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DISSERTATION

Titel der Dissertation

**The Evaluation of a New Method for Analysis of Thin Slices of
Behaviour as Cues to Personality**

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Abstract

The design of prior self-stranger agreement studies was adapted to test a new advanced method and its applicability.

Prior studies on zero acquaintance most often used a photo paradigm. People are able to rate others from photos, at least on Extraversion and to a lesser degree Conscientiousness, based only on physical appearance.

This study concentrated on facial expressions and head movements as possible information sources. Thus, a new method was developed to eliminate the appearance information. With this method it was possible to transmit nonverbal cues of real-life persons onto embodied agents in a virtual computer environment that looked and moved realistically.

30 volunteers were interviewed and asked to fill out a personality questionnaire (the Neo-FFI). Their facial and head movements were transferred onto computer-generated 3D-equivalents (avatars). The original videos without sound, served as a control group. The 3D avatars with facial expressions and head movements, as well as the avatars without either head movements or facial expressions were then rated by $n = 605$ participants on 60 items of the Neo-FFI personality scales.

With the exception of women rating men in the Without Head Movement Condition, no signal could be found in this data set (after Bonferroni adaption). This includes the Control Group watching the taped interview. There are three possible explanations for this: (1) there was something wrong either with the targets or the raters, (2) the technical issues (concerning the avatar) that were uncovered during the experiment and the evaluation of the data, had too big an impact on the results, and (3) people were unable to overlook the artificiality of the avatar, i.e. they could not rate it as they would the actual person providing the motions.

In summary, the Null Hypothesis was confirmed.

1. Introduction

“First impressions are formed when people observe others for the first time and then ascribe personality traits based on those observations. First impressions play an important role in human interaction because they affect the ways in which people anticipate reactions from others.” (Hubbard, 1994, p.1)

“An important kind of judgement in daily life concerns the personality traits of other people and ourselves. Evaluations of the people in our social environment are central to our decisions about who to befriend and avoid, trust and distrust, hire and fire, and so on.” (Funder & Dobroth, 1987, p. 409)

“They [consensus and accuracy] are important for applied reasons because personality judgments have effects on interpersonal attraction as well as on personal and organizational decisions. To the extent that personality judgments are accurate, they are likely to improve the quality of such decisions, whereas if judgments of personality were unrelated to actual individual differences, they would impair the quality of such decisions.” (Borkenau & Mauer, 2004, p. 599)

Humans base many of their decisions on first impressions. One example is the „coup de foudre“ when people fall in love at first glance and may decide to spend the rest of their lives together based on such a short moment.

It is not surprising, given the importance of such first impressions, that scientists want to find out, how good these first impressions are. Personality psychologists have spent decades studying the interaction mechanisms between two people meeting for the first time.

A critical question here is defining what exactly constitutes a first impression. Personality psychologists circumvented this by asking instead how much information is enough to form an opinion. These studies are called zero acquaintance studies and have asked their participants to assess a stranger’s personality based on as little information as, for example, provided in a photograph. Results indicate that at least a few people are able to forecast another’s personality based on very little information.

Ambady and Rosenthal (1992) read an observation by Gordon Allport that there is something in the nature of human individuals that leads observers to attribute certain

characteristics to them. Based on this they believed that this something is communicated through expressive behaviour and that much of this expressive behaviour is unintended, unconscious, and yet extremely effective.

However, singling out specific signals proved rather challenging. The rating process of personality can be separated into two phases: the ratée sends out signals (encoding) and the rater receives and interprets those signals (decoding¹). There are two ways to send those signals: verbally or nonverbally. This dissertation focuses on the nonverbal signals. The nonverbal category can be further divided into the paralinguistic and the visible channel. The paralinguistic channel is what remains after the semantic content has been removed, i.e. pitch, amplitude, rate, voice quality, contour, etc. (Krauss *et al.*, 1981), while the visible channel includes such expressive behaviours as facial expression, gesture, posture, and appearance (Fabri, Moore & Hobbs, 1999; 2002; Krauss *et al.*, 1981).

Some personality studies focused on voice quality (part of the paralinguistic channel) and attractiveness (part of the visible channel): Of the many cues that people use to judge personality, it was found that voice quality makes a strong impact. Extraversion is especially expressed through (and perceived from) vocal effort, nasality and dynamic range (Scherer, 1978). This finding has been debated, however, as many researchers have found that the assessment of Extraversion is largely mediated by judgements of physical attractiveness (Borkenau & Liebler, 1992) or appearance on the whole (Albright, Kenny & Malloy, 1988). The highest consensus between self- and stranger ratings exists for the most visible traits (Funder & Colvin, 1988), which correlate with Extraversion (Albright *et al.*, 1988).

To control the available information most zero acquaintance studies use a photo paradigm where a photograph of a person with a neutral facial expression is shown. In a study design such as this, attractiveness is the only available cue, and thus, of course, the only cue identified. However, Albright and colleagues (1988) chose a physical presence paradigm for their study - the person being judged was present. Albright argued that even though it decreases the control over the available information, having a live stimulus is

¹ The terms „decoding“ and „encoding“ were used by Hall (a.o. 1984).

more representative of the process of making judgements of strangers. Even with this paradigm, the cues identified were mostly linked to appearance. If one were to show an animated stimulus, for example a brief video segment showing a person during a social interaction, whether the stranger-ratings of personality would be based on the motions of the target or his/her attractiveness would be unclear.

This study was designed to study the role of expressive behaviour using avatars (computer generated figures), instead of real human beings. The avatar was chosen so that no extraneous sources of information could influence the results. The aim of this project was to reveal how much information about personality is transmitted through nonverbal behaviour (i.e. head movements and facial expressions).

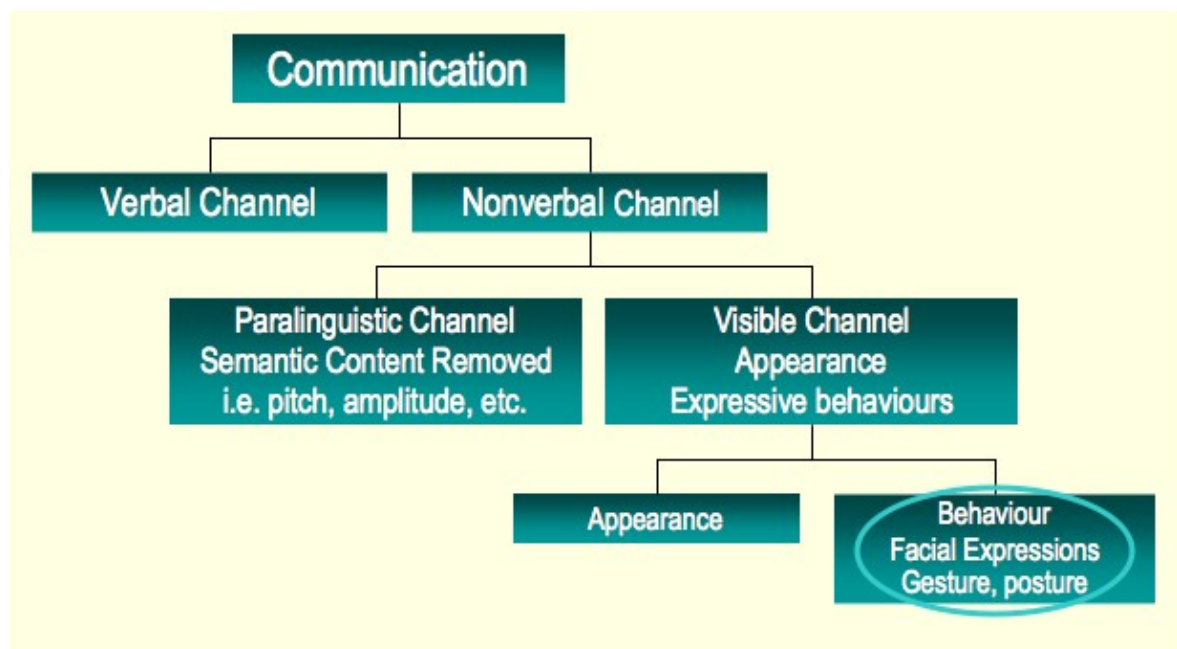


Figure 1: The Aim of this Project

Figure 1 shows the communication channels. Studies exist for the paralinguistic channel (Scherer, 2003), and personality studies have uncovered information on the appearance aspect of the visible channel (Borkenau & Liebler, 1992). The focus of this study was on the behavioural channel (circled in blue). With the aid of the avatar, all information unnecessary to this study, i.e. the verbal channel, the paralinguistic channel and appearance, could be filtered out, enabling the exploration of only the behavioural

channel. Of the behavioural channel, only the value of facial expressions and head movements for personality assessment was studied.

