Qiezli – A "Self-Absorbed" Creative Virtual Agent in Second Life

J.O. Turner, P. Pasquier, and M. Nixon

Simon Fraser University, Canada

Abstract

This paper describes the implementation and evaluation of an abstract, believable virtual agent (SL-bot) known as "Qiezli" that functions as an automated "performance artist" in Second Life. Seemingly pre-occupied with its own daydreaming imagination, Qiezli is visually inspired by Josephine Anstey's narrative-embedded zoomorphic agent, "*The Thing Growing" (2000)*. Qiezli uses aesthetic abstraction, Non-Verbal Communication (NVC) and combinatorial creativity to interact with participants beyond the confines of a goal-oriented narrative. This research catalyzes methods for simulating "alien" ontologies and stereotypically Western (i.e. Enlightenment and Romantic-era) "artistic" behaviors in user-generated virtual worlds.

Keywords: Second Life, Virtual Agent, bot, NPC, performance art, metacreation, Artificial Intelligence, AI

1. History

Historically, agents in Second Life (aka "SL-bots") are either designed as conversational agents (i.e. chatterbots, Oh 2010, Laconensi 2008,) for explicit interaction, or treated as completely "aloof" abstract agent-systems that resemble slightly more personified responsive environments (Oh, 2010, Hax 2008, Nash, 2007). Since early 2010, a virtual aesthetically engineered being named "Qiezli" possessed a dual ontology in Second Life 2.0 as both an automated agent and a manually controlled avatar. Qiezli is the subject of this paper. Unlike agent designs that "*find their own relationship to their context"* (Bogart 2007:1), Qiezli expresses its contextual creativity within very limited community domain constraints. In fact, those most qualified to measure Qiezli's level of creativity are artists from Qiezli's immediate peer-community. Qiezli is already recognized within the Odyssey Island community of Second Life as a "performance artist" known to exhibit abstract "creative" behavior. Prominent members of this local virtual arts community (i.e. Oh, Hax et al) are also aware of Qiezli's dual ontology. For the purposes of this particular experiment, the lead author has decided to completely automate Qiezli's creative behavior and therefore, focus exclusively on Qiezli's agent-based ontological[1] orientation. It is hoped that through this metacreative process, Qiezli will remain as an agent and will eventually appear to have its own ontological autonomy from that of the lead author and programmer. Ultimately, Qiezli's avatar peers determine whether Qiezli's combinatorial creativity – as expressed directly through its visual appearance – is indicative of genuine domain-validated H-creativity or H-novelty (H = Historical, Boden 1999).

[1] Not to be confused with an "ontology". In the Knowledge-Representation (KR) sub-domain of Artificial Intelligence, an ontology is part of an agent's knowledge-base and is accessible for logical deliberation via the parsing of subject-predicate-object statements. Qiezli did not possess this type of ontology. Rather, the word "ontology" in this context refers to Qiezli's philosophical perspective as a discrete virtually embodied "being". Qiezli possessed no upper ontology in the stronger AI sense - other than reacting to the quantity of avatars detected within its gaze-range.

2. The agent's appearance

Inspired by Anstey's visual design of her "believable virtual agent" known as "The Thing" (Anstey et al 2000), Qiezli was designed as a *"character with a developed personality and enough presence to engage the user believably"* (Anstey et al 2000:71). Qiezli's design mirrors Anstey's "Thing" as it also possesses a *"body (motor component) and a brain (cognitive/perceptual component)"* (Anstey et al 2000:75). With Qiezli, however, the "brain" is localized within each prim-limb – as mandated by the programming constraints of Second Life's Linden Scripting Language (LSL). With Qiezli, there was no explicit design imperative that corresponded with a *"development of a story that established the user at its center"* (Anstey et al 2000:71). Rather, its visual design symbolically conveyed the author's intention that Qiezli was to be perceived as a personified abstract art entity within the situated context of an emergent community of virtual artists. Unlike Anstey's narrative-constrained design domain, Qiezli's visual appearance enables differing subjective evaluations from the users rather than have its discrete geometrical components visually guide users towards the next expected narrative action. Resembling an embodied configuration of abstract modules, Qiezli's visual design was originally intended to be non-anthropomorphic before settling on a quasi-zoomorphic appearance, due to the design constraints for avatars in SL.

Qiezli's non-gendered body is composed out of a variable array of floating illuminated video-textured 3D geometrically primitive shapes called "prims" [Figure 1]. In other words, Qiezli constantly shifts its outward visual appearance. Qiezli's core anthropomorphic avatar base form is completely invisible. This invisible humanoid avatar acts as a placement axis for the manifestation(s) of varying video-prim objects that represent its limbs and face (including eyes). Similarly, Anstey's "Thing" relies on geometrical limbs (pyramids) and other *"body-part[s...]"* that *"could be substituted"* (Anstey et al 2000:75). Qiezli's modularity is emphasized more than Anstey's agent because new body-parts "grow" from invisible stems in a generative manner. Qiezli's perpetual limb-substitution activity becomes a key component of its perceived gestalt visual design. Therefore, users' gestalt interpretations of Qiezli's body schema helps sustain a *"strong illusion of an autonomous being formed from a collection of primitive shapes"* (Anstey et al 2000:75). As with Anstey's agent, the illusion that Qiezli is a single entity *"is not broken by parts of the body joining badly"* (Anstey et al 2000:75). In order for such configurations to minimally engage anthropomorphic coherence, both Anstey's "Thing" and Qiezli employ non-verbal dance-gestures to express a feigned emotional connection with the user(s) (Anstey et al 2000).

