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Who am I - and if so, where? A Study on Personality in Virtual Realities

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Abstract

   Virtual realities form a new technical platform, raising scientific questions about the human mind, communication and identity. There is hardly any scientific research on the influence of a virtual reality on the identity perception and the personality of a user of these virtual realities. The present study attempts to contribute to filling this gap by assessing the potential difference between real-life personality and the 'virtual' avatar personality using the online virtual world of Second Life. Dutch participants (N = 34) were asked to use their own avatar or create a new avatar within this online virtual reality, to communicate with other avatars and finally to fill in a Big Five personality questionnaire (5 Persoonlijkheids Factoren Test - 5PFT) via a virtual interactive testing screen within Second Life. The virtual 5 PFT scores were compared to pencil and paper scores of the same questionnaire, which had been filled in by all 34 participants during a first-year undergraduate test battery, seven months prior to the virtual testing. Results showed no difference for any of the five subscales (extraversion, friendliness, conscientiousness, neuroticism, development) between the pencil and paper and the virtual version, suggesting that users of virtual realities do not create a 'virtual' personality for their avatar. Furthermore, high scores of internal consistency and high test-retest correlations between the two versions were found, which are very similar to the original test-retest scores of the 5PFT. These findings show the potential of virtual realities as new platforms for reliable (psychological) testing and future clinical applications.

Keywords: personality; virtual reality; online games; Second Life; virtual psychology

Who am I - and if so, where? A Study on Personality in Virtual Realities

By Benjamin Gregor Aas, Katharina Meyerbröker, Paul M. G. Emmelkamp
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In recent years technological development has enriched our daily lives with a wide range of new possibilities. Personal computers, the internet and other means of information technology are rapidly changing communication and thereby people's lives, maybe even as much as the invention of language, writing and printing did (Baecker, 2007). One of the most intriguing experiences, and at the same time most controversial discussed topics, is the phenomenon of virtual realities. Second Life is the biggest free available virtual reality, with 15 million people currently registered, while approximately 500.000 people are online in Second Life at least once during one week (Linden Research, Inc., 20 October, 2008). At any moment somebody with an avatar can join the Second Life world to meet people, build objects and do whatever he likes. In fact, in Second Life there is an online world developing that has pretty much the same features as the real world.

One important difference between the real world and virtual worlds is that contacts are always established via the technical use of the computer. Avatars approach each other in virtual places, but to disappear it only takes a mouse click. There is for example the possibility to fly and teleport, meaning that at any time the avatar can directly be transferred to any other place within Second Life, except some restricted private areas. By wearing the virtual mask of the avatar and by always having the chance to leave without being known or questioned, a user of the virtual reality finds himself confronted with questions as "what am I going to tell?" and "am I going to tell the truth?". This anonymity can lead to a sense of de-individuation and disclosure, which in turn has influence on the identity perception of the user (McKenna & Bargh, 2000). Users of the online role game 'World of Warcraft' are found to create their avatar more closely related to their ideal self, than to their real self (Bessiére, Seay & Kiesler, 2007). This finding is supported by an experimental study, in which the true self (the inner concept of the participant's self) is found to be more available cognitively during internet interactions, while during face-to-face interaction the actual self (the 'outer' concept of the participants self) shows to be more accessible (Bargh, McKenna & Fitzsimons, 2002). One could argue that people communicating via internet or virtual reality try out behavior which they do not dare to express in real life, or do show implicit stereotypical behavior without willing so (Wigboldus, 2008). The avatar could for example be much more open, telling his deepest thoughts. They could also be less friendly, because there is no need of being polite as in the real world, which in turn can also be interpreted as being more honest. In fact, each person could have its own differences compared to the real life. It is even possible that one is maintaining several avatars with different personality styles, for example an animal avatar which is friendly and besides that maybe a rough-looking guy being direct and extraverted. In the end, one could also use the avatar just to be the same as in real life; all directions of change or no change at all are possible, raising the question what the influence of online virtual realities on the user's personality is.

'Personality' is generally defined as the stable and unchangeable concept of the sum of the attributes of a person (Mischel, 1999). The most widely known theory of personality is the so-called 'Big Five', a theory that tries to describe personality by using five basic continuous traits, namely extraversion, openness, conscientiousness, agreeableness and neuroticism. These traits are supposed to be stable across time and situations. Modern theories nevertheless view personality as a whole set of different adaptive modes for different situations (Turkle, 1997).

