

Journal of • Virtual Worlds Research

jvwresearch.org ISSN: 1941-8477

Volume 2, Number 3
Technology, Economy, and Standards.

**Community
Creation
Commerce**

Artwork by Anshe Chung Studios

Volume 2, Number 3

Technology, Economy, and Standards

October 2009

Editor

Jeremiah Spence

Guest Editors

Yesha Sivan
J.H.A. (Jean) Gelissen
Robert Bloomfield

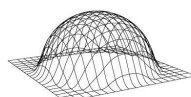
Reviewers

Aki Harma
Esko Dijk
Ger van den Broek
Mark Bell
Mauro Barbieri
Mia Consalvo
Ren Reynolds
Roland LeGrand
Vili Lehdonvirta

Technical Staff

Andrea Muñoz
Kelly Jensen
Roque Planas
Amy Reed

Sponsored in part by:



virtual worlds research consortium

**The Journal of Virtual Worlds Research
is owned and published by:**

The JVWR is an academic journal. As such, it is dedicated to the open exchange of information. For this reason, JVWR is freely available to individuals and institutions. Copies of this journal or articles in this journal may be distributed for research or educational purposes only free of charge and without permission. However, the JVWR does not grant permission for use of any content in advertisements or advertising supplements or in any manner that would imply an endorsement of any product or service. All uses beyond research or educational purposes require the written permission of the JVWR.

Authors who publish in the Journal of Virtual Worlds Research will release their articles under the Creative Commons Attribution No Derivative Works 3.0 United States (cc-by-nd) license.

The Journal of Virtual Worlds Research is funded by its sponsors and contributions from readers. If this material is useful to you, please consider making a contribution. To make a contribution online, visit: <http://jvwresearch.org/donate.html>



Journal of • Virtual Worlds Research

jvwresearch.org ISSN: 1941-8477

**Volume 2, Number 3
Technology, Economy, and Standards
October 2009**

Virtual Chironomia:

Developing Non-verbal Communication Standards in Virtual Worlds

By Gustav Verhulsdonck, New Mexico State University
Jacquelyn Ford Morie, University of Southern California

Abstract

Online virtual worlds offer new ways to explore evolving forms of social interaction, including the use of non-verbal elements used in conjunction with other communication modalities of text and voice. Ancient rhetorician Cicero coined the term “chironomia” for non-verbal communication elements that were used in a persuasive manner. Non-verbal communication is an inherently human trait and, while virtual worlds provide an immersive space for interaction, they also introduce new questions regarding standards and best communication practices within them. Because virtual worlds present a richer environment with multiple semiotic modes of interaction, they add additional channels for communication over previous text-based online modalities. In such worlds, users can select and execute non-verbal behavior in a rhetorical manner by animating their avatar thus performing in a virtual context. Therefore, communication in virtual worlds presents an intentional “speech act” in which a speaker purposefully seeks to evoke a particular response or transmit specific semantic content. As people's behavior in virtual worlds evolves and codifies, virtual worlds as a communication platform will need to develop standards based on successful user practices. In this paper we propose the need for a virtual chironomia – a standard for non-verbal elements in virtual world.

Keywords: virtual worlds; standards; non-verbal communication; computer-mediated communication (CMC); rhetoric; avatars; embodied conversational agents; deictics; proxemics; symbolic interaction; gestures.

This work is copyrighted under the Creative Commons Attribution-No Derivative Works 3.0 United States License by the Journal of Virtual Worlds Research.

Virtual Chironomia:

Developing Non-verbal Communication Standards in Virtual Worlds

By Gustav Verhulsdonck, New Mexico State University

Jacquelyn Ford Morie, University of Southern California

Virtual worlds represent a burgeoning area for exploring new forms of social interaction, work, leisure, and play. Myriad virtual worlds are currently being implemented on various computing and mobile devices. Such worlds can be compared to early, pre-industrial societies in which artisans, scientists, and various other strata of civilization met and connected in ways that encouraged cross-fertilization (Ikegami & Hut, 2008). As principles of social commerce and creativity emerge in these environments, and as their social collateral increases, virtual worlds may increasingly be used for various business, education and entertainment purposes (Churchill et al., 2001). This new virtual public sphere presents opportunities for enhanced social interaction. In so doing, virtual worlds may “remediate” our communication practices through transformed social interaction via avatars that permit us to augment certain elements of self-presentation through avatar-to-avatar communication and interaction (Bailenson, 2006; Bailenson & Beall, 2006; Bolter & Grusin, 2000; Meadows, 2008; Taylor, 2006; Yee et al., 2007a; Yee et al., 2007b; and Yee et al., 2007c). For instance, realizing the global potential of these shared environments, IBM is currently focusing on developing standards designed to help effectively mediate business meetings and provide ways of facilitating group communication and decision-making in virtual worlds.