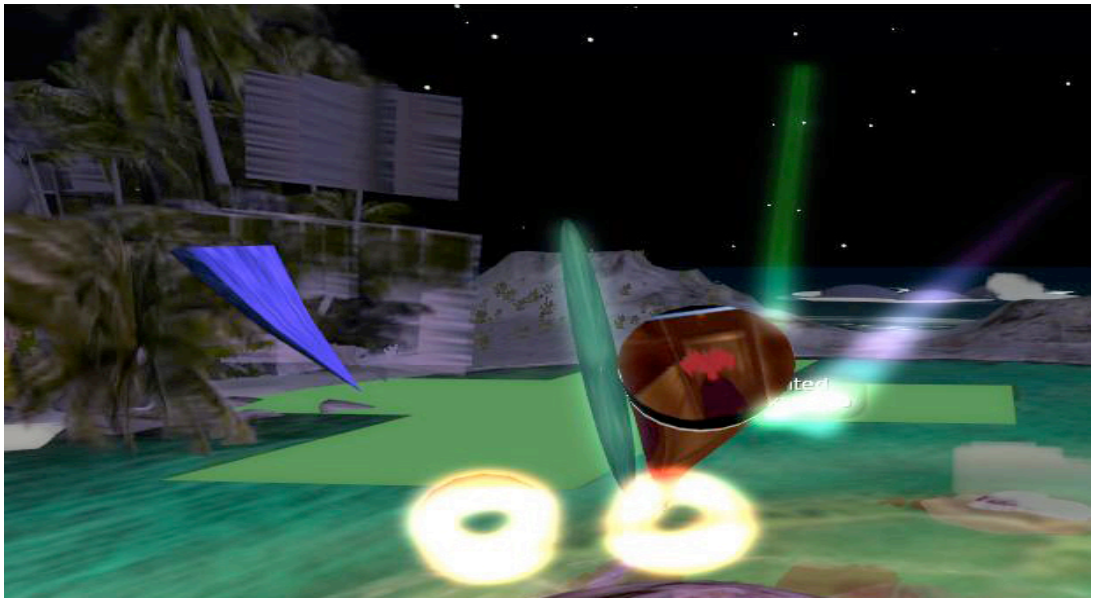

Figure 1: *Qiezli at "Crossing Currents" (2010)*

Figure 2: Qiezli (2011) in its solitary state with its anthropomorphic eyes.