This study's purpose was to test whether the behavioural channel offers enough information for an assessment using avatars as a method in self-stranger rating studies. For this reason, the signals were limited to either facial or head movements. In future studies this could be taken a step further, by limiting the available information to single facial expressions, such as lifting the right eyebrow.

There are multiple reasons for this. Basing one's decisions on verbal information can be dangerous, because your counterpart might be lying. However, most people find it difficult to fake their nonverbal signals. The existence of conmen, whose very livelihood depends on their ability to decipher other people's nonverbal signals for their own ends, proves that it is possible to form a correct impression of a stranger even when meeting him for the first time. If people insist on making important decisions based on such erroneous information², then maybe, by analysing which information is important, they could learn to form more accurate first impressions.

This research also has some importance for the future of avatars. Avatars have found their way into our lives. First, they found their way into computer games and later into animated movies. They can represent a user in a chat room. There are quite a few studies out there on how people use these avatars to hide who they truly are.

Imagine a corporation that has an avatar as representative of their public image. This avatar could feature in advertisement campaigns, but could also be found on the corporation's homepage, guiding their users through the page. This corporation has a certain image that it wishes to present to its clients, carefully crafted by its vast public relations department. Imagine that people can read another's personality from their motions (however inaccurate those readings might be). The motions given to the avatar by their animators could be quite opposite to the corporate image. Maybe they hired an actor for motion capture. Can this actor really hide his true personality or does he always play

² Not only zero acquaintance, but also deception studies have proven that most people are not good at decoding nonverbal signals.

himself? If signals could be identified, this knowledge could be used to create virtual “conmen”.

In short, prior studies have provided information about the signal value of the paralinguistic channel, as well as the appearance aspect of the visible channel. In this study, I wanted to examine another aspect of the visible channel: facial expressions and head movements. To ensure that the ratings of personality attained in this study would be based solely on facial expressions (and head movements), and not on other aspects of nonverbal communications, whose signal value has already been estimated, it was necessary to choose/create a methodology where the influence of attractiveness and voice quality (which are considered confounding variables in this study) could be suppressed.

However, in this context one thing had to be considered. Avatars are a great method for limiting information. On the other hand, they are graphical representations of human beings. Before starting this study, I asked myself whether they could replace a human being. It was quite possible that the raters in this study would be so distracted by its artificiality that they could not judge the personality of the real person hiding behind the mask of an avatar. This is not necessarily a bad thing. Who wants to be deceived by a puppet?

1.1. Person Perception

The main focus of this study was to uncover the influence of nonverbal behaviours, such as facial expressions and head movements, on personality assessment. However, in the end this study is about self-stranger agreement³. Are people able to guess another person's personality after only a brief impression?

Although there are studies where personality was deduced from the environment, either working environment or living space (Gosling *et al.*, 2002), this study will focus on results of person perception.

According to Borkenau (2004) there are two kinds of studies on consensus and accuracy of personality judgements:

“The first uses descriptions by close acquaintances or spouses of the target persons, because these persons know the target well and are therefore able to provide quite accurate judgments of his or her personality. ... Second, there are studies that use personality ratings by strangers who are exposed to controlled samples of the targets' appearance ..., behavior ..., or behavioral residues” (pp. 599)

The following subchapter (Studies in Personality Psychology) will summarize findings on the Acquaintanceship Effect and Self-stranger studies, including those with the Zero Acquaintance design. Prior acquaintanceship studies yielded consensus correlations of about 0.5, whereas those at Zero Acquaintance are even lower (Borkenau *et al.*, 2004).

1.1.1. Studies in Personality Psychology

According to Kenny and his colleagues (1992), social psychologists have long asked themselves how strongly the perception of a person is influenced by a direct cue i.e. stimulus, or if perception is limited to a rendition of the perceiver's assumption about the person. The psychologists' argument is that these characteristics are important factors in the identification of behaviour (Kenny *et al.*, 1992).

³ Self-stranger agreement studies basically consist of two parts: in the first part, a person is asked to fill out a personality questionnaire. This person is then used as a stimulus in the second part of the study, where strangers are asked to observe that person and answer the same personality questionnaire for the stimulus (who is a stranger to them). Whether the strangers are able to assess the personality of the stimulus person or not is calculated via self-stranger correlations. Here, the personality scores achieved by the stimuli themselves are correlated with the personality scores of the stranger ratings.

Acquaintanceship Effect

The term Acquaintanceship Effect as defined by Watson and colleagues (2000) refers to the improvement of the self- and inter-judge agreement with increasing levels of acquaintance. This is likely to have a particularly important influence on low visibility dimensions, e.g. the dimension Neuroticism shows no or little consensus when the judges are unacquainted, but correlations increase and become statistically significant with increasing acquaintanceship (Borkenau & Liebler, 1992; 1993; Colvin & Funder, 1991; Funder & Colvin, 1988; Funder, Kolar & Blackman, 1995; Kurtz & Sherker, 2003).

The trait visibility effect (Watson et al., 2000) on the other hand describes that easily observable personality traits (i.e. those with clear, frequent behavioural manifestations) yield a better inter-judge agreement and higher self- other correlations than do more internal subjective traits (e.g. Funder & Colvin, 1988).

This means that judges need trait relevant information in order to assess (Funder *et al.*, 1995) and that low visibility traits require relatively high levels of acquaintanceship before this information is readily available (Watson et al., 2000).

A good way to estimate the influence of the Acquaintanceship Effect is a so-called self-spouse study, since generally spouses should know their partners very well and thus have gained insight into their personality. The Acquaintanceship Effect relies on two basic assumptions:

1. Assumed similarity: judges show a tendency to rate targets as similar to themselves
2. Assortative mating: people form relationships with similar others, although there generally seems little evidence of it for Extraversion and Neuroticism (Watson *et al.*, 2000).

Funder and colleagues (1995) assumed that similarity may, in part, represent a heuristic that judges use when they lack adequate trait relevant information. When judges know their targets very well - or when they are rating a high visibility characteristic such as Extraversion - they can easily judge based on their direct knowledge of the person. If the information is limited (as it would be in a low visibility trait), their strategy is to use

their own personality as a starting point and to assume that the targets resemble them to some extent. Because the actual degree of similarity is usually limited this heuristic is not particularly effective in most cases.

Comparing married to dating couples and friends Watson (2000) found that the agreement between self and spouse ratings was significantly higher for the married couples than the other two. He further showed that the dimension Neuroticism (rateable under the influence of the Acquaintanceship Effect) showed a very strong agreement for married couples, but only a moderate one for the others. The Acquaintanceship Effect even had the greatest influence on Neuroticism (Table 1).

Table 1: Self-other Agreement Watson (2000)*

	Friendship Dyads	Dating Couples	Married Couples
Neuroticism	.37	.41	.59
Extraversion	.48	.45	.61
Conscientiousness	.39	.53	.49
Agreeableness	.34	.39	.53
Openness	.44	.55	.58

* All correlations significant at $p \leq 0.01$ level.