Because virtual worlds are already used as intercultural work environments, it is important to effectively study the use of *non-verbal* elements in online interactions. We argue there is a need for developing standards for online communication so that understanding is enhanced within virtual world group social dynamics afforded by avatar interaction.

In conjunction with the other communication modalities of text and voice, virtual worlds such as Second Life provide inhabitants with several default gestures that may be used as a non-verbal communication elements. Yet the provided gestures are useful more for their novelty or entertainment value than as specific communication tools. A common example of this is a popular song phrase coupled with animations or a wild and crazy dance step. Yet, for virtual worlds to be used in business or professional contexts, the use of more normative and expressive gestures will become increasingly important to functional interactions as these environments evolve and more people adapt their communicative behavior to virtual worlds.

The Function of Non-verbal Elements in Human Communication and Interaction

Non-verbal communication is an inherent trait utilized in subtle manners during human-to-human communication and interaction. We shrug our shoulders, we raise our hand to signal that we want to ask a question, we turn our eyes to someone we want to address or to show we are paying attention to them. As humans, these types of non-verbal communication are second nature and so ingrained in our communicative behavior that we do not even think about them. Non-verbal communication complements verbal speech elements, modifies speech elements, or at times forms its own semantic unit (when, for instance, a “thumbs up” is given by someone outside of listening distance). Researchers have remarked that non-verbal communication plays an intrinsic role in human communication and interaction by mediating understanding and feedback through a variety of “back channels” such as facial expressions, eye gaze, hand and

arm gestures, and body language.

In real world contexts we emit various social cues naturally through our body language, eye gaze, facial expression, and hand and arm gestures (Sproull & Kiesler, 1992). In conversations, “facial displays and gesture add redundancy when the speech situation is noisy, give the listener cues about where in the conversation one is, and add information that is not conveyed by accompanying speech” and so provide important information about the communication context (Cassell et al., 2001, p. 6). Next to social cues, non-verbal communication may help to avoid ambiguity and provide feedback to those communicating. For example, nodding one's head and saying “uh-huh” signals understanding on behalf of the listener. The use of non-verbal communication can also facilitate “common ground” by allowing speakers and listeners to monitor and signal the extent to understanding of a communication context is being shared (Clark & Brennan, 1991). This ability to emit non-verbal elements together with speech is so embedded in our communicative abilities that sometimes it is witnessed when people gesture while talking to someone on the phone (Cassell et al., 2001; McNeill, 1992; Kendon, 1980; Manusov & Patterson, 2006). Indeed, research on non-verbal communication indicates that only 7% of a message is understood by verbal means, whereas 93% is conveyed through non-verbal means such as voice intonation and facial expression (Mehrabian, 1972). This is because while communicating, people focus more on the context of the communication and less on the semantic content, using visual cues to make inferences about the context of the communication.

A difference can be introduced between the formal properties of non-verbal language (sign language), to less formalized non-verbal gestures (hand and arm gestures, interpersonal or proximal distance, and body language, facial expressions), and the more instinctual, subconscious displays of non-verbal communication (such as someone crossing their arms when they feel vulnerable). As such, while we may utilize non-verbal communication in real life to form impressions, at times we do not realize we are emitting such information and are unwittingly providing others with information about our emotional state, our attitude or our understanding of a particular context. A large percentage of our understanding in face-to-face contexts is based upon non-verbal communication.

If virtual worlds are to develop into global workplaces, spaces for socializing or interacting, it will be necessary to develop a greater functionality and standards for non-verbal communication in these environments. Increasingly realistic avatars can be animated in a lively manner, conveying meta-information about the communication process, emotion, behavior and attitude in various contexts (for a good overview, see Seif El-Nasr et al., 2009). The development of new media and its affordances may also encourage novel communicative behavior in humans as they adapt and evolve their communicative abilities to such environments.

Virtual Worlds as Communication Environments

While virtual worlds are promising as communication environments, non-verbal elements are currently in their infancy and largely depend upon: a) the constraints and design choices of various virtual world platforms and b) the familiarity of users with the use of non-verbals in these virtual worlds. Because of this, it is important to explore avatar-based non-verbal communication functions in virtual worlds.