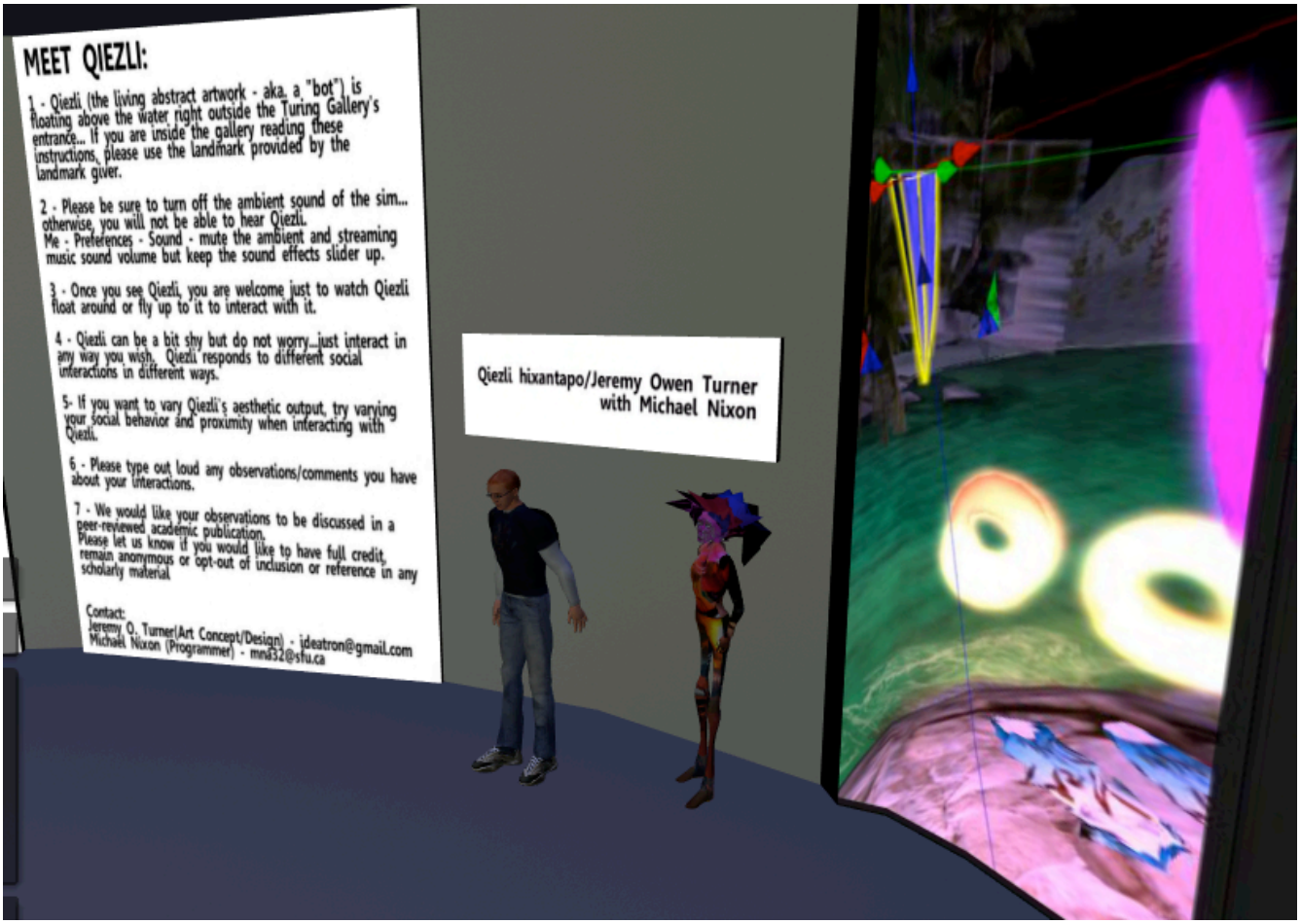

Figure 3: Didactic panel presentation, "Systems of Existence" exhibition, Turing Gallery, Extropia Island.

3. Inspiration

On a higher level, the lead author was motivated to create a "living" entity composed entirely out of personified abstract relationships. These abstract relationships would be both aesthetic (visual) and behavioral in nature. The goal was to allow Qiezli to exist without any narrative purpose other than to as exist as seemingly intelligent art. Ultimately, Qiezli would one day express itself artistically in a performative manner without the aid of its original creator. The purpose of designing Qiezli was to explore alternative possibilities for modeling non-functional (non-goal oriented) imaginative expression in an embodied virtual world like Second Life. Qiezli's Non-verbal Communication (NVC) modalities (Ventrella 2010) continue Wilson's research with modeling perceived personality characteristics of a non-human intelligence. In this context, these projected personality characteristics have been applied in the form of an embodied mobile virtual agent that possesses scripted AI functionality (Wilson 1995). Despite the abstract associations with an agent's "alien" ontology, this agent-project also explored the anthropomorphic limits of "artistic personalities" as they relate to characteristics of creative behavior. Stereotypically, "significant" artists since the Romantic period tended to subvert the functional imperative for task-based (or goal-oriented) creativity.

Qiezli's personality characteristics were modeled on a few key traits belonging to stereotypical Romantic or Modernist artists. Such artists are commonly believed by consumers of creative artifacts to possess authentic originality, novelty and canonical validity. However, since Boden has determined that for such appearances of autonomous creativity to be formally authenticated by the community as such, the situated agent must display creative processes that are unique to its particular domain (and associated community).

4. Combinatorial metacreation in Second Life

In virtual worlds such as Second Life, the historically accepted paradigm for generating community-validated "originality" is almost exclusively that of combinatorial creativity (Manovich 1995). Therefore, Qiezli expresses itself through the combination, selection and arrangement of pre-fabricated elements. Such instances of combinatorial creativity have fairly recently entered into the "real world's" institutionalized High Art discourse. Through the means of Postmodern critique and institutional subversion, canonical artists such as Hans Haacke and Haim Steinbach have unintentionally reached Neo-Romantic and Neo-Modernist qualities that are axiomatically associated with mythological concepts such as "universality", the "sublime" and "the lone artist genius". In simple terms, both of these artists express their unique creativity strictly through the arrangement of pre-fabricated assets. Steinbach *"assembles objects of all sorts into small groupings of two and three kinds of things"* (Estep 2005:58). Likewise, Qiezli also organizes its pre-loaded assets into two major groupings and four corresponding sub-groupings. Haacke's creative mode re-enforces Boden's criteria for authentic H-novelty by focusing his expression through the *"extension and affirmation of the consciousness industry [that] he is trying to subvert"*(Golczewski 2003:1). With his curatorial project at the Victoria and Albert Museum in London, Haacke merely expressed his combinatorial creativity by re-arranging historical artifacts that were already being exhibited at the museum. Resulting from this minor aesthetic re-configuration of pre-loaded content, Haacke is considered to be creative by his peers simply by replacing *"the 'museum's utopic economy' of meaning with a 'heterotopia' [...]"* (Golczewski 2003:1). Tacitly, Haacke generates a new framework of value and reveals a novel kind of universality through placement alone. Mirroring these processes from within a virtual domain, Qiezli expresses its combinatorial creativity by abstracting heterotopic content (i.e. the pre-loaded video-texture sources) into expressive, utopic statements.

5. Design intentions

The primary intention was to have Qiezli express its artistic character-traits and receive creative merit from the avatar-artist community via its non-verbal mode of expression. This modality includes Qiezli's processes (input/output) and artifacts (output). By no means was Qiezli intended for a human-level Turing Test. This is because Qiezli was meant to be aesthetically appreciated on its own terms: at best, as an autonomous art entity, and at worst, as a pre-authored kinetic artifact. Due to Qiezli's abstract "alien" appearance, there was no intention that art-critics would perceive Qiezli as a substitute for a human-artist (avatar) in Second Life. Qiezli's "autonomous" behavior and corresponding aesthetic output was designed so that others perceive Qiezli as an agent-as-living-art. In other words, the design goal was that Qiezli would *"strongly express [...] a personality"* and not *"fool the viewer into thinking [it was] human"* (Mateas 1997 in Anstey et all 2000:77).