Supporting Funder's (1995) findings, the assumed similarity (i.e. the assumption that the other person has a personality similar to oneself's) tended to be greatest for traits that showed a relatively weak Self-Other-Agreement. Appendix C shows further findings and studies on the Acquaintanceship Effect.

Extraversion and Conscientiousness are the only dimensions rateable at a level of correlation that is statistically significant in samples of reasonable size. Women receive higher ratings on Agreeableness and Conscientiousness. Kenny and colleagues (1994) also found that overall, correlations for self-stranger agreement studies range from 0 to about 0.3, with higher levels of consensus ratings for Extraversion. It is expected that the results of this study should also be in this range.

As for the remaining dimensions: Neuroticism, Openness, and Agreeableness. Neuroticism can only be judged accurately under the influence of the acquaintanceship effect. The greatest agreement between self and other ratings was between the subjects and their parents, followed by the subjects and their spouses. In other words, I expect Neuroticism to remain hard if not impossible to rate in my study. Agreeableness and

Openness offer little in the way of information. Therefore, most raters rely on assumed similarity (Kenny & Kashy, 1994; Watson *et al.*, 2000). That is, when no information is readily available the rater assumes that the target is similar to him and answers the questions in a personality questionnaire, for example, the way he would have answered them himself.

Zero Acquaintance

Given the design of Zero Acquaintance studies (with a photo paradigm), any impact of the stimulus target can be attributed to physical features⁴. Thus, the physical features determine the extent to which the target creates consensus among judges (Albright *et al.*, 1988).

At first encounter, much information can be derived from physical appearance, gender, ethnicity, physical attractiveness or dress style of the target. This information defines whether our initial perceptions are accurate or erroneous. Using these features, we create an opinion with the application of stereotypes (Albright *et al.*, 1988). Thus, most Zero Acquaintance studies use pictures of their targets as stimuli, where the target looks at the camera with a neutral expression. The pictures are often cut in a way that only the face, and not even the hairdo is visible.

Paunonen (1991) called these cues (i.e. physical appearance, gender, ethnicity, physical attractiveness, dress style, etc.) extraneous sources of information. In a Zero Acquaintance study, there is no social interaction, to test how accurate one's first impression is. Yet Paunonen (1991) explains that due to those extraneous sources of information, observers and targets are "not strangers in the strict sense of the word", since "observers may use valid cues about the target behaviour derived at the time of the experiment itself, cues that go beyond social desirability or base rate considerations". For example, if the target is talkative, smiles and chats with his/her neighbour, he/she will be rated as high in sociability; if he/she is carefully groomed and his/her books are in a neat pile, he/she will be rated as high in orderliness. This also explains why studies in the past

⁴ Zero Acquaintance studies mostly use a photograph paradigm to ensure Zero Acquaintance, in which a photograph of the stimulus is presented. In this photograph the stimulus has to wear a neutral expression, and only the "inner face" is shown, i.e. hair is not shown. In this photographic paradigm no nonverbal cues, beyond appearance, are available. People rating these pictures have to rely solely on appearance for their judgements.

found such high accuracy for observable domains of behaviour such as Extraversion, Conscientiousness and to a lesser degree Agreeableness (Paunonen, 1991).

The following studies show some of the findings concerning the rateability of dimensions and their cues. The first study did not use photographs. Unlike other researchers of Zero Acquaintance, Albright (1988) preferred a physical presence paradigm for her study. Though this decreases the control over available information, Albright believes that it is representative of the process of making judgements on strangers, i.e. first impressions are formed about people and not about photographs. She found that the highest consensus could be achieved for the most visible traits, which were furthermore positively correlated with Extraversion, thus the high agreement for this dimension. Extraversion also had the highest correlation with attractiveness. However, the attractiveness stereotype did not influence ratings on all traits, but only three out of ten: talkative, being sociable and good-natured (Albright *et al.*, 1988). This shows that though attractiveness is an important cue for Extraversion, it is not the only one. Therefore, Extraversion could retain its rateability in the avatar condition.

The greater self-stranger agreement for the dimension of Extraversion was also found by Ambady and colleagues (1995). Results indicate that more sociable and extraverted participants tend to be more legible, and therefore, are judged more accurately. Participants who are more accurate judges tend to be less sociable and perform better on tests of decoding accuracy. Ambady also studied gender effects in decoding and encoding. While some studies (e.g. Watson, 1989) found that there are no gender effects when it comes to the accuracy of judgement, Ambady retested this based on the following findings: Hall (1984) found unambiguous, consistent evidence that women are better decoders of both posed and spontaneous nonverbal behaviour than men. Ambady therefore assumed that women would be better judges than men in a zero-acquaintance situation (Ambady *et al.*, 1995). Furthermore, it was found that women are better encoders of nonverbal behaviour than men (Hall, 1984). As a consequence, Ambady found it likely that women would be more accurately judged than men in Zero Acquaintance situations (Ambady *et al.*, 1995). Ambady used the Big Five dimensions, with Positive Affect replacing Openness. She found that women were better at judging Extraversion and Positive Affect, while men seemed to be better at judging Agreeableness (though not

significantly so). Ambady's finding could indicate that women place more emphasis on Openness, and men on Agreeableness.

Albright and colleagues (1988) found that the second highest agreement (besides Extraversion) was achieved for Conscientiousness, which correlated most strongly with the cue neatness of dress. This dimension also had a slight gender effect, in so far that women were generally rated as more conscientious than men (Albright *et al.*, 1988).

Watson (1989) replicated Albright's findings that the highest correlation could be achieved for Extraversion and Conscientiousness. In his study, all four marker-items ("talkative versus silent", "frank, open versus secretive", "adventurous versus cautious", "sociable versus reclusive") for Extraversion displayed a statistically significant self-peer-agreement, meaning it had a larger amount of visible cues than the other dimensions. For Conscientiousness this was reduced to one marker item ("fussy, tidy versus careless"), but this one was statistically significant. Though ratings for Agreeableness showed no significance, Watson (1989) was able to find, that given a certain number of raters the correlation between self and stranger ratings of Agreeableness becomes statistically significant. Neuroticism showed significant but low agreement on one marker item.

Some other findings from Zero Acquaintance studies are listed below:

- While Kenny (1992) could confirm the conclusion that consensus was highest for Extraversion, and somewhat weaker for Conscientiousness, he added some other findings:
 - ⇒ The ratings of attractiveness correlated with judgements of Extraversion, meaning that attractiveness is a cue for the assessment of Extraversion.
 - ⇒ There are some mediators of target effects, for Extraversion smiling and rapid body movement⁵, for Agreeableness smiling, for Conscientiousness formal dress and negatively rapid body movement, for emotional stability primping and rapid body movement (both negatively), and lastly, for intelligence (Openness) smiling. This would explain, why Agreeableness

⁵ Rapid body movement does not refer to the speed of movements, but their frequency.

and Openness⁶ were unratable in prior studies, where the targets' faces were photographed showing a neutral expression. Extraversion, on the other hand, has other cues besides smiling, such as attractiveness (Borkenau & Liebler, 1992).

⇒ The consensus for the dimension Agreeableness is most likely based on facial cues, which is very interesting for the present study, since of all the cues provided by the study design, the facial cues are the most pronounced ones (i.e. there 23 cues, as provided by the computer program, were used and available, with 16 being facial expressions or facial cues, Kenny, 2002)

In conclusion, Extraversion and Conscientiousness are the only dimensions rateable with any significance at Zero Acquaintance. Some of the cues for ratings are a friendly expression, extensive smiling, direct looks into the camera, and fast movement. Smiling and rapid body movement are an important cue for Extraversion and neatness of dress for Conscientiousness. The latter, however, already counts as what Paunonen (1991) dubbed extraneous sources of information. The reason that Extraversion is rated with higher consensus than the other dimensions is that it provides the most visible cues. One of the main cues is attractiveness (even though it influences only ratings of whether one is talkative, being sociable, and good natured) followed by features of attractiveness, such as hairstyle and clothing, in short beauty enhancers. These also would be extraneous of information.