People do behave very differently in various situations, mostly appropriate to the demanded social rules in the situation. In other words, people use a variety of different personality-patterns according to a specific situation. Therefore it seems plausible that people may also create a 'special' personality to use in Second Life. To put it short: Richard David Prechts philosophical question on personality: "Who am I - and if so, how many" expands with virtual realities to: "Who am I – and if so, where?" (Precht, 2007)

Current literature strives the above mentioned question, but has a number of shortcomings. First, scientific papers are often more theoretically than empirically oriented. For example the work of Turkle (1995) or McKenna and Bargh (2000) give an overview on the implications of the internet and virtual reality on people's lives and their personality, though without transcending their theoretical framework to a more experimental level. Second, a few studies make use of massively multi player online role playing games (MMORPG's) like 'World of Warcraft', in which the main aim is, in contrast to Second Life, to fulfill missions of a preset plot and not on social interaction (Bessiére et al. 2007, Bainbridge, 2007). The emphasis in these studies is on people's personalities in real-life, rather than on how personality undergoes changes during such role-playing games. Third, a number of researchers interested in virtual realities are not interested in the aspect of personality in virtual settings (De Nood & Attema 2006). Although they use experimental designs, interest lies on behavioral aspects like virtual distance between avatars (Yee & Bailenson, 2007). A few researchers use reaction time tasks to assess actual and true self in virtual realities, but do not make any claims about the content of these selves and the differences between them (e.g. Yee & Bailenson, 2007; Bargh et al. 2002, Boellstorff, 2008).

The present study will try to overcome the shortcomings of the mentioned studies by using psychological questionnaires in an experimental-correlation setup and answer the research question: **How stable are personality-traits when entering a virtual reality?**

To assess this potential difference between personality in real life and virtual life, personality is measured twice with the same tool, namely the *5 Persoonlijkheids Factoren Test* (5PFT, Elshout, 1999*)*. This pencil and paper questionnaire is regularly taken by first year undergraduate psychology students during the so-called 'testweek', which is an obligatory testing panel, undergraduate psychology students of the University of Amsterdam have to attend. The 5PFT is supposed to be a fairly stable measurement of the five personality attributes: extraversion, friendliness, conscientiousness, neuroticism and development (Elshout, 1999). In the present study, the 5PFT questionnaire is filled in a second time via an interactive virtual tool in Second Life. The participants use their avatar to approach the testing screen, where all questions of the 5PFT are presented one after another. If the comparison of the two 5PFT versions shows differences for the real life condition and the virtual condition, this can be accounted for by a real difference of how participants experience and act within the two worlds. To control for mediating factors, 'absorption' and 'presence' will be measured. People that are being 'sucked' in or absorbed by all kinds of situations (the plot of a play or a story) might get more involved in their avatar and therefore show different results on 'absorption' than people that keep a distance towards the virtual world. Presence tries to measure whether the participant feels present in the online virtual reality and whether this world appears to the participant as if it was real. Again, it is possible that participants that feel more present in the virtual world behave differently from participants who are not feeling present.

With this approach, the present study attempts to transcend the discussion about personality in virtual realities from a theoretical level to an empirical level. Using 'blind'

participants, a laboratory setting, scientific data analyses et cetera, will make it possible to give an informed answer to hypothetical beliefs on how people 'are' in virtual realities as they circulate in press, internet forums and blogs. Finally, using the platform of Second Life has, in contrast to MMORPG's, the advantage that the emphasis lies on 'virtual', hence relatively 'normal' social contact instead of following a role-play objective. Due to a lack of empirical studies, it is not possible to predict an outcome on the question whether there is a difference between virtual personality and real personality. On the basis of a more flexible view on personality one would expect that a difference between virtual and real life can be identified. On the other hand personality is, in contrast to Turkle (1997), widely seen as a stable concept that does not vary across different situations (Mischel, 1999); from this perspective there is no reason to predict a difference between the real life and the virtual setting.