6. Qiezli's memory

According to Mueller's paradigm, the *"unique quality of art"* is that it enables *"us to 'replay' past imaginings vividly in our personal consciousness"* (Mueller 1988:191). Since art is a form of "playback", artistic expression is merely a re-arrangement of aesthetically significant memories – which may have even been implanted by the original creator (i.e. the author). Consequently, Qiezli

merely expresses – through rote arrangement and configuration – the creator's most "memorable" experiences. Therefore, these revivified significant consciousness events are imported and the original creator is the inspirer (via pre-loaded content) for Qiezli's imagined memory-banks. Navigating through Second Life as a *"stimulus space"* (Bogart 2008:18), Qiezli relies on a fully distributed exploratory memory. For Qiezli, all memory processes relate to a reactive (but perceived as "rational") content-addressable working memory only. For Gabora, this type of memory is *"distributed but constrained"*(Gabora 2000 in Bogart 2008:19). For Bogart, Gabora's conception of distributed memory is *"in essence the combination of experiences into a structure"* (2008:25) and therefore, conducive towards combinatorial creative expression. Furthermore, Qiezli superficially employs a *"*memoryless vs. memorizing" taxonomy although its localized prim-limbs only allows for a "memorization" of assets. Qiezli's scanning state is ultimately memoryless because its scanning is arbitrary and devoid of (even an emulation) of genuine semantic apprehension. Qiezli only appears to be memorizing when encountering another avatar (or group) because its retrieval criteria has been reduced to match the quantity of avatars/agents.

In order to match the paradigm of artistic daydreaming, Qiezli is utterly planless and uses a long and abstract *"stream of thought"* so as to mimic Bogart's and Gabora's wide activation function (Bogart 2008:20). According to Bogart*, "abstraction occurs when an activation traverses a highly distributed memory [...] The larger the gaps between islands of memories the more abstract thought process"* (Bogart 2008:20). Also, there is no real goal-buffer or action-selection mechanism – with the exception of actions that trigger transitions in Qiezli's state (Marques/Holland 2009). Since memory *"can never retrieve an exact copy of a previous experience"* (Bogart 2008:20), Qiezli's memory architecture avoids the problem of exact copies even with a limited number of video textures in its inventory because every video-texture becomes re-coloured, tinted, oriented and shaped with each iteration. Although each stored "memory" is treated to a series of aesthetic mutations, it is still understood on Perez's terms that *"previous narrative-like experiences are the source of daydreams"* (Perez et al 2007:103). Unlike Perez's model(s), however, Qiezli's daydreamed experiences (memories) are *"provided to the system"* in a pre-loaded, rather than generative manner. Once assembled in a list, this pre-loaded content is retrieved according to the presence or absence of avatars and scripted objects. Unlike Lehnert's and Mueller's decision to represent daydreamed experiences through indexing, weighting, and archiving episodic memories into "emotional" folders (Mueller/Dyer 1985), Qiezli's emotional transitions only occur on the state-level and are not directly correlated with each asset's (memory's) meta-tag.

Qiezli's switching activity between overt behavior and internal simulation is the inverse of Marques and Holland's research into simulating an isometric imagination-space. Qiezli's default solitary (perpetually scanning) state (i.e. the simulated imagination) is the primary contemplation-world [Figure 2]; while the social state is seen more as a non-threatening interruption. Since Qiezli's internal world is merely a symbolic representation of past "memories" from Second Life's community history, Qiezli's "memorized" content is not at all isomorphic and therefore, does not require a user-supervised algorithm (i.e. Rocchio) for matching texture types (i.e. making similarity comparisons) with a gazed avatar's/agent's appearance at a generative level. Since Qiezli is not going out of its way to socialize with others, there is no imperative for user-supervision of image selection. Furthermore, this means that Qiezli relies on a real Short Term Memory (STM) even less than Marques' model since Qiezli never compares "real" actions with its internal simulation for accuracy (Marques/Holland 2009) Without this comparison mechanism available, Qiezli can only simulate *"relevance feedback"* (Thomee et al 2007:19). as the ranked set of objects are only at the category level and there is no discernable hierarchy of preferred assets to synthesize for each discrete asset contained in a given category. With regards to the "inspired" assets, Qiezli does not have a developed belief memory but

does have a kind of perpetual buffer that manages the (very) *"temporary storage of percepts"* (Chong et al 2007:109). Since Qiezli data-mines the individual creator profiles of the scripted objects that it encounters, Qiezli's inspiration strictly involves a fleeting relational memory that matches the *"set of active inferences"* with the *"objects perceived"* (Chong et al 2007: 109). Qiezli's most significant memory property has more to do with the way in which its memorization process is visually represented. Specifically, Qiezli interprets free association memory through its illumination level. For example, those memorized assets that are closer to the daydreaming state have their representational source (i.e video-texture) occluded by the pre-determined luminosity (glow). As "memories" become more social, this glow fades. Similar to Bogart's Memory Association Machine, Qiezli creates a *"cinematic montage"* out of previously experienced "memories" (Bogart 2007:5).