Put differently, trait visibility contributes to the accuracy of personality assessment. The more visible a trait, the higher its cue value and the greater its influence on personality assessment. Extraneous sources of information, such as attractiveness, enable a more accurate judgement, but could also be considered a confounding variable. If one wants to study how much information is enough to allow for an accurate judgement of personality, these kinds of sources have to be controlled.

⁶ Only one study ever provided a significant result for the dimension of Openness. However, the cues were not provided by the targets' physical appearance or motions, but by their surroundings, i.e. their working space or rooms (Gosling *et al.*, 2002). This could mean that there are no physical cues to Openness.

1.1.2. Methodological Issues

At this point I would like to review the methodology of zero acquaintance studies based on two articles by Peter Borkenau, who is one of the top researchers in this field.

In the first study (Borkenau & Liebler, 1992), the targets and the judges were recruited at different locations to ensure that they had no personal contact. Thus, he recruited the targets outside of the University of Bielefeld and the judges inside. Applicants were not accepted as targets if they had studied at the University of Bielefeld. The mean age of the targets (50 men, 50 women) was 26.32 years. Most subjects were either high-school pupils, students at a technical college at Bielefeld or house wives recruited at the supermarket via announcement. The judges were recruited from the student population at the University of Bielefeld via flyers. They were paid for their participation. Of the interested parties 24 were selected (13 men and 11 women). The prerequisite was that they had not gone to school in the city of Bielefeld. As an additional measure to ensure that the targets and the judges were unacquainted, the judges were asked during the study whether they had seen the target before. In 11 out of 2400 judge-target combinations this question was answered “yes” and the judges’ ratings for those targets were excluded (Borkenau & Liebler, 1992).

The targets described themselves and were described by the strangers on (1) the Norman 20 trait scale and (2) the NEO Five-Factor-Inventory. Furthermore, they had to fill out a rating sheet for 45 physical attributes. These fell into four classes. The first consisted of overall impression such as the age of the target. The second consisted of nine attributes that could only be inferred from acoustic information. 24 attributes that could be inferred from static visual information made up class three. And the fourth class consisted of eight attributes that could only be inferred from dynamic visual information (Borkenau & Liebler, 1992).

The targets were videotaped while entering a room, walking around a table. Then they sat down at the table, looked into the camera and read a standard text (i.e. the weather forecast). Afterwards they got up, walked around the table again and exited the room. This sequence was about 90s long. Before being videotaped the targets were shown the room and the procedure was explained to them. Afterwards they filled out the two personality

measures and the physical attribute-rating sheet. Then they were paid for their participation and left (Borkenau & Liebler, 1992).

Out of this tape four conditions were created. The first one was a 60s still of each target looking into the camera (= still condition). In another condition only the sound was recorded onto an audiotape (=audiotape condition). The third and the fourth condition were the original videotape (= sound-film condition) and the videotape without sound (= silent film). As can be seen the physical attributes from certain classes of the rating sheet only pertain to certain conditions (Borkenau & Liebler, 1992).

The judges entered a room with either a tape or a video recorder (depending on the condition). They listened/viewed the recording of a single target, then stopped the tape and filled out the rating sheets that referred to the physical attributes and the traits of that particular target. Then they restarted the recorder to view or listen to the next target. This procedure was repeated until they had provided ratings of all 100 judges. This took several days per target (Borkenau & Liebler, 1992).

The procedure how the targets and judges of the following study were recruited, the conditions (though only the sound and the silent film were used), and the personality measures used were the same. However, they added a criterion. Borkenau himself describes the self-ratings as “less-than-ideal criterion to evaluate the accuracy of stranger ratings” (Borkenau & Liebler, 1993). To control for this, Borkenau did not only use self-stranger correlations, but also self-peer correlations. So, instead of recruiting a hundred single targets, 50 couples that lived together were recruited. Of these six were same-sex pairs (3 of each sex) and 44 opposite-sex pairs. One of these was mother and son, the others were either engaged or married (Borkenau & Liebler, 1993).

Instead of physical attributes, the third questionnaire employed besides the NEO-FFI and the Norman was an intelligence test (the subscales 1, 2, 3, 4, 5, 6, 8, and 9 of the Leistungsprüfsystem). This additional test was also added as a way to verify the self-reports. Intelligence tests are actual performance tests; they are not based on subjective impressions. Thus self-presentation could not explain a statistically significant correlation between stranger-ratings of intelligence and measured intelligence.

Overall the correlations in prior self-stranger agreement studies ranged from .3 to .45. As such correlations are more a measure of inaccuracy than accuracy. Extraversion is the only correlation that was always found. Depending on the study paradigm Conscientiousness was the second most rateable factor. Agreeableness has been found to be rateable under specific circumstances (e.g. when the Norman 20 trait scale was used instead of the NEO), whereas Openness and Neuroticism are almost impossible to rate in the self-stranger design.

There are some things that struck me as odd in this design. As you can see, even Borkenau has some doubts as to the validity of the self-reports. To validate these other scientists besides Borkenau had compared them to reports from knowledgeable raters. These knowledgeable raters are either spouses or parents. The correlations between the self-reports and those by spouses/parents are in the range of .4 to .6 (Hogan, Johnson & Briggs, 1997).

Hogan describes these values as substantial correlations, which they are not. They are medium to low correlations. And since the literature describes such results using terms like accurate or valid, they are too low.

There are four possible explanations for these low correlations:

- (1) That people are living with strangers. Not even parents/ spouses know that their children/marriage partners are truly like. This explanation makes sense given divorce rates or estrangement from parents. There are some that know their children/spouses better than others, which is hard to tell with mean values.
- (2) People act differently in certain situations. Thus, they behave differently in front of their parents than their spouses. The relatives ratings agree to some point, because they target's personality overlaps. They do act according to their personality in both situations, but there are some aspects of their personality they only reveal to their parents, but not their spouses, and vice versa.
- (3) The self-reports are wrong. People may have a distorted self-image.
- (4) Correlations are the wrong method.

Concerning the first two possibilities there is an interesting study by Borkenau (2004). As before Borkenau used videos of his targets as his stimuli. However, this time they were not filmed in a single situation, but in 15 different ones ranging from “introducing oneself” to “singing a song of one’s choice”. If the ratings were based on 15 different situations self-stranger correlations became higher (but other than Extraversion with .56, none was higher than .5). The stranger ratings in this study were not only provided by recruited judges, but also by the experimenters. Also, under these circumstances the stranger judgments were stronger than the acquaintanceship judgements related to the video-based scores (Borkenau *et al.*, 2004).

The possibility that self-reports are wrong has been considered. Hence the comparison to reports by knowledgeable raters. However, there is no perfect agreement. And it is difficult to say which report is to blame: the self or the acquaintanceship report. No matter which of the first two explanations for the low correlations in self-acquaintanceship ratings is correct, it makes little sense to use them as the “true self-rating”.

There is no situation that would require someone to guess a person’s opinion of himself. Our first impression should be about another’s real personality. If the self-ratings are the basis of a study then participants should not be asked to estimate a stimulus’ personality. Instead of “What is this person like?” the research question should be “How does this person see himself?” In studies it is assumed that the self-report coincides with the real personality. This, however, would have to be verified. To validate results based on the self-reports one would have to multiply the self-stranger correlations with the results from the correlations with knowledgeable raters. Say there is a correlation of .3. This multiplied by the medium from above (.5) results in a correlation of .15. The square of which is .0225. Thus, the self-rating would account for 2.25% of the variance of the stranger rating.

To truly validate the self-ratings true self-ratings are needed. It would be necessary to have all the targets rated by a psychiatrist.

Also, why is the self-stranger agreement calculated via correlations? Personally I would evaluate the agreement between true personality ratings and stranger ratings by calculating the difference, i.e. if the stimuli’s personality score for Extraversion was 3 and the stranger’s 2, the difference would be 1.