Given the importance of non-verbal communication in face-to-face communication, we see a need for developing better mechanisms for non-verbal communication in virtual worlds. In contrast to face-to-face communication, virtual worlds ask us to consciously perform these interactions through our avatar, though current means to do this are neither sophisticated nor particularly effective. In virtual worlds, a broad distinction can be made between *rhetorical* (intentional) and *non-rhetorical* (unintentional) non-verbal communication behavior. While the rhetorical use of non-verbal communication involves a conscious selecting of non-verbal communication towards an effect in one's audience, non-rhetorical (unintentional) performance of an avatar is sometimes done by a less evolved understanding of the use of an avatar, a lack of understanding of a context (e.g., lack of a feedback in a timely manner), or simply by responding with one's avatar in a way that is confusing to the other person. At times what we do *not* do with our avatar may cause confusion (for instance, not coming closer while talking to someone), or being too close to someone (in which case, the laws of proximity dictate that the other person may feel “crowded” and will move their avatar backwards). The use of avatars, in other words, requires a better understanding of how we use non-verbal communication in such contexts.

Instances which are clear in physical, face-to-face environments require an extra effort in virtual worlds by requiring someone to “perform” one's avatar and creating a different context, in which virtual embodiment has consequences for human communication and interaction (Verhulsdonck, 2007; Morie & Verhulsdonck, 2008). Using a rhetorical understanding of virtual world interactions, we propose the need for developing non-verbal communication standards (i.e., eye gaze, facial expressions, proximal distance, hand and arm gestures, and so forth) in virtual contexts. We believe non-verbal communication standards may become necessary as time spent in such worlds increases and their use expands from education to business and recreation. A standard framework for non-verbal behaviors can mitigate misinterpretations due to the idiosyncratic nature of diverse virtual worlds, platforms and affordances, and provide a shared structure for understanding.

Rhetoric and Non-verbal Communication

The study of rhetoric dates back to ancient Greco-Roman civilization, when rhetoricians like Aristotle and Cicero used rhetoric to teach orators how to address the assemblies in the Greek polis. The ancient discipline of rhetoric has long sought to include non-verbal communication in a system for effectively addressing groups of people through oratory. Cicero coined the term *chironomia* in his *De Oratore* (55 b.c.) for the study of non-verbal communication through hand and arm gestures that accompany speech. Besides the necessity of using non-verbal communication for communicative purposes or its visual immediacy, non-verbal communication also plays a social role in human-to-human interaction. In his analysis of social interaction, sociologist Ervin Goffman coined the term *symbolic interactionism* – the way we use language and symbols to negotiate our identity – to describe how our interactions are largely dependent upon performances of the self (Goffman, 1958 and 1963). Goffman uses the term “facework” to indicate how our *identity* – the perception of others of us as well as our perception of ourselves – is negotiated through a “pattern of verbal and non-verbal acts” while interacting with others or in groups (1967, p. 5). The negotiation of one's face rests upon assumptions about the tone of the conversation, impressions of the self, and the way we think others perceive us, to determine whether or not we have maintained “face” to others. Likewise, we see an important function for the non-verbal performance by avatars in virtual contexts as the use of non-verbal communication lets us negotiate our identity through embodiment.

Research in embodied conversational agents (ECAs) tends to support the idea that humans strongly invest their identity in the way they may perform their avatar. Research on avatars and their usage has yielded some interesting results regarding how people behave through them, as well as the effects existing as an avatar in a virtual world has on the person behind that avatar. For example, avatars that were more responsive in mimicking their human partner's behavior were rated more highly, an effect which researchers have called the “Chameleon Effect” (Bailenson & Yee, 2005; Gratch et al., 2007). Further, inhabiting an avatar with highly regarded characteristics (such as attractiveness, tallness) has positive effects on the behaviors the inhibitor tended to exhibit in-world (termed the “Proteus Effect”) and such effects could also perhaps be carried back into the real world (Yee et al., 2007b). These studies point to the importance of avatar usage in virtual worlds: they are powerful social constructs that affect us both psychologically and physically. As virtual worlds mature, our avatars will play an increasingly important role in representing our identity to others.