7. The agent's behaviour and perceptual apparatus

As a way to mirror the stereotypical (i.e. Romantic) behavior of "artist geniuses", Qiezli has been designed with the intention of not having any imperative for creative realization. Since *"interactivity has always implied choice",* and there is *"nothing inherently dramatic about choosing between several options"* (Anstey 2002:152), Qiezli was designed to not appear overtly reactive. In other words, Qiezli will occasionally encounter a command in its algorithms that explicitly instructs Qiezli not to visually realize a particular imagined video-prim appendage. As is the case with many artists, not all contemplated ideas end up past the self-absorbed "imagination" phase of their existence and reach fruition as aesthetic output. For example, Anstey's agent constantly realizes reminds others of its creative reactive agency by verbally rewarding users for their participation in the narrative (i.e. following the agent's orders) with a similar dance event (Anstey et al 2000). Anstey seems to favor the idea that an agent's perceived *"smartness"* is directly related to the power dynamics (i.e. initiated reactivity) between the agent and the interacting user. Just as long as the reactivity is not too explicit on a 1:1 level, Anstey's idea makes sense. Anstey's trope gives her agent the illusion of creative intelligence. However, excessive agent-dominance would only work if the user feels compelled to participate in the story. User-interaction is one thing but user-control is another. In contrast, Qiezli is not story-bounded but is situated in an emergent story-world generated by its avatar and agent peers in the Second Life community. Since Qiezli's personality is meant to be contemplative, it does not parse immediate reactivity as a reward. Prompt gestural responsiveness between the agent and user in this case, is not crucial for interaction. By structurally reducing the necessity for explicit creative expression; Qiezli was designed to appear more sentient, autonomous (i.e. less explicitly reactive) and "self-absorbed" within its own imagination space.

7.1 The solitary "daydreaming" state.

Qiezli's "intuitive" state is its "solitary/imaginative/daydreaming" state. Similar to Bogart's agents, Qiezli also uses *"arbitrary choices, random variables and placeholders"* (Bogart 2007:3) for initiating and maintaining this dominant state. However, the purpose of apparent randomness in Qiezli's case is to simulate the seeming occlusion or arbitrariness of the goal-less imaginative processes. Having said this, it is useful to also show Qiezli contemplating its environment, even if the environment is devoid of avatars and objects. From a pre-loaded inventory of up to 20-30 unique video textures, illumination settings, shapes, animations, gestures, and sounds, Qiezli uses LSL's built-in *llListRandomize* function to create a do-while loop that arbitrarily scans each inventory item regardless of item class. While in this perpetual scanning state, Qiezli randomly roams around the virtual space and may or may not choose to detect approaching objects that enter its immediate range. When encountering scripted objects (only), Qiezli then scans that object's barcode. Known as a Universally Unique Identifier (UUID), Second Life generates and assigns such barcodes for every individual component – whether it be an avatar, agent or object. Once the scripted object's UUID has been scanned, Qiezli will retrieve

that object's owner's personal UUID and will eventually display the owner's profile page as an image texture for one of its "inspired prims". In the meantime, Qiezli will also consult its inventory (with the do-while scanning loop perpetually running behind the scenes) for similar-looking UUID strings. Whenever such scripted objects are encountered, Qiezli can retrieve that object's UUID and use this encrypted string as "inspiration" for particular objects in its inventory. Such "inspired" video-prims (symbolically expressed using the more abstract purple-pink and green color spectra) have an increased likelihood of drawing Qiezli's attention away from its purely self-absorbed state. Despite the fact that Qiezli's CPU lacks a neural-net, its memory-retrieval behavior for inspired assets does resemble the "attention-excitation" node of Naur's "Synapse-State Theory of Human Mind" (SST) architecture (Ahson/Buller 2009). For example, in this transitory state, Qiezli does indeed get *"excited beyond a certain level"* to where the *"related attention synapse becomes conductive for about one second"* (Ahson/Buller 2009:246). In this case, Qiezli was designed to reduce - as much as possible - the reactive imperative for producing any visual evidence of this simulated thought-process. It should be noted that even though there is no explicit semantic correlation between extracting UUID information and visual content, the agent – in this solitary daydreaming state – can keep these pseudo-semantic processes behind its inspiration completely hidden from the viewer.

Qiezli will occasionally materialize ("rez") up to 6 large-scale video (or sound) textured prims as part of its inter-changeable body. When no interactors are detected by Qiezli's gaze **(7.1.1),** these large-scale prim-limbs would only be rezzed (if at all) without accompanying animations but with illumination settings set to "full bright". The scale and the illumination of these video-prim appendages symbolizes the ethereal nature of these contemplated items. The large-scale of these shapes evokes the imaginative potential of the sublime while the illumination indicates each appendage's virtual or "dream-like" qualities. In terms of Non-Verbal Communication, Qiezli will rely on its random "wandering" animation (containing a basic collision-detection algorithm) but will occasionally trigger a non-anthropomorphic animation (such as those reserved for animating vehicles in Second Life). Once interactors (inputs) enter into the picture, Qiezli will change its mode of selection and presentation.

7.2 Qiezli's "gaze"

Qiezli possesses a pair of cartoonish anthropomorphic eyes. These eyes utilize an embedded script that contains the llSensor function. This script corresponds to the rotational axis of Qiezli's eyes. Therefore, Qiezli uses its eyes to detect the visual presence and relative proxemic velocity of other avatars and agents. When at least one entity has been detected, Qiezli switches its binary state from "solitary/daydreaming" to "social/presenting". When a single virtual entity enters Qiezli's gaze, Qiezli will restrict its do-while loop inventory searches to content stored within its designated "representational1" image category. This category contains video-textures that depict close-up portraits of single avatars. However, when more than one virtual entities enter Qiezli's gaze, Qiezli derives its video-texture content from the "representational 2" category which contains videos that depict avatar crowds or groups. When no virtual entities are within Qiezli's gaze-range for a fixed duration of time, Qiezli switches back to its solitary/daydreaming state **(9.2.3).**