It has been assumed that e.g. physical attributes can be mediators of self-stranger

correlations. For example, Albright *et al.* (1988) found correlations beyond 0.7 between strangers' ratings of targets' physical attractiveness and their ratings of targets' Extraversion. However, Albright failed to calculate the correlation between attractiveness and self-ratings. Thus, this study may show that strangers rely on attractiveness to infer the targets' personality traits, but unless these attributes correlate also with the targets' self-reports, they do not contribute to any agreement between self-ratings and stranger ratings (see also Borkenau & Liebler, 1992).

“But it is only necessary to assume here that physical and personality attributes are correlated, as correlations between physical variables and self-reported personality traits are sufficient to explain the consensus between targets and strangers. For instance, if strangers infer level of Conscientiousness from the targets' neatness of dress, and if neatness of dress correlates with the targets' self-rated Conscientiousness, then neatness of dress may mediate the correlation between self-ratings and stranger ratings of Conscientiousness.” (Borkenau & Liebler, 1992, p.646)

In his study Borkenau (1992) assessed the physical variables that mediate the consensus between targets and strangers. For this the stranger ratings of the 45 physical attributes were correlated with the targets NEO-FFI scores and the stranger ratings. This was done only in the sound-film condition, since only in this condition all 45 attributes were present. Many physical attributes correlated with the strangers' trait inferences. Also, self-reported Extraversion correlated significantly with 23 out of 45 attributes.

In this thesis I wanted to study whether nonverbal behaviour is a mediator for stranger-ratings. However, this could not be done via questionnaires. Therefore, the avatar was used, which can be manipulated in two ways (for more details on the avatar refer to chapter 2: Methods): either to display only head movements or all motions except head movement (henceforth called either facial motions or expressions). Thus, the next chapter is going to be a review of nonverbal behaviour and studies in this field.

1.2. *Nonverbal Behaviour and Communication*

Nonverbal communication studies rarely examine the relation between personality and nonverbal signals per se, i.e. there are no studies where particular behavioural correlates are analyzed relative to personality.

Studies in Personality Psychology on the other hand, found more general behavioural correlates such as talkativeness.

The few studies dealing with the exploration of behavioural cues often employed only hypothetical behaviours:

“The usual procedure of such research in person perception⁷ is to provide subjects with artificial, experimentally manipulated cues (e.g., hypothetical behaviors) and then to measure the judgements subjects make on the basis of those cues.” (Funder & Sneed, 1993, p. 479)

For this study, it proved necessary to put results from both fields into perspective and drawing conclusions on which this study could be based.

Thus, this chapter deals with nonverbal communication and results of studies in this field. However, since nonverbal communication seldom deals with personality, the knowledge about cues gained in this chapter will be completed with knowledge about cues to personality gained from personality studies.

1.2.1. Cues to Personality as Identified in Personality Studies

Borkenau and Liebler (1992) have found that the traits that are considered to be most easily visible result in a statistically significant correlation between self- and stranger ratings. In their study Funder and Dobroth (1987) have found that traits are considered to be easily visible when it is easy to imagine the behaviours that would confirm or disconfirm the trait. There are many occasions to allow such behaviour, only a few confirming behaviours are necessary to establish that trait, and it seems subjectively easy to judge. In this study Funder and Dobroth (1987) have identified not only those items of the Q-Sort that resulted in the greatest self-stranger agreement, but also which of those items are the most visible ones. It remains to be seen, which of these items also feature in

⁷ Research into what kind of behavioural and other cues can affect personality judgements

this study. Unfortunately, Funder and Dobroth, while assessing self-stranger agreement failed to assess which item stands for which dimension. Also, in a study a year later some of the items with the highest and lowest self-stranger agreement were found to be different (Funder & Colvin, 1988), so it is hard to judge how reliable their findings were.

Borkenau and Liebler filmed a sample of 100 adults while entering and walking through a room, sitting down, looking into the camera, and reading a standard text. These targets then provided self-descriptions on five personality factors. The raters viewed those targets in four conditions: sound-film, silent film, still picture, or audiotape. Norman's 20 marker scales for the five factors were used (Borkenau & Liebler, 1992).

In relation to the stimuli in this study, the following conditions were present in that study: sound film had displayed all communication channels, i.e. body movements, facial expressions, voice quality, attractiveness etc., in the silent movie the voice quality was missing, still picture meant that raters had to base their judgements solely on the exterior appearance of the target, and audio tape had voice quality as cue to personality. Talkativeness was not an issue, since the subjects only read a standard text.

Two opposite trait descriptive terms (e.g. talkative versus silent), and a seven point rating scale were provided. Additionally, the targets were administered the NEO-Five Factor Inventory (NEO-FFI).

Physical appearance was rated with the use of a rating sheet containing 45 attributes. These fell into four major classes: the first containing overall impression variables (14 attributes), the second could only be inferred from acoustic variables, i.e. audio-tape (nine attributes), the third could be inferred from static visual information, i.e. still picture (24 attributes), and the fourth contained the eight attributes for the dynamic visual information, i.e. sound or silent film.

The results of this study (Borkenau & Liebler, 1992) are depicted in Table 2:

Table 2: Self-stranger Agreement on Norman 20 Trait Scale

Trait dimension	Validity of stranger ratings
Talkative-silent	.30**
Frank-secretive	.23*
Adventurous-cautious	.37**
Sociable-reclusive	.38**
NEO-FFI Extraversion	.51**
Good-natured-irritable	.08
Not jealous-jealous	.05
Gentle-headstrong	.18
Cooperative-negativistic	.19
NEO-FFI Agreeableness	.35**
Fussy-careless	.33**
Responsible-undependable	.10
Exacting-inexacting	.23*
Preserving-quitting	.12
NEO-FFI Conscientiousness	.25*
Poised-nervous	.19
Calm-anxious	.21*
Composed-exitable	-.08
Not hypochondrical- hypochondriacal	-.10
NEO-FFI Neuroticism	.10
Artistically sensitive-insensitive	.15
Intellectual-narrow	.08
Polished-crude	.38**
Imaginative-simple	.15
NEO-FFI Openness to Experience	.20*

As can be seen, strangers least inaccurately inferred Extraversion and Conscientiousness, whereas Emotional Stability was inferred the least accurately. Looking at the cues as given by the Norman 20 trait scale, talkativeness, frankness, adventurousness and sociability seem to be physical cues for Extraversion. Apparently, there are no physical cues for Agreeableness, for Conscientiousness there is fussy and to a lesser degree exacting, for Neuroticism calm, and for Openness there is polished.

As mentioned above (Chapter 1.2.3: Methodological Issues) of 45 physical cues, 23 correlated significantly with self-reported Extraversion. (Those in **bold** script are the ones that could be considered nonverbal behaviours.) Comparing these with stranger-reports, the following physical attributes result as being important for the assessment of Extraversion: sympathetic, attractive, feminine, soft-voiced, powerful voice, unrefined appearance, made-up face, showy dress, unfashionable dress, stylish hair, hard facial lineaments, **friendly expression**, **unconcerned expression**, **self-assured expression**,

extensive smiling, avoids camera, fast movements, frequent head movements, lack of arm swinging, and stiff walking.

Agreeableness produced sympathetic, feminine, effortful reading, high voice, easy to understand, hectic speaking, **friendly expression**, lifts feet while walking, and lack of arm swinging. For Conscientiousness the physical cues were: estimated age, effortful reading, informal dress (a contradiction to “neatness of dress”, Albright *et al.*, 1988), and relaxed sitting. Neuroticism resulted in stiff walking. And Culture or Openness provided the following physical cue: sympathetic.