Method

Participants

Psychology students of the University of Amsterdam were informed and could register for participation via wallpapers. Potentially, every psychology student who has participated in the 'testweek' could also take part in the study, as during this prior testing corresponding results of the 5PFT had already been produced. As compensation, participants could earn up to 2 ½ 'participation hours' or 17 Euros, depending on whether or not they had a previously existing avatar. Participants flagging not to have taken part in the 'testweek' could not take part.

Measures
5 Persoonlijkheids Factoren Test

To assess the personality structure of the participants the *5 Persoonlijkheids Factoren Test* (5PFT) has been used, which consists of 70 items. This is the first questionnaire to assess the Big Five personality structure, consisting of the scales extraversion, friendliness/sociability, conscientiousness, neuroticism/emotionality and development (Elshout & Akkerman, 1973; Elshout 1999). This questionnaire is included in 'testweek' tests on a routine basis; therefore, each participant had filled in the 5PFT with pencil and paper before. Between the two versions of the 5PFT ('testweek' and virtual), there was a delay of at least 6 months for each participant, ensuring that nobody had insight into the real purpose of the study, namely the comparison of the two 5PFT versions. In fact, no participant mentioned recognizing the 5PFT from earlier testing. To measure the avatar's personality, this test was administered in the present study by using a virtual interactive screen within Second Life, as can be seen on Figure 1. The participant started the questionnaire by clicking on the screen. Subsequently, the avatar was welcomed personally by its avatar name and the screen showed the introduction of the 5PFT. Finally, after being introduced, the screen showed each question one by one and the participant could respond by clicking on one of seven 'answer-buttons', ranging from 'absolutely not of relevance' to 'absolutely of relevance'. After the participant's response, the next question followed. As an example, the first question is as follows: "Talkative. Talks a lot, to everybody."
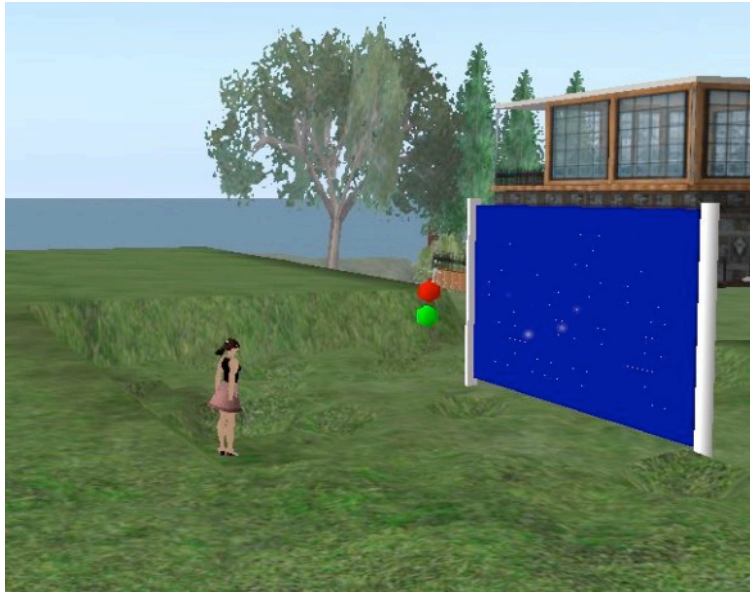
Figure 1. *Avatar in front of the interactive survey screen*

Absorption

 After the avatar logged out, participants were asked to fill in a questionnaire that measures *Absorption* (Tellegen & Atkinson, 1974). The absorption list is included as a subscale of the *Multidimensional Personality Questionnaire* (MPQ; Tellegen, Lykken, Bouchard, Wilcox, Segal & Rich, 1988), which had also been completed during the 'testweek'. In the present study *Absorption* is measured to control how much participants are open to absorb new situations and are open to self-altering experiences. This test consists of 34 items, each to be answered on a 5 point scale ranging from "This is barely of relevance" to "This is of very high relevance". The first question is for example: "Sometimes I experience things just the way I did as a child". Furthermore the 'testweek' results of the MPQ also yield scores on *time* needed to fill in, as well as two validity scales, namely the *Variable Response Inconsistency* (VRIN) and the *True Response Inconsistency* (TRIN) (Patrick, Curtin & Tellegen, 2002). The VRIN controls whether participants fill in the MPQ "randomly", while the TRIN flags participants' tendency to have a specific positive or negative answering style, respectively. These three scales are used in the present study to exclude participants that filled in the 'testweek'-MPQ too fast, too randomly or with a too strong specific answering pattern.