7.3 Qiezli's emotional threshold

Qiezli's output veto mechanism (Marques/Holland 2009) is analogous to Aleksander's Kernel architecture in that the initial state of the *"imagination or internal stimulation will win out by competition if the perceptual channel is unstimulated or unattended"* (Marques/Holland 2009:749). However, Qiezli's internal daydreaming state would also be re-prioritized if it is socially over-stimulated by the presence of hyperactive interacting avatars/agents. Once Qiezli detects avatars/agents

in its midst, four "emotional" conditions are considered during the social interaction process. Inspired by Laird's State Operator and Result's (SOAR) four types of impasse ("no-change, "tie", "conflict", "rejection"), and Anstey's four emotional categories ("praise", "encouragement", "criticism", "explanation", Anstey et al 2000:75), Qiezli's social conditions are*: ambient, passive, conversational and hostile.* If virtual entities have left Qiezli's gaze range for more than 1 minute, Qiezli will activate the random roaming animation as part of an *ambient condition* and depart at a slow velocity but will continue scanning for new avatars/agents while running its do-while daydreaming loop. The *passive* condition is publically expressed if the detected virtual entities are still within Qiezli's gaze range but have been idle for at least two minutes. After this period of lengthy idleness, Qiezli switches back to its solitary/daydreaming mode, re-activates the roaming animation, departs at a random velocity and delays any re-scanning for new avatars/agents for 5 minutes. The reason for the delay in scanning new avatars is because Qiezli has come to the conclusion that others are uninterested in its artistic presentation-performance so it quickly becomes "bored" and returns to its self-absorbed daydreaming state. The *conversational* condition is met if the detected virtual entities are not idle but move around at a very low velocity and with little or no visceral interaction (collision) with the video-prim limbs. Under this condition, Qiezli will present video-prims with the color scheme that matches the current level of interaction/collision. For example, the more each prim is touched, the redder it will get. Unless, the other three conditions are met (ambient, passive, hostile), then Qiezli will engage in this presentation mode for a random duration of time. After which, it will re-activate its roaming animation and depart at a random velocity. If the agents/avatars cross this comfort threshold by making all of Qiezli's 6 video-prim limbs completely red, Qiezli's will perceive this behavior as a *hostile* condition and initiates a contingency plan. Under this condition, Qiezli immediately switches to its roaming animation while intentionally avoiding those "hostile" avatars using the *llRequestAgentData_Name* function and escapes at a much faster velocity than in the passive mode. Naturally, Qiezli also delays re-scanning new avatars/agents for at least 5 minutes.

Overall, Qiezli's veto mechanism is remarkably similar to Ahson and Buller's proposed enhancement to NAUR's SST model called "Machine Psychodyamics Architecture" (M^{ψ} D) (Ahson/Buller 2009). With M^{ψ} D, Ahson and Buller sought to add a pleasure node and a pleasure principle as a reward system for SST's goal-seeking neural net schema. By avoiding social hostility, Qiezli mildly emulates pleasure-seeking behavior although the virtue of escapism in Qiezli's case is more of a contingency condition than a hedonistic reward condition, per se. In Qiezli's case then, all social activity is merely perceived as deviations from its *"homeostatic equilibrium"*(Ahson/Buller 2009:247). Although Qiezli's uncanny ability to avoid emotional situations seems to indicate hyper-rational behavior, Qiezli is not actually a developed rational agent. On the contrary, Qiezli does not have the cognitive ability to utilize *"negative emotions resulting from recalled failures"* towards activating *"rationalization control goals"* (Mueller/Dyer 1985:124). Instead, Qiezli merely flees from negative behavior and avoids, rather than learns. In this sense, Qiezli's daydreaming is literally escapist rather than functional. Qiezli does not even have the capacity to reflect on these failures.

8. Environmental constraints

Second Life as a scripting environment is limited by the syntax capabilities of the Linden Scripting Language (LSL). As coding objects using LSL is based on the finite state machine architecture, it is extremely difficult to code into Qiezli behavior that does not seem overly reactive and that avoids seeming "touchy". LSL is intended to be event-driven, and as a result, Qiezli is somewhat subject to behavioral feedback loops. Also, Second Life is prone to excessive bandwidth latency (aka. "lag"). Therefore, Qiezli might seem overly deliberative at times and at other times, non-responsive. Maximizing the allotment for available video-prims also contributed to unintentional lag and the

occasional disappearance of some video-textures. As a result, there were occasions where only a couple video-textures being displayed on Qiezli's body. Possibly due to client-side rendering issues, many saw Qiezli interacting without any textures at all. Furthermore, due to the unpredictability of the audience's interactions with Qiezli, he would often seem to be caught in a reactive pointing gesture, and would have to be rebooted to show new arrivals its daydreaming state. In a couple of instances relating to bandwidth latency, Qiezli seemed to be existing "between states" and showed video-prims common to both the social and solitary state and many experienced videos of single avatar portraits rather than group avatar portraits **[7.2]**. This occurred even when more than one avatar approached Qiezli. Due to the limitations of the sensor within LSL, Qiezli's "gaze" is locked to the same angle in the horizontal and vertical planes. Because of the large vertical angles of approach used by some avatars, we believe the z-plane introduced a difficulty in entity scanning. Three separate times, Qiezli tried to escape Odyssey Island but encountered a collision field and did not change direction. Instead, it was persistent in its futile attempts to break through the invisible barrier. After each barrier encounter, Qiezli was manually moved to a higher elevation so it could roam more freely without invisible collisions. Once positioned at the proper axis, it began to interact more normally but its gaze range was still limited to a precise z-axis, and so it could not detect every approaching avatars.