Non-verbal Communication: Challenges and Opportunities for Virtual Worlds

In everyday interactions, it is obvious that non-verbal communication plays an important role by providing groups of people back channel mechanisms for turn-taking, asking questions, or providing reference to objects. Non-verbal gestures such as raising a hand and turning to face someone are second nature to us in physical contexts and play an important role in grounding communication and establishing contexts. Researchers argue that speech and hand and arm gestures are intertwined and that gesturing, far from being ancillary or separate from verbal language, is actually an intrinsic part of face-to-face communicative processes that helps to decrease cognitive load by allowing speakers the ability to replace elements of speech with gestures (Cassell et al., 2001; Goldin-Meadow, 2003; Kendon, 1980; McNeill, 1992). We transmit various (conscious or subconscious) signals regarding the context of our communication through embodied cues that are interpreted by our communication partner. Researchers distinguish various kinds of non-verbal communication based on their relation to our sensorimotoric capabilities, with a distinction made between vocalic (intonation) and non-vocalic (body language) non-verbal communication. Mehrabain (1971) lists the following non-vocalic cues in common use:

- *Oculesics*: eye gaze, eye contact
- *Deictics*: Pointing
- *Gesticulation*: Hand and arm gesturing
- *Proxemics*: Body distance
- *Chronemics*: Time between interactions

In face-to-face contexts, many instances of *unintended* non-verbal communication take place, such as a subconscious display of emotion on our face or an unwanted movement of a leg/arm due to nervousness while communicating with others. In virtual worlds, there is less unintended non-verbal communication, as people must consciously animate their avatar. While Second Life provides a variety of looped “wait state” animations for avatars (so that they shift their body weight, look around, and appear to be breathing) other motions or actions must be executed through a menu choice, typing a command, or selecting a pose from one’s inventory. The available actions may not always be a good match for the desired effect.

So, in contrast to face-to-face contexts, virtual worlds contain intentional non-verbal communication as users must purposively select and execute non-verbal behavior in a rhetorical manner when animating their avatar. The intentional/unintentional distinction is important as the use of chosen gestures affects the decoding and encoding processes that take place between speaker and listener. Encoding happens at the transmission level by the speaker, whereas decoding happens by the listener. While a speaker may encode their speech in a particular manner, a listener may fail to decode the message in a similar manner. Based on this distinction, we think non-verbal communication in virtual worlds will develop as an intentional “speech act” in which a speaker seeks to evoke a particular response or transmit specific semantic content (Austin, 1962). A common framework for non-verbal behaviors in virtual worlds must include both rhetorical acts (actions of choice), as well as those that are procedurally driven by the utterances or the psychological state of the avatar. Such a system should exhibit real time responsiveness and a wide range of available attitudes and movements for the full complement of body and facial elements, yet it should also allow for evolutionary development.

We argue that any developing standards should be open enough to allow for such evolution. They should also provide some overlap with real-world non-verbals but should not strictly emulate or mimic face-to-face interactions. An evolutionary perspective suggests that a medium affects and is affected by users adapting to its affordances and creating novel ways to communicate through them. This also means that users will bring their prior experiences with other media, such as text chat, to virtual worlds. As practices shape interaction, so do users shape the medium itself and the interactions that take place. Developing standards requires understanding why and in what context people would use gestures. This calls for a rhetorical understanding of why people use gestures to perform communication and interaction with others through an avatar and challenges virtual world developers to pay closer attention to how these gestures are used. As virtual worlds emerge as important communication environments, convincing non-verbal communication is key to their being utilized in effective ways.

Conclusion

Virtual worlds present us with a dilemma. As a medium of communication, virtual worlds are somewhere between text chat and face-to-face communication. While there are opportunities for embodied interaction and the feeling of sharing the same space, confusion may arise between users of virtual worlds due to a wide range of varying communication affordances. As people's adaptation of virtual worlds as a communication platform will depend on their behavior, we argue that it will be important for non-verbal communication standards to evolve along with virtual world technology. While non-verbal elements such as proximity, eye gaze, and affect displays are usually unintentional (but very necessary) in face-to-face contexts, these elements, if they are to be used, have to be performed in a rhetorical manner in virtual worlds. Therefore, designers of non-verbal communication in virtual worlds are given a hard task of making the *unintentional* elements of communication *intentional* elements. Mechanisms for this are not easily designed, but as we argue, utilizing people's rhetorical understanding of communication may present one way to start developing such standards.