Kenny and colleagues (1992) performed the following study to identify nonverbal cues to personality. Twenty-second videos of 32 students were used. These were filmed while waiting alone in a private office for a minute. Overall, the study by Kenny and colleagues consisted of four studies. In the third of these studies, they tried to survey behavioural and physical cues to the five dimensions of personality as given by Norman (1963, also used by Borkenau and Liebler, 1992, see Table 2 for overview of items), i.e. the 5th factor was Culture and not Openness. Out of a set of behavioural ratings, which were rated by the observers after viewing the stimulus tapes, only 10 had sufficient interrater reliability (the alpha had to be at least .70) to be used in the subsequent analysis. Six variables were discarded: frowning, downward gaze, information-seeking gaze, slow movement, hair groomed, and fashionable dress. The following behavioural cues were identified as mediators to the five dimensions of personality: the two variables that correlated with ratings of Extraversion were **smiling** and **rapid body movement**, i.e. judges tended to rate targets who moved about frequently and who smiled as extraverts. **Smiling** also had a positive correlation with Agreeableness. Conscientiousness was judged based on **rapid body movements** (negative effect) and formal dress. **Rapid body movement** and primping also affected Emotional Stability negatively, in other words, these movements were a signal for Neuroticism, while Emotional Stability was found to be characterised by slow body movements and not primping. I.e. targets that were relatively stationary were rated as more emotionally stable and conscientious as those who were more mobile. **Smiling** also proved to be a mediator for Culture, and thus for Openness. As before, nonverbal cues are marked in **bold** script. Thus, only two reliable cues emerged from the study: smiling and rapid body movement. Furthermore, Kenny *et al.* (1992) found

that rapid body movement does not manifest itself through the speed of body movement, but only describes how much movement the target displayed.

Albright and colleagues (1988) found a correlation of .74 between Extraversion and attractiveness. In study one to three, Kenny and colleagues tried to replicate these findings. They found the highest correlation in the third study (.59). Though lower than Albright's finding, it still confirmed the relationship between Extraversion and physical attractiveness. Both of these correlations are positive, so one has to wonder if physically unattractive people are considered introverted. Another finding by Albright replicated in this study is that women are considered more conscientious. Since extraneous sources of information, such as attractiveness, are reduced in the avatar conditions, only the gender difference will be replicable in my study design (Kenny et al., 1992).

In their study, Ambady and Rosenthal (1992) tried to identify the accuracy of judgements in each communication channel. For this they reviewed prior studies and organized their results by the communication available in the study design. Overall, they found that the level of accuracy declined when voice was added to face and body (Ambady & Rosenthal, 1992). Table 3 shows the results:

Table 3: Self-stranger agreement split by available channel

Communication Channel	Correlations
Body	.28
Face	.40
Speech	.36
Tone of voice	.26
Transcripts	.29
Body and speech	.33
Face and Body	.54
Face and speech	.41
Face, body, and speech	.28

The accuracy was highest for face and body, followed by face and speech, and only face. The importance of the face for accurate judgements reflects the importance of facial expressions for judgements.

Another interesting finding was that the length of the segment shown apparently has no effect, i.e. accuracy does not increase with length of exposure. Whether observers viewed the films for half a minute or five minutes, there was no statistically significant effect size (Ambady & Rosenthal, 1992). However, in a more recent study (Carney, Colvin

& Hall, 2007) the authors state that the slices should be no smaller than 20s. The optimal length is 60s. Although ratings for a movie with a length of 300s were found to achieve a higher consensus, compared to the 60s movie results the difference was too small to warrant the effort. This study employs a movie length of 25s.

In a study by Albright and colleagues (1988) five traits from the Norman factors were chosen: sociable for Extraversion, good-natured for Agreeableness, responsible for Conscientiousness, calm for Emotional Stability, and intellectual for Culture. They performed three studies at the same time (study one and two being methodologically equivalent), but only study three contained four physical appearance variables, i.e. physical attractiveness, formality of dress style, neatness of attire, and perceived age. Furthermore, an additional trait from each Norman factor was added (talkative for Extraversion, cooperative for Agreeableness, composed for Emotional Stability, fussy for Conscientiousness, and imaginative for Culture (Albright *et al.*, 1988).

1.2.2. Nonverbal Communication Studies on Facial Expressions and Body Movements

Thus far, only few nonverbal cues to personality have been identified by nonverbal communication studies, especially concerning the Big Five (only Extraversion was considered).

Studies on the Nonverbal Cue Value of Facial Expressions

Riggio and Friedman (1986), for example, found that extraverted persons speak faster and display more facial expressiveness cues, as well as use more gesturing and body movement (Riggio & Friedman, 1986). In a prior study, Riggio and Friedman (1982), found that extroverted men spoke more rapidly and expressed themselves through larger body movements, while extroverted females displayed numerous changes in facial expressions, but no body movements.

One problematic finding is that extraverted persons are more successful at posed sendings of facial expressions of emotions (Friedman, Riggio & Segall, 1980), in other words, they are better deceivers.

The next finding is based on a personality dimension not found in the Big Five (however it overlaps with the Big Five's dimensions): Masculinity (M) versus Femininity (F)⁸. In a circumplex model M may be conceptualised as dominance and F as nurturance, the two defining axes of the circumplex (Paulhus, 1987). LaFrance and Carmen (1980) found that persons high on F smile more and hold their counterpart's gaze (no gaze avoidance), whereas those high on M interrupted more and were incapable of continuous speech, filling the pauses with e.g. "um"(LaFrance & Carmen, 1980). Kendon and Cook (1969) found that the amount of eye contact (as well as the loudness of the speaking voice) was also correlated with Extraversion. This could be interpreted as a contradiction, since F and Extraversion are not connected.

Masculinity and Femininity are essentially the behaviour and characteristics of the average male or female, only if a person of the opposite gender could behave that way as well. Seen like this, women normally should smile more and avoid eye contact less often, and given the correlation of F with dimensions of the Big Five, there should be a connection between smiling, gaze avoidance, Conscientiousness and Agreeableness. Men, on average, disrupt their speeches with pauses, which probably is correlated with Neuroticism and negatively with Extraversion⁹. And those high on Extraversion should seek more eye contact.

The next study was particularly interesting for my goals, because it identifies cues not only vaguely related to personality, but also relevant to the assessment of personality. (Riggio, Lippa & Salinas, 1990). The following cues were considered: smiles, nods, head movements (the movement of the head in a single direction), eye contact, hand to hand contact, gestures, self touching (hand to body movement), grooming, shifting

⁸ Lippa (2001) argues gender related traits are true personality traits, and not just social constructions. But he finds that M (masculine instrumentality) - F (feminine expressiveness) is a trait that is largely independent of the Big Five. M overlaps strongly with Extraversion and Neuroticism and to a lesser degree with Openness, and F overlaps strongly with Agreeableness and to a lesser degree with Conscientiousness and Neuroticism, but since they draw on broader personality domains, they cannot be seen as uniquely gender related traits. I.e. someone high on M would be high on Extraversion and Neuroticism, but this person could be male as well as female (Lippa, 1998).

⁹ In the chapter about trait taxonomies, it was mentioned that a negative correlation between Neuroticism and Extraversion exists (Buckingham, Charles & Beh, 2001). Since in relation to Masculinity and Femininity, only the correlation was mentioned and not what kind of correlation, I assume the correlation is in proportion to the relationship between Extraversion and Neuroticism.

(redistribution of body weight and change of posture), turning away, and taking a few steps. The authors found that Extraversion was the most rateable dimension; unfortunately there were no results for visually expressive cues. However, this could have been because they only considered the quantity of the cues and not their form, i.e. how strong the smile was (Riggio *et al.*, 1990). So, while at first glance it may seem that there are no nonverbal cues to Extraversion, this lack of finding could be attributed to an error in design.

Studies on nonverbal communication could be criticized because unlike Zero Acquaintance Studies where there are many studies with a similar methodology measuring the same thing, more or less all findings in nonverbal communication are based on single studies. This could be the main criticism against this field.

Also I was unable to find any studies pertaining to both head or body movements and personality.