9. Prototype demonstration and exhibition

From a recruitment pool of one hundred individuals on Facebook, eighteen established avatar and agent designers from Second Life's artistic community interacted with a prototype iteration of Qiezli. These beta-tests took place on Odyssey Island and a public virtual beach known as "Crossing Currents". A year later, a debugged version of Qiezli was re-presented at the Turing Gallery on Extropia Island as living artwork [Figure 3]. During the beta-testing sessionsl, the lead author teleported avatar guests to a viewing platform from which Qiezli could be seen hovering in the distance. All avatars were advised that Qiezli wears video textures and could only properly be viewed using SL 2.0 or an equivalent viewer application. Many re-entered with the appropriate viewer. Guests were then invited to interact with Qiezli if they wished and were also encouraged to take videos/photos and to blog about the event.

For beta-testing feedback, five experts responded to questions about Qiezli's relative sentience, creativity, autonomy, agency, presence, resemblance and responsiveness. These experts were Alan Sondheim, Doug Jarvis, Steve Millar, Miguel Angel Montoya and Pyewacket Kazyanenko (avatar name). Beginning with the designation of Qiezli as an "avatar" (as indicated in the name-tag), the experts felt that Qiezli's shifting configuration of colours and shapes (i.e. way each shape and colour grew and receded) indicated the possibility of an alien form of sentience. This illusion of sentience was conferred by the phenomena that each morphing configuration seemed to respond – in an abstract way – to the *"environment and attention of other entities and avatars in close proximity to it"*. Montoya also attributed Qiezli's wandering movement to perceptions of sentience. Millar believed that Qiezli may have been interacting with a human user at times since the video-textures appeared to him as if they were live video-feeds. Despite the fact that these artists attributed Qiezli's shape-shifting body to appearing sentient, the participants did not feel overall that Qiezli exhibited genuinely creative behavior. This was primarily because Qiezli's aesthetic output appeared as if it would become predictable over time. Montoya, for example, believed that the movements looked programmed and acknowledged Qiezli's looping gestural behaviors. Qiezli's perceived unresponsiveness to participant input indicated that many of Qiezli's functions could have been random and thus, devoid of creative agency. The only exception seems to be Jarvis' observation that Qiezli *"had some discretion when it came to choosing another object or shape in conjunction with the others in the montage"* and therefore, reminded him of an *"awareness of and sensitivity to aesthetics"*. All but Jarvis perceived Qiezli as a living-artwork rather than as an artist peer. At best, they felt that Qiezli was a *"programmed*

performer, created by an artist". Most evaluators felt that Qiezli's inability to *"spontaneously change its parameters or actions"* and generate its own video-textures in a novel way contributed to this perception. Jarvis however, suggested that Qiezli must be an artist because no other entity would *"walk around with all of those random objects attached to them without a clear intent of trying to alter [an]other[']s perception of what it means to be an avatar"*.

Surprisingly, Qiezli appeared autonomous to all of the interactors despite the fact that the author informed them that he was manually re-repositioning Qiezli when it became stuck in a state-loop and/or bounded region. Apparently, they explicitly correlated Qiezli's autonomy to its abstract body design and *"changing actions"*. Sondheim, for example, went on to insist that even with this knowledge in mind, he felt that Qiezli appeared – in an alien way – more *"in itself than standard avatars, which attempt – poorly – to model humans or animals […] extending from the real world"*. In this sense, Sondheim considered Qiezli's autonomy to be equivalent to the alien ontology of Modernist artifacts that celebrate "art for art's sake". With its Modernist autonomy, Qiezli's ontological *"illegibility"* made it appear *"self-activated"* and *"self-motivated"*. It is for this reason, that Sondheim and Kazyanenko indicated that Qiezli's anthropomorphic eyes should be replaced with *"less cartoonish"* shapes that only represented sight on a symbolic level (i.e. possibly interacting spheres of morphing illumination and colour). The evaluators were divided over whether they would have been surprised if they were informed post-session that Qiezli was in fact, manually controlled by a human operator. Sondheim and Montoya felt that Qiezli's movements were too *"vague, too random, too unintended"* to be human-controlled but not *"erratic"* enough to pass for "human" either. Jarvis, however, believed that the *"seeming randomness of colours, shapes, textures and actions"* could not have been entirely *"pre-meditated"*. Finally, Kazyanenko was paying close attention to the author's avatar's comments in the text-channel and so was keenly aware that sometimes the author took manual control over Qiezli's body in order to reposition it for further testing sessions.