Igroup Presence Questionnaire

 To control the manner in which participants experienced a sense of presence in the virtual reality, the *Igroup Presence Questionnaire* (IPQ) was used (Schubert, Friedmann, & Regenbrecht, 1999; 2001). In this 14 item questionnaire, participants answered questions on a 7 point Likert-scale, ranging from -3 to +3 ("absolutely not" to "very strongly"), like: "I had the feeling of being present in the virtual reality". The IPQ subdivides into the three subscales of spatial presence, involvement and experienced realism.

Computer competence.

Finally, another 5 pencil and paper questions on *computer competence* were administered. The answer possibilities ranged from "very bad or never" to "very good or daily or often". Questions were for example: "How often do you use a PC?"

Procedure

Participants were first asked, whether they had previously been participating in the 'testweek'. The laboratory itself was based at the psychology faculty of the University of Amsterdam and consisted of 5 working places. Each working place was equipped with a PC on which the computer program Second Life, version 1.19.1, was already installed (Linden Research, Inc., April 2, 2008). In case of technical problems the instructor, situated in the same room, could be asked for help. If participants agreed to sign an informed consent, they were asked whether they already owned an avatar in Second Life. If they did **not** have an avatar yet, participants were asked to open the website of Second Life and create their own avatar. Participants then logged in to Second Life with their new avatar and ran the Second Life tutorial, which took about 60 minutes. In this tutorial, provided by Second Life, participants learned how to move, communicate and change the appearance of their avatar. After finishing the tutorial a new appointment was scheduled with the participant, taking place one week after the first use of Second Life. Participants were also encouraged to use Second Life in their spare time.

In the second session both groups of participants, namely those who had created their avatar one week earlier in the first session, as well as those who had an avatar already before starting the experiment, had to follow this procedure: First, the participant was asked to log in to Second Life and teleport to 'Groningen' (virtual Dutch city) via the Second Life search option. Then the participants were asked to walk around and talk to at least two random avatars and find out as much as possible about these avatars. By communicating with other avatars it was supposed that participants identified with their own avatar more and in a short period of time. When merely walking around in the virtual world, the avatar might only be used as a tool for navigation. The introduced processes of trying out new personalities and being approached by somebody else through the virtual appearance process supposedly come into play the most during communication with others. After 30 minutes of conversation, the participants were told to teleport from Groningen to the area where the testing screen was situated (Monowai 111/207/62) and follow the instructions written on the screen, starting with welcoming the participant by the avatar name. After finishing the virtual 5PFT questionnaire, the participants were asked to log out of Second Life and fill in the questionnaires 'Absorption', 'IPQ' and 'computer competence'. Finally, some questions concerning demographic data (age, gender et cetera) had to be filled in. The participants were then asked to sign an allowance form in which they gave permission to couple the results of the Second Life study to the 'testweek' results and were then debriefed about the real purpose of the study. After signing the debriefing the compensation for participation in the study was given.

Results

Participants.

In total, 57 persons (30 women/ 27 men) intended to take part in the study, only two of whom had their own pre-existing avatar. Due to not being psychology students and therefore not having taken part in 'testweek', seven persons could not take part in the study. Another four participants had to be excluded, because no matching 5PFT 'testweek' results could be found.

Due to technical problems of the website www.secondlife.com, four participants could not create an avatar. From the 42 remaining participants the results of two persons could not be included in the analyses due to a large number of missing values in the Second Life 5PFT version. When participants had more than seven missing values, which was calculated by the commonly agreed ratio of 1/10 of the total 70 questions, they were excluded. The missing values of the remaining 40 participants (M = 1.94; 2.7% of 70 5PFT answers per participant) were replaced by the calculated mean of the group on the respective question.