1.3. Gender Effects

In their literature review, Markus and Lehman (2002) stated that almost no studies on sex differences in person perception had been performed. Prior studies hinted at the possibility that women could be more legible than men, and that because they were more perceptive, they could be better judges of a stranger's personality (Hall, 1984). Ambady and colleagues (1995) found that women are more accurate judges than men concerning Extraversion and Positive Affect, but they found no differences in who is more legible.

Personality studies thus far have found two factors (Extraversion and Conscientiousness) that could be rated by strangers. These provide low to medium agreement. When the raters and the targets were acquainted, personality can be judged on all five factors, however the scores are not much higher, e.g. Extraversion as rated by spouses with a correlation of 0.61 (Watson, 2000) and of 0.42 by parents (Funder *et al.*, 1995).

1.3.1. Gender Effects Regarding the Assessment of Personality

Some of the most intriguing research on interpersonal perception has focused on people's first impressions of strangers. Typically, these studies have involved ratings of the Big Five personality traits. We know with a reasonable degree of certainty that (a) there are high levels of consensus (= self-stranger agreement) at Zero Acquaintance for perceptions of Extraversion, smaller but statistically significant levels of consensus for Conscientiousness, and little consensus for the other three factors (e.g. Kenny *et al.*, 1994 ; (b) there is self-other agreement for Extraversion and sometimes Conscientiousness, but rarely for the other three factors (Kenny, 1994); and (c) these snap judgements of Extraversion may predict targets' subsequent behaviour (Levesque & Kenny, 1993).

Considering gender effects found for en- and decoding ability (see above), Markus and Lehman (2002) concluded that there should be gender effects in person perception. However, they found that almost no studies on sex differences in person perception had been performed. Only gender effects were found, such as women being rated as more conscientious and agreeable (see Albright *et al.*, 1988¹⁰). Marcus and Lehman (2002)

¹⁰ Though in their study it was also assumed that there should be gender effects based on the studies on gender difference in nonverbal behaviour by e.g. Hall (see chapter 4.3).

theorised that given that women are easier to read and also better at rating personality, women rating other women should achieve the highest consensus, whereas men rating other men should achieve the lowest. Alternatively, Markus and Lehman (2002) suggested that interaction effects might be possible, such as, men and women may be the most accurate when rating the personalities of members of the other sex because they are potential romantic partners.

Their hypotheses for their study were as follows: they assumed that female raters would yield higher levels of consensus and self-stranger agreement, i.e. women are better raters, interaction effects are possible, therefore consensus and self-other agreement may be highest for other-sex ratings because participants may be more sensitive to potential romantic partners. Nevertheless, the possibility that same sex-ratings would be highest was also considered. The last hypothesis was that women would be rated more positively than men. And that this would be greatest for communal traits, such as cheerful, in women, and for the agentic trait of intelligence in men (Markus & Lehman, 2002).

Markus and Lehman (2002) not only considered the perceiver and target variance, but also gender effects as studied in this doctoral thesis, i.e. that there may be gender effects concerning the readability of a gender, as well as the rating ability of the genders, and furthermore, that personality assessment may be influenced by the romantic interest in the rated person. Because of their relevance for this thesis, the results of Markus and Lehman's (2002) study are reported in some detail.

They found few sex differences in the process of perception at Zero Acquaintance (i.e. there were similar levels of consensus and self-other agreement regardless of the sex of the perceiver or the target). The first table juxtaposes the proportion of Markus and Lehman's target variance with the median consensus estimates reported in Kenny and colleagues (1994). The second table divides the data into two groups according to the sex of the target and shows what percentage of each judgement could be attributed to the perceiver and to the target.

Table 4: Consensus at Zero Acquaintance

Trait	Markus & Lehman (2002)	Kenny <i>et al.</i> (1994)
Sociable-Reclusive (Extraversion)	.24	.27
Cheerful-Irritable (Agreeableness)	.19	.03
Responsible-Irresponsible (Conscientiousness)	.18	.13
Calm-Anxious (Emotional Stability)	.10	.08
Intelligent-Unintelligent (Culture)	.09	.07

Table 4 shows that Markus and Lehman (2002) found the greatest amount of consensus for judgements of a sociable factor, the trait representing Extraversion (24%). The difference between the proportion of target variance in their study and the median values reported by Kenny and colleagues (1994) was .05 or less. Cheerful, the trait representing Agreeableness was the only factor for which there was a large discrepancy between their findings and previous studies.

Table 5: Relative Variance Partitioning for Perceptions at Zero Acquaintance

	Sex of Target			
	Female		Male	
	Perceiver Variance	Target Variance	Perceiver Variance	Target Variance
Sociable-Reclusive				
Female Perceivers	.17*	.24*	.16*	.30*
Male Perceivers	.15*	.28*	.18*	.28*
Cheerful-Irritable				
Female Perceivers	.30*	.22*	.30*	.21*
Male Perceivers	.22*	.20*	.19*	.08
Responsible-Irresponsible				
Female Perceivers	.43*	.07	.27*	.16*
Male Perceivers	.35*	.12*	.18*	.16*
Calm-Anxious				
Female Perceivers	.27*	.02	.21*	.00
Male Perceivers	.25*	.15*	.14*	.21*
Intelligent-Unintelligent				
Female Perceivers	.52*	.07	.48*	.09*
Male Perceivers	.43*	.13*	.34*	.11*

* $p < .05$

Table 5 shows the relative variance for the interpersonal ratings. These values indicate what percentage of each judgement could be attributed to the perceiver and the target. Variance components (perceiver or target) significantly greater than 0 are marked with an asterisk. The level of consensus for judgements of sociable factors appears to be relatively consistent regardless of the sex of the rater or the target, ranging from .24 when women rate other women to .30 when women rate how sociable men appear to be. The unusually high levels of consensus for Zero Acquaintance judgements of cheerfulness were

consistent across the different perceivers and targets except when male perceivers rated male targets, where the proportion of target variance (.08) was much closer to the average value (.03) reported by Kenny and colleagues (1994). Ratings of responsibility and intelligence both yielded statistically significant levels of consensus except when female perceivers rated female targets.

The only notable sex differences were found for ratings of calmness. There were statistically significant levels of consensus when men provided the ratings but not when the perceivers were female. Although the target accounted for 21% of the variance when men rated the calmness of other men and 15% of the variance when men rated women, there was virtually no consensus when women rated the calmness of either men (0%) or women (2%). Thus, men were more likely than women to reach consensus when rating the calmness of strangers (Markus & Lehman, 2002).

There is some disagreement regarding gender effects. In prior studies, (e.g. (FormyDuval et al., 1995)) it was found that men were judged more positively than women. Men were perceived as more conscientious, emotionally stable, open to experience, and (perhaps) extraverted. On the other hand, a review by Eagly and Mladinic (1994) found a “Women Are Wonderful effect”, indicating that both male and female raters tended to hold a more favourable stereotype about women than men, e.g. women were rated as more conscientious and agreeable (Albright et al., 1988).

There were few sex differences in the process of perception at zero acquaintance (i.e., there were similar levels of consensus and self–other agreement regardless of the sex of the perceiver or the target). However, there were noteworthy sex differences in the content of these perceptions; Markus and Lehman (2002) found that women were rated as more cheerful, responsible and intelligent. For the NEO-FFI this would be more agreeable, conscientious and open, i.e. there is a “Women Are Wonderful” effect. They also found that compared to men, women rated others as more sociable and cheerful (extraverted and agreeable). However, no interaction effects were found.

Each dimension of the Big Five was represented by a single trait: **sociable-reclusive** (Extraversion), **cheerful-irritable** (Agreeableness), responsible-irresponsible

(Conscientiousness), **calm-anxious** (Emotional Stability), and intelligent-unintelligent (Culture). The facial expressions are marked in **bold** script.