These artists were evenly divided as to whether Qiezli most closely resembled an agent, avatar or object. Sondheim felt that Qiezli was an agent since *"its response was too limited for an avatar, and too perplexed for an object"*. Furthermore, Montoya did not feel there were *"many unexpected movements or interactions with the other avatars"*. However, Jarvis managed to see Qiezli's humanoid avatar core form underneath the occluding invisiprim and personally concluded that Qiezli was manually controlled by an avatar (human). Also, Kazyanenko felt that Qiezli *"eyes and rounded shapes gave [Qiezli] a human like quality"* normally attributed to avatars. For those that saw scant evidence of video-textures playing on Qiezli's limbs, associations of *"landscapes, avatars and […] early Antonioni [the filmmaker]"* were reported. As a colleague of the lead author in Second Front, Jarvis recognized a video-texture as being a portrait of the author's original avatar, *"Wirxli Flimflam"*. Millar, however, was convinced that these video-textures were live webcam streams. As a result, Millar was confused as to how such videos symbolically related to Qiezli's long-term history. This latter observation reveals that possibility that occasionally, Qiezli can create the illusion of providing real-time visual processing and feedback as well as visual indications of episodic memory. Ultimately, none of the artist-participants found Qiezli to appear explicitly responsive to their input. For example, both Sondheim and Jarvis attempted to communicate with Qiezli through text and voice chat channels. In a desperate attempt, Sondheim *"tried repeating certain gestures, and [Qiezli] didn't seem to acknowledge them"*. Jarvis confirms this observation since Qiezli did not follow him, *"or show any other cause and affect indicators"*.

The only responsiveness noted was when avatars approached Qiezli and it immediately switched to its social state. Kazyanenko noticed that Qiezli *"seemed to make a noise"* when he *"flew through it"*. Generally, one can surmise that the evaluators would have preferred a more explicit responsiveness

from Qiezli although Sondheim earlier indicated that he felt sympathetic towards Qiezli's "alien" lack of anthropomorphic communication protocols. Eerily, the artists felt that Qiezli was only indirectly aware of their presence in Second Life. Jarvis and Kazyanenko felt that the author was observing them through Qiezli's eyes as a *"meta-operator"*.

10. Conclusions

Even though Qiezli did not ultimately appear to be creative nor responsive compared with avatar artists, Qiezli's scripted visual content and behavior prompted the artist experts to reconsider aspects of their own aesthetic research. Sondheim felt an affinity towards invisible textures and *"highly abstracted avatars that appear alien*" while Jarvis was reminded of virtuality's *"visceral"* and *"tangible"* nature. Constructively, they requested that Qiezli have more developed facial expressions, explicit interactions with other avatars and the ability to communicate using voice. Sondheim, however, felt that Qiezli's alien nature should not be compromised. Sondheim believed that Qiezli could appear even *"less human"* than it does already while ensuring that *"its responses [...]"* were *"made more evident"* to the interactor. To conclude, Qiezli succeeded in appearing alien and aloof while lacking a sufficient level of responsiveness and generative novelty to appear genuinely creative within Second Life's community and environmental constraints (Boden 1999). One main lesson is a confirmation that delayed reactivity between states and a preference for the solitary state would help lower anthropomorphic expectations for interactivity. Further iteration is needed to express Qiezli's personality properly by by-passing LSL's emphasis on finite state-loops. Otherwise, Qiezli's interactive states will only be slightly more nuanced than that of an alarm-system. Overall, Qiezli's vertical orientation in the social state appeared too predatory due to its relative height. As a result, Qiezli's 6 solitary prims were re-oriented and pared down in scope (from 6 to 3) for the exhibition at the Turing Gallery.

11. Future work

Fundamentally, Qiezli's content-storage capacity, behavioral mechanism and cognitive architecture are completely scalable so this agent will likely evolve to eventually implement increasingly complex cognitive functionality and aesthetic possibilities. The scalability of content and behavioral/cognitive aptitude might one day correlate with an enhanced perception of creative agency by others. In other words, Qiezli's performative behavior could eventually be perceived as truly "autonomous".Since Qiezli is "SOAR Lite", it would be advisable for Qiezli's future iterations to incorporate additional memory banks for semantic deliberation as well as a more clearly defined learning mechanism that involves episodic and long-term memory retrieval. However, since the Second Life's Linden Scripting Language (LSL) does not (yet) allow for lists to be categorized into arrays, a genuine SOAR-inspired classical cognitive AI type model (Chong et al 2007) is currently prohibitive. Qiezli can only employ an immanent working memory which, at this time, dilutes the transcendent aspects of this agent's cognitive potential. However, there is a caveat in relying too much on a SOAR-inspired cognition model. For example, a faithful implementation of SOAR's reinforcement learning module may lead to Qiezli possessing an over-conditioned reactivity. Consequently, such 1:1 user/agent reactivity may appear too predictable for genuine creative behavior (Chong et al 2007).

Ideally, Qiezli should also one day have the functionality to become inspired by and eventually daydream about historical events unfolding in front of it either recently or in real-time. Even if the daydreamed content is represented in a visually abstract manner, Qiezli should learn to at least occasionally daydream about such events. Based on artist-expert feedback, the lead author agrees that social prims should also grow and recede in a dynamic fashion. Regarding audio, samples should be triggered by local prim-collisions so Qiezli's social sound-field does not always become dense and

timbrally homogenous. The sound palette should vary with the degree of social interaction. Finally, the conversational mode has been reduced to matter of seconds rather than minutes. Qiezli now returns to the daydreaming mode much more frequently when interacting with other avatars. Since avatars tend to stand/float in one place without much further movement, there was no discernable use of Qiezli's avatar rotation tracker. Regardless, Qiezli maintained the illusion of appearing as an alien entity with its own abstract context in a user-generated virtual world. For now, Qiezli's development has been suspended to focus on next-generation abstract virtual agents that employ transformational creativity (T-Creativity, Boden 1999) and aesthetically react to brainwave-impressions via a commercially available EEG-headset.

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Resources

Please visit the website http://qiezli.blogspot.com to access flow-chart diagrams that describe Qiezli's behavioral architecture in detail.

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