place and how potential movement paths are signified. The landing spot functions as the location where initial discourses are formed about what the place is about, and what type of experience visitors should be expecting if they choose to continue exploring.

> Aspen: The landing spot, where people arrive on this sim, is a backyard which doesn't look very friendly. We have put up some signs asking people if they have

the guts to become a real superhero. And then, they have to follow this dark path, and then they arrive here at the costume bazaar in the open.

Depending on the characteristics of the virtual environment (i.e. open/closed spaces, directing or limiting features), the avatars can walk, fly or teleport from one place to another. Although their users may choose to fly or teleport away and not follow the 'dark path' to the Costume Bazaar, the co-designers chose to limit the affordances by providing a direction to follow. Thus the organization of spatial relations between these design elements fulfills a semiotic function in construction of the meaning potentials about visual language and style, at the same time visualizing possible routes for movement. PAL's design also shows similar considerations about movement and navigation:

> AmyLee: So this makes the thinking different. In SL, you can fly, you don't hurt yourself if you fall, you teleport to places, etc. So this is a wide open space (I love flying through it!) There is a long pathway driving throughout the sim so people who like to walk can discover the sim at a slow pace. There is also a strong teleporter network, for people who want to go right to their point. We offer everything SL can offer to explore a place, in fact.

On the other hand, division of space in PAL demonstrates an important experiential potential. As visitors move their avatars within the sim and enter different zones, the music they hear through SL changes.

> AmyLee: in fact, each area contains one stream. you can define areas ("parcels") on the sim and give each a different stream . a parcel will have a style of music and will be the same whatever the altitude. [this is] why the rock pod is at the vertical of the rock area on lower deck, for example. There's a link between where you are and the music you get: that's how SL works

The findings indicate that the experiential and interpersonal meaning potentials are also important features in three-dimensional scaling of the designed places for avatar interaction, which determines the sizes and spatial relations. One particular factor behind the organizational logic was the presence of avatars, and the need to present visually accessible signifiers for the practical use functions to communicate the affordances and/or constraints. Therefore, co-designers' interpretations of avatar-based presence had a central role in their constructions of virtual places and artifacts. In other words, the co-designers of places shaped the places that they design in certain ways that their imagined users, or visitors, would experience.

Curiza: I would say, I don't know the figures, but maybe 60 to 70 % of all people into SL, they come to a sim to *socialize*. So, *you can put up as much beautiful buildings*, as lots bots and explanation areas about how/what to do in this sim. But, they look at the map and they see two people there, and then they disappear. And I really think that's up to 50 maybe 70 % of all my visitors in my sim. They typically TP (teleport) away because they find out that there's *no people.*

The multimodal configuration of various design elements, such as logos, posters, 3D objects and other verbal/non-verbal signifiers, operates on the interpersonal semiotic function by setting the mood and style. Structural elements such as 3D shapes, textures and scripts afford and/or constrain particular actions for the visitors. Therefore, it is possible to observe how multimodality was employed as a design strategy in construction of virtual places and artifacts, and multimodal elements are placed within designs in meaningful combinations in order to signify particular messages, guide visitors to specific directions, or emphasize social activities.

CONCLUSION

This article presented a multimodal social semiotic analysis of the places and artifacts in SL to explore the co-creation of meaning potentials by the VW's so-called residents. One primary purpose was to explore the social practices of co-design within SL, which is supported by various other interoperable digital platforms, as collaborative efforts of meaning-making. Consequently, I aimed to analyze how a variety of users interpret and use the available resources to communicate, collaborate and co-produce the platform's three-dimensional content. Two qualitative case studies, including observations and interviews with co-designers of projects in SL, have served this purpose. The analysis of three empirical cases showed that multimodal semiotic analysis of virtual places can uncover the modes of design-based communication in multi-user virtual environments.

The analysis of data from the two cases points to the relations between semiotic meta-functions and design features: *Experiential* meta-functions correspond to the features of movement and functionality, *interpersonal* meta-functions correspond to the features of visual language and representation of social presence, and the *textual* meta-functions correspond to the features of structure, organization and multimodal orchestration. Furthermore, the findings have shown that co- design and co-creation practices do not only depend on the social actors and their interactions, but also on a variety of tools, practices and resources that digital media platforms provide. The three-dimensional interaction in SL introduces new tools and multimodal resources to content creators. Moreover, these tools and resources have *transmedia* characteristics; as the co-designers

of virtual places traverse among various both online and offline platforms the visual characteristics of their designs reflect their choices and capabilities.

The implications of analyzing virtual worlds as places foreground the relevance of a social semiotic approach and a place-oriented perspective within VW research. Combining the analysis of multimodal place-making with the *nexus analysis* framework supports the design-oriented approach to semiotics by focusing on the socio-technical aspects of various potential co-design contexts. This has implications for both platform and content developers and designers of virtual places. Forthcoming user-driven VW platforms could benefit from such co-creation approaches to motivate their users to design innovative places and artifacts. Furthermore, professional or amateur designers and design educators could think in terms of virtual places and artifacts to collaborate and co-design new concepts in a *virtual studio* environment.

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