Bots in Our Midst: Communicating with Automated Agents in Online Virtual Worlds

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These days we spend an increasing amount of our time online communicating with automated digital entities. Millions of people spend time in multi-user online games and virtual worlds, where they not only play but also engage in various social activities together. Of particular interest is Second Life (SL): it is a generic platform that enables a virtual world constructed completely by its citizens. The study presented here was conducted in collaboration between AVL and a scholar of online religion (Prof. Gregory Price Grieve of the Department of Religious Studies, University of North Carolina). In this paper we discuss the methodology of using research bots for surveying a virtual world, and the lessons learned regarding the communicative responses to such entities. Bots in virtual worlds, such as SL, are avatars that are controlled by software rather than by a human operator. Our AVL bots have already taken part in other studies [1], and are available for other researchers upon request. In this study we compare the responses to the bot with responses to a human interrogator asking a single question about their RL religion. We coded participants' responses in two ways: affective coding and functional-semiotic coding. For affective analysis, responses were coded using the categories "neutral", "positive", and "negative". The functional-semiotic classification was analyzed using Jakobson's functional-semiotic mode [2,3] which distinguishes among six communicative functions: the referential function is assigned to the context, the emotive function is assigned to addresser (the participant, in our case), the conative function is assigned to addressee (the bot, in our case), the poetic function is assigned to the message, the phatic function is assigned to the contact, and the meta-lingual function is assigned to the code. The bot received 1227 replies from 954 (out of 2480 contacted) avatars; we note that this sample is comparable to the number of subjects in the previously-reported largest-scale case study performed in SL (N = 2094) [4]. Although in our case the number of valid responses is smaller, our method has the advantage of approaching participants in a highly-random fashion, whereas the majority of the subject recruiting to the Bell et al. study [4] was made in traditional channels (mailing list and classified ads), and the number of valid responses obtained by a random placement of kiosks in-world was much smaller (N = 75) than the number of valid responses obtained from randomly approaching participants in world in our case (N = 954). The response rate to the human experimenter was significantly higher (66%) than the response rate to the bot (35%). The human experimenter received slightly more negative responses overall as compared with the bot. The

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specific pattern of result depends on the way we do the analysis, but the overall trend is consistent. If we take all responses to the human experimenter into account, then the human received significantly more negative responses (N=82, M=74.8, SD=33.0) than the bot (N=767, M=14.1, SD=33.6) and significantly less neutral responses (N=82, M=7.1, SD=22.4) than the bot (N=767, M=67.0, SD=44.3).

The results indicate that communication with the bot involved all functions of the model suggested by Jakobson. The most salient function operated by the respondents was the referential function, i.e., answering the question (66.7%). Surprisingly, the phatic function came second and was also quite frequent (20.5%). The responses to the human were also mostly referential (53.1%) followed by phatic (23.5%). We see that the difference in communicative functions is not dramatically different. However, the number of referential responses to the bot was significantly higher than to the human ($\chi 2$ (1) = 16.0, $p < .001$), whereas the numbers of phatic and meta-lingual responses to the human were significantly larger than to the bot ($\chi 2$ (1) = 15.14, $p < .001$ and $\chi 2$ (1) = 10.40, $p = .001$, correspondingly).Our results in this preliminary study indicate that participants responded more negatively to the human interrogator than to the bot. One interpretation would attribute that to the fact that participants do not expect the bot to understand the negative responses. Yet another interpretation is that this indicates that people are not negatively inclined towards bots, but rather some of them do not want to be solicited for filling in surveys. We note that the semiotic functions operated towards the bot and the human interrogator seemed relatively similar in distribution, as compared with a "baseline" of public human chat in SL. This is evident by the significantly higher percentage of emotive and phatic messages and the significantly lower percentage of referential messages in public chat. This indicates that the responses to the interrogator were more informative and "down to the point" than public chat, thus validating the semiotic analysis. The responses to the bot were also more informative than to the human interrogator, as indicated by the higher percentage of the referential responses and the lower percentage of phatic and meta-lingual responses. However, we find that the most interesting lesson from this analysis is that while communicating with a bot in IM (private chat), addressers operate all functions of communication. We were surprised that the referential function only takes 66% of the messages, and that a third of the messages were attempts to communicate with the bot beyond the referential function.

References

1. Friedman, D., Steed, A., Slater, M.: Spatial Social Behavior in Second Life. Paper presented at the Proc. Intelligent Virtual Agents (September 2007)
2. Jakobson, R.: Closing Statement: Linguistic ands Poetics. In: Sebeok, T.A. (ed.) Style in Language. The MIT Press, Cambridge (1960)
3. Jakobson, R.: Language in Relation to other Communication Systems. In: Selected Writings, 2, Word and Language, pp. 697–708. Monto, The Hague-Paris (1971)
4. Bell, M.W., Castronova, E., Wagner, G.G.: Surveying the Virtual World: A Large Scale Survey in Second Life Using the Virtual Data Collection Interface (VDCI) (2009)