Bibliography

- Austin, J. L. (1962). *How to Do Things with Words*. Oxford: Clarendon.
- Bailenson, J. N. (2006). Transformed social interaction in collaborative virtual environments. *Digital Media: Transformations in Human Communication* (P. Messaris & L. Humphreys, eds.). New York: Peter Lang, 255–264.
- Bailenson, J. N. and Beall, A. C. (2006). Transformed social interaction: Exploring the digital plasticity of avatars. *Avatars at work and play: Collaboration and interaction in shared virtual environments* (R. Schroeder & A. Axelsson, eds.). London: Springer-Verlag, 1-16.
- Bailenson, J. N. and Yee, N. (2005). Digital chameleons: Automatic assimilation of nonverbal gestures in immersive virtual environments. *Psychological Science* 16 (10): 814-819.
- Bolter, J.D. and Grusin, R. (2000). *Remediation: Understanding new media*. Cambridge: MIT Press.
- Cassell, J., Sullivan, J., Prevost, S., and Churchill, E. (2001). *Embodied Conversational Agents*. Cambridge: MIT Press.
- Cicero. (1948). *De Oratore*. Cambridge: Harvard University Press.
- Churchill, E., Snowdon, D., and Munro, J. (2001). Collaborative virtual environments: Digital spaces and places for CSCW: An introduction. In *Collaborative Virtual Environments: Digital Places and Spaces for Interaction*. London, UK, Springer, 3-17.
- Clark, H., & Brennan, S. (1991). Grounding in communication. In L. Resnick, J. Levine and S. Teasley (Eds.), *Perspectives on Socially Shared Cognition* (E. Churchill, D. Snowdon, and J. Munro, eds). Washington, DC: American Psychological Association, 127-149.
- Goffman, E. (1958). *The Presentation of Self in Everyday Life*. Edinburgh: University of Edinburgh.
- Goffman, E. (1963). *Behavior in Public Places: Notes on the Social Organization of Gatherings*. New York: The Free Press.
- Goffman, E. (1967). *Interaction Ritual*. New York: Pantheon.
- Goldin-Meadow, S. (2003). *Hearing Gesture: How Our Hands Help Us Think*. Cambridge: Harvard University Press.
- Gratch, J., Wang, N., Okhmatovskaia, A., Lamothe F., Morales, M., van der Werf, R.J., and Morency, L. (2007). Can virtual humans be more engaging than real ones? *Human-Computer Interaction* (J. Jacko, ed.). Berlin: Springer-Verlag, 286–297.
- Ikegami, E. and Hut, P. (2008). Avatars are for real: Virtual communities and public spheres. *Journal of Virtual World Research* 1(1). Available from: <http://journals.tdl.org/jvwr/article/view/288>.
- Kendon, A. (1980). Gesticulation and speech: Two aspects of the process. *The Relation Between Verbal and Non-verbal Communication* (M. R. Key, ed.). The Hague: Mouton.
- Knapp, M. (1980). *Essentials of nonverbal communication*. London: Harcourt School.

- Manusov, V. and Patterson, M.L. (2006). *The SAGE handbook of non-verbal communication*. Thousand Oaks: Sage.
- Meadows, M. S. (2008). *I, Avatar: The Culture and Consequences of Having a Second Life*. Berkeley: New Riders Press.
- Mehrabian, A. (1972). *Nonverbal Communication*. Chicago: Aldine-Atherton.
- McNeill, D. (1992). *Hand and Mind: What Gestures Reveal about Thought*. Chicago: University of Chicago Press.
- Morie, J. F. and Verhulsdonck, G. (2008). Body/persona/action!: Emerging non-anthropomorphic communication and interaction in virtual worlds. *Proceedings of the International Conference on Advances in Computer Entertainment Technology ACE 2008* (Inakage, Masa, and A. D. Cheok, eds.). New York: ACM Press, 365-372. Available from: <http://doi.acm.org/10.1145/1501750.1501837>
- Sproull, L. and Kiesler, S. (1992). *Connections: New Ways of Working in the Networked Organization*. Cambridge: MIT Press.
- Seif El-Nasr, M., Bishko, L., Zammitto, V., Nixon, M., Vasilakos, T., and Wei, H. (2009). Believable characters. *Handbook of Digital Media in Entertainment and Arts* (B. Furth, ed.). London: Springer.
- Taylor, T. L. (2006). *Play Between Worlds: Exploring Online Game Culture*. Cambridge: MIT Press.
- Verhulsdonck, G. (2007). Issues of designing gestures into online interactions: Implications for communicating in virtual environments. *Proceedings of SIGDOC 2007: Design of Communication*. New York: ACM Press, 26-33. Available from: <http://doi.acm.org/10.1145/1297144.1297151>.
- Yee, N., Bailenson, J., and Rickertsen, K. (2007a). A meta-analysis of the impact of the inclusion and realism of human-like faces on user experiences in interfaces. *Proceedings of the 2007 SIGCHI conference on human factors in computing systems*. New York: ACM Press, 1-10.
- Yee, N. and Bailenson, J. (2007b). The proteus effect: The effect of transformed self-representation on behavior. *Human Communication Research* 33(3): 271-290.
- Yee, N., Bailenson, J., Urbanek, M., Change, F., and Merget, D. (2007c). The unbearable likeness of being digital: The persistence of nonverbal social norms in online virtual environments. *CyberPsychology and Behavior* 10 (1): 115-121.