On basis of the 'testweek' MPQ results, participants were controlled for time, TRIN and VRIN scores. According to Patrick et al. (2002), an exclusion criterion of two standard deviations above and below the mean was used. On the basis of time scores two participants had to be excluded (M = 1269, SD = 338), whereas VRIN (M = 10.7, SD = 2.4) and TRIN (M = -1.14, SD = 3.86) each led to exclude one participant. Data of two more participants were excluded from the statistical analysis due to corresponding low scores on the conscientiousness scale of the 5PFT in both versions. It is possible that participants with low scores on this trait do not seriously participate in experiments in general, so they were excluded from data analyses. Finally, 34 datasets were included in the statistical analyses.

Internal consistency.

The present study used *Cronbach's α* to assess the internal consistency of the different scales of the 5PFT. In fact, all scales reached acceptable *Cronbach's α* in both, 'testweek' and virtual settings, as can be seen in Table 1. Both settings managed to yield reliable results for the 5PFT. Furthermore, 'testweek' and 'virtual' *Cronbach's α*s are similar to the *Cronbach's α*s found in the original version (Elshout & Akkerman, 1975).

Tabel 1
Cronbach's α reliability coefficients for 'testweek'-virtual and original version of the 5PFT per subscale (Elshout & Akkerman, 1975)

Subscale	Testweek[1]	Virtual[1]	Original[2]
Extraversion	.80	.76	.85
Friendliness	.76	.69	.77
Conscientiousness	.76	.67	.80
Neuroticism	.83	.87	.87
Development	.73	.74	.82

[1] N = 34; [2] N = 37 (Elshout & Akkerman, 1975)

Exploratory results

Using *paired-samples t-tests*, significant differences were **not** found for any pair of the corresponding scales of the 5PFT 'testweek-' and the virtual-version, as can be seen in Figure 2. The notion that there is no difference between the virtual and the paper and pencil 5PFT scores is further supported by the fact that among all participants the difference between the total score per subscale of the virtual version subtracted by the 'testweek' total score per subscale is close to zero (difference-extraversion: M = 1.74, SD = 5.90; difference-friendliness: M = 1.61, SD = 6.904; difference-conscientiousness: M = 0.35, SD = 6.201; difference-neuroticism: M = 0.31, SD = 6.50; difference-development: M = 1.12, SD = 6.04). These difference scores are all

(except neuroticism) normally distributed according to *Kolmogorov-Smirnov tests* (difference-extraversion: $D(34) = .121$, $p > .2$; difference-friendliness: $D(34) = .071$, $p > .2$; difference-conscientiousness: $D(34) = .126$, $p = .185$; difference-neuroticism: $D(34) = .158$, $p = .031$; difference-development: $D(34) = .103$, $p > .2$). Even the absolute difference for each participant across the whole test does not exceed a mean of 24.81 (*SD* = 7.802) with a maximum of 45.16, which are both very low with regard to the fact that the 5PFT consists of 70 questions with a range of 1 to 7. In other words, the mean participant (avatar) filled in a mean question only about 0.35 points different compared to the first time as subject in the context of the test week.

Figure 2
Means of the Real Life and virtual Second Life version of the 5PFT personality traits (with standard error bars)

$N = 34$

■ Real Life
■ Second Life

Extraversion   Friendliness   Conscientiousness   Neuroticism   Development
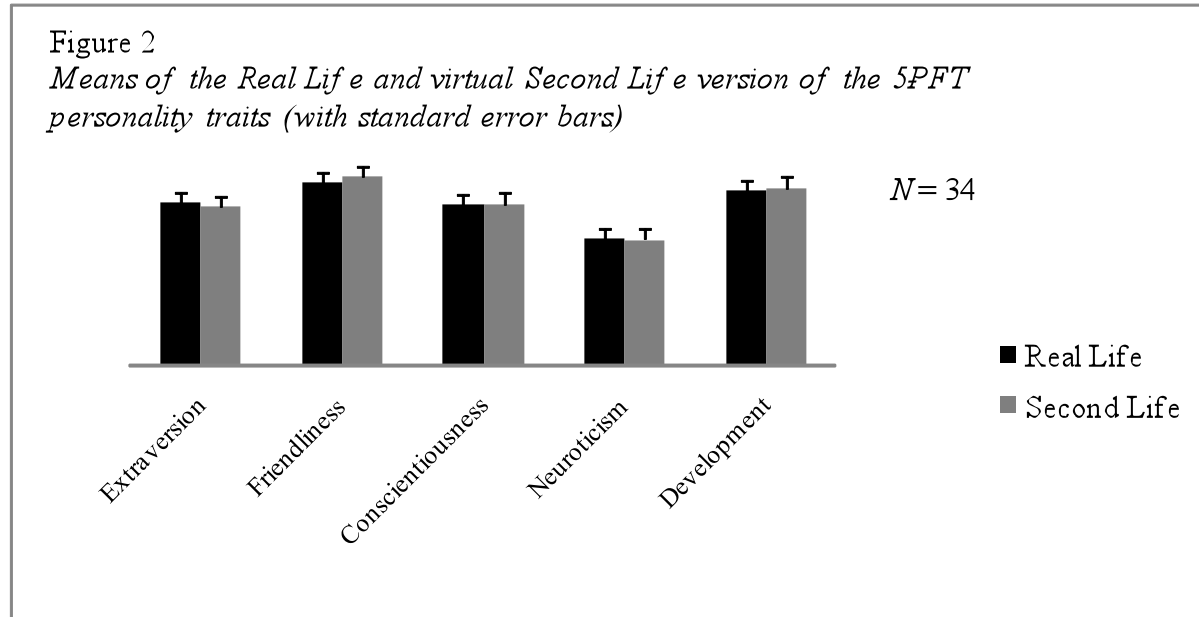
Very high *Pearson Correlation coefficients* were found for all couples of the virtual versus real setting scales, meaning that there is a positive relationship between the scores obtained in the 'testweek' and scores obtained in Second Life for the five scales respectively.

All other possible combinations of subscales for both versions showed no significant *Pearson Correlation coefficients*, except the correlation between neuroticism and friendliness scores of the 'testweek' ($r = -.35$, $p = .043$). These test-retest reliability results are in fact similar to the results Elshout and Akkerman (1975) reported in their original test-retest analyses for the 5PFT, which had a delay of one year between the two test sessions, as shown in Table 2. Only the correlation for the subscale of neuroticism differs substantially between the present study and the original results (neuroticism: present study: $r = .84$; Elshout & Akkerman, 1975: $r = .37$).

Table 2
Test-retest correlations per subscale of the 5 PFT for the 'testweek' vs. virtual version and as tested by Elshout and Akkerman (1975)

Subscale	Testweek vs. virtual version* (N=34)	Elshout & Akkerman (1975)** (N=37)
Extraversion	.81	.73
Friendliness	.61	.52

Conscientiousness	.73	.76
Neuroticism	.84	.37
Development	.72	.72

*: 7 month between test and retest; **: 12 month between test and retest

In order to control the influence of absorption and presence on the virtual 5PFT scores, difference scores between 'testweek' and virtual 5PFT scores were correlated with absorption and presence scores, by calculating *Pearson Correlation coefficients*. There were no significant correlations found, neither for the subscales spatial presence, involvement and experienced realism of the IPQ presence measure, nor for the absorption questionnaire, meaning that the way a participant absorbs and feels present in the virtual reality is not connected to difference in personality scores. Computer competence was not a moderating factor either.

Discussion

The main intention of the present study was to explore the stability of personality-traits when entering a virtual reality. With respect to the 5 Persoonlijkheids Factoren Test, results are stable when the version completed in the test week and the version completed seven month later by the avatar in Second Life, are compared. High correlations of the personality traits extraversion, friendliness, conscientiousness, neuroticism and development are found for each subscale of the two versions respectively. In other words, the personality traits of participants do not differ between the real world setting and the virtual world setting. In light of these results the answer for the research question (How stable are personality-traits when entering a virtual reality?) seems to be that usage of virtual environments does not have an influence on the personality traits of the user; apparently, people do not use the virtual worlds to create a 'virtual' personality through or for their avatar. Also, strong correlations between the real life setting and the virtual setting on the one hand and the similarity of these correlations compared to the test-retest correlation attained by Elshout and Akkerman (1975) on the other hand, can be interpreted as supporting evidence that questionnaires can be administered in virtual settings as reliable as in real life settings. Furthermore, neither presence, the feeling of being present in the virtual reality, nor absorption, the tendency to completely absorb and being 'sucked' in by new situations, has moderating influence on the personality measure.

These findings support the notion that personality can be seen as a very stable concept that is not disturbed when entering a 'new' world such as Second Life. This sheds rather critical light on some blogs on the internet, which are trying to detect the difference between avatars' and peoples' personality (Botgirl Questi, 2008). The differences in personality found by these must be accounted for by the poor operationalization of asking participants directly whether they perceive a difference, and not by a real difference in personality-style.

In psychological research, it is a big problem to find participants for experiments. It is customary to make participation in psychological research an obligatory part of undergraduate psychology programs. This group, however, is very specific in age, interests, educational level etc., all flaws to the validity and generalizability of scientific experimentation. Besides that, the costs of running laboratories are immense, need supervision and are mostly situated at universities, which are not easily accessible for everyone. A virtual laboratory, in contrast, could

run 24 hours a day without any supervision needed and assess people from all around the world (Bainbridge, 2007). This virtual group is not a heterogeneous group representing the whole population either (PC, internet and a program for running the virtual world are necessary), but as a recent study on the demographics among Dutch users of Second Life shows, this group has a big variance in age, education, gender and financial background (de Nood & Attema, 2006). The fact that high reliability scores are found for the real life version and the virtual version of a personality questionnaire as well and that these are very similar to the original reliability scores (Elshout & Akkerman, 1975), shows that virtual realities could function as new reliable platforms to assess participants for psychological research. The mere fact that it was possible to run the present study within a virtual reality, without having too much dropout, running at low expenses and yielding reliable results, shows the high potential and usability of virtual laboratories.

Although the present study yields promising findings, there are clearly some shortcomings at hand. First, the fact that no difference in personality is found might be due to the stability of the questionnaire that has been used, because it is insensitive to the change of personality by nature. Being built on the idea of a stable personality within the tradition of the Big Five personality theory, any personality questionnaire might be un-useful to detect differences of personality within the participants. It might be better to use less stable psychological aspects like self-concept, mood or emotions to detect differences between the real and the virtual world. Second, most participants (except two) of the present study were not in possession of an avatar beforehand. It can be hypothesized that it takes quite some time to develop a 'virtual' personality, which might be found in people using virtual realities on a regular basis. Some participants asked the instructor, if they were supposed to fill in the personality questionnaire as themselves or as their avatar. Apparently, some participants perceived their avatar as partly distinct from themselves, otherwise they would not have asked how to fill in the questionnaire.

Future research should try to overcome these shortcomings to enable future applications of virtual realities for clinical psychological interventions (Westerhoff, 2007). Classically, therapy takes place in a therapist-client(s) setting, in which direct contact is an essential part of the therapy. Nevertheless, new technologies present new methods even in this field. Interapy, for example, uses the internet to give writing therapy without face to face contact between therapist and client, showing promising results (Wagner & Lange, 2008). One could think of expanding classical therapy into virtual realities and by doing so, ease the first step to start therapy. Thinking one step further one could try to implement 3-D worlds in therapeutic avenues that use exposure techniques (Emmelkamp, 2005). In such studies, fear is induced by wearing a 3-D toggle and virtually walking up a skyscraper or virtually sitting in an airplane. Even though people know that they are not on a skyscraper and in no danger of falling, they do experience symptoms of fear. Even in more complex anxieties, like social fear or agoraphobia, virtual realities like Second Life could be used (Gallego, Botella, Banos & Guillen, 2008). People e.g. experience virtual realities as being freer to begin and end conversations with others (McKenna & Bargh, 2000). A socially phobic patient could, as a first step of intervention, step into Second Life and experience social situations behind the PC. The experience of communication and the training of social skills could then subsequently transfer to real life. If the present results are replicated, knowing that people show no difference in personality, psychologists could develop specific intervention programs within virtual settings.

One possibility of future research would be to use other realms of human psychology. Personality is, as shown, a fairly stable concept even across virtual worlds. In contrast, emotional

processing is a more flexible concept that could react on virtual realities much more than personality. Classical experiments within the field of social identity theory manipulate mood or emotion rather than that they assess personality. One further line of research is to administer a mood changing manipulation in real life and in virtual life, in participants that use virtual realities and their avatar on a regular basis. Results of such an experiment could much more thoroughly answer the question, whether people 'are' different in real world compared to virtual worlds.

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