1.3.2. Gender Effects in Encoding and Decoding Nonverbal Behaviour

That gender effects exist for encoding (the actual information conveyed by a specific cue) and decoding ability (how good perceivers are at interpreting said information) supports that there should be gender effects in person perception.

It was found that women smile and laugh more frequently (Hall, 1984), which, as seen above, is associated with the personality dimension of Femininity (LaFrance & Carmen, 1980), and thus a possible explanation as to why women are rated as more agreeable and conscientious (Albright et al., 1988), Kenny and colleagues (1992) established in their study that smiling is a cue for Agreeableness. Women are also the better nonverbal encoders and decoders (Hall, 1984), especially of facial expressions (Rosenthal et al., 1979) and they are sensitive to nonverbal communication (Hall, 1984). The most probable reason for this sex difference is that men are taught to suppress most emotions. In most human cultures this is considered proper masculine behaviour (Brody & Hall, 1993). Women are more alert to nonverbal behaviour on the whole and better at recognizing specific messages conveyed by nonverbal cues (Hall, 1984).

Briton and Hall (1995) wanted to study this effect more closely in a study involving 441 undergraduates. The items relevant for this thesis are marked in **bold** script. It was found that women score higher on the following items: interaction with other people at close distance, recognition of faces, **smiling, gazing, having expressive faces**, paying attention to others' nonverbal cues, using hands to communicate, **laughing**, and having an expressive voice. They were also perceived as having significantly better de-/encoding skills. Men scored higher on using speech disfluencies (stammers, false starts), interrupting others, having restless feet and legs, interspersing speech with "um" and "ah", speaking loudly, and touching themselves during interaction. Lastly, there were no perceived gender effects for talking a lot in mixed sex groups, frowning and facing another person directly (rather than at an angle) when talking.

For this study it is important to notice that women indeed are better at recognizing specific messages conveyed by nonverbal cues, i.e. there is a gender effect. Until now,

only very visible facial expressions, such as smiling and eyebrow movements were considered.

Finally, men seem to rely more on body movements as communication methods than facial expressions.

1.4. The Embodied Agent i.e. Avatar

The chapter about personality showed that it is indeed possible to judge a person after a brief impression. However, these judgements are influenced e.g. by characteristics such as attractiveness. These characteristics are not interfering variables. Instead they are cues for the judgement of personality. Thus, the problem when investigating how much information is necessary to judge a stranger accurately is to know which cues are used. Therefore, a method has to be found to limit the amount of available information: an embodied agent i.e. avatar.

Avatars, up to this point, were used in a different context, i.e. they were not used for self-stranger agreement ratings of personality. But, they have certain characteristics that make them useful for this kind of study. An avatar is a puppet. It will not act without an input from the puppeteer: the researcher. Thus, it is very useful when it comes to control the information that will be available during the study. When Borkenau (1992, 1993) performed his studies (detailed in chapter 1.2.3: Methodological Issues), he taped his targets. From this original movie, that had both video and sound, he could derive three sub conditions: a silent movie, a sound tape and a still picture. This is all the influence one can have on the stimulus material without taking invasive measures. For example, if I wanted to film my subjects without head movements, than I would have to hold their head in place so they will not move it unintentionally. However, if that subject is an avatar, I quite simply will not animate its head movements. The question is whether watching an avatar is the same as watching a human being. The following studies have used the avatar as method before.

Bente (2001) described the problem of the avatars as follows:

“The major concern of the present approach [use of an avatar] was to determine whether such computer animations are capable of producing realistic person perception effects in neutral observers. This test is crucial for any future application of this methodology in person perception research: before systematic variations of computer animations can be applied in experimental research into specific nonverbal behaviors, it has to be demonstrated that animated movement evokes socio-emotional effects similar to those of real-life or videotaped behavior and is not merely perceived as ‘artificial’ or ‘strange’.” (Bente et al., 2001, pp.154)

Mainly this chapter refers to the question whether an avatar elicits the same kind of responses as a real person.

Moser and colleagues (2006) have found avatars¹¹ (computer generated figures) to “elicit amygdala activation similarly to human faces, yet have the advantage of being highly manipulable and fully controllable” (p.1). In other words, an avatar can be used to keep attractiveness constant, while the variable expressiveness remains variable.

Frey (1999) and Kempter (1993) conducted experiments showing video clips of politicians. While participants watched these, their electrical skin conductance was measured. Some of these politicians elicited changes in the vegetative system as if they had a kind of nonverbal charisma.

In a continuation of this study Kempter (1999) wanted to examine kinesic behaviour. For this he used a computer-animated doll i.e. an avatar. With the help of script animations, a method to survey body movements, the motions of politicians as seen in television was transferred onto the avatar. When comparing the ratings for the original videos, to those of the computer animations only little difference was found. Frey (1999) saw this as the evidence for the dominance of information on movements over appearance. In conclusion, the response is the same whether the stimuli is an avatar or not.

Bente (2001) successfully used avatars in person perception studies, estimating that “most of the relevant social information available to observers in the video recordings was also conveyed by computer animations” (2001, p. 151). The difference between my avatar and the one used by Bente is that in one study he surveyed person perception effects on head movements (Bente, Feist & Elder, 1996), where the avatar consisted of a wire-frame model, and in another he studied body movements (Bente et al., 2001), while I studied facial expressions and general expressiveness.

When it comes to the cue value of facial expressions, studies so far have mainly identified smiling as a cue and centred their interest of research on it. One (Krahmer et al., 2006) is particularly interesting for this thesis, because it also used avatars (no interactive ones, but still pictures of avatars) to investigate the influence of movements on personality scores, specifically Extraversion/Introversion. The main difference from my study is that

¹¹ The word Avatar or Avatara is Sanskrit and means to descend. In Hinduism deities would descend to earth as a human or animal incarnation to fight an evil in the world (Encyclopaedia Britannica). This concept was remembered when the first chat rooms were created. There the avatar is a synthetic character, a stylised representation of the user, and a notion of place. Avatars can be represented as text, pictures or three dimensional models. It is a virtual incarnation of its human user with which he can travel through the virtual world (Roddy & Epelman-Wang, 1998). Today, avatars are also used in motion pictures, advertising and even in science.

the motions used were not taken from real subjects, but were stylised to investigate the influence of the movements on personality scores, specifically Extraversion/Introversion. The cues studied were: gaze, eyebrows and speech. These cues were modified to show a parameter value for either Extraversion or Introversion. Specifically this means that there was an:

- Introverted Gaze, where the eyes moved to the southwest (or rather the lower right, from the stimulus' point of view).
- Extroverted Gaze, where the eyes were fixed on the user, only interrupted by two blinks to enhance naturalness
- Introverted Brows, meaning no eyebrow movement, and the
- Extroverted Brows, where the eyebrow movements coincide with the accented words in the extrovert speech condition.

It was found that all three cues have a highly statistically significant effect on perceived personality, and that gaze and eyebrow patterns reinforce each other. Basically, five personality types were found: if all three patterns corresponded to either the Extraversion or Introversion patterns, then the personality score was either highest (Extraversion) or lowest (Introversion). With at least two Extraversion patterns, the avatars were seen as more extraverted, etc. The more expressive the face (in this case, because of stronger eyebrow movement), the more extraverted it seems (Krahmer et al., 2006).

Important for my study are the following consolidated findings: eyebrow movement and gaze direction seem to be important cues for Extraversion, and the avatar should be interactive (i.e. show an interaction with an imaginary conversation partner) for the full portrayal of either extraverted or introverted behaviour.

Krahmer *et al.* (2006) were not the only researchers trying to identify cues for Extraversion. This focus on Extraversion can be explained by the fact that, as portrayed before in the chapter about personality studies or rather self-stranger agreement studies (chapter 1.1.1), Extraversion is the dimension rated with the most accuracy, meaning the

dimension with the greatest self-stranger agreement (although Conscientiousness is mostly equally rateable).

Besides using the avatar to control the extraneous sources of information, the targets and raters in this study will be split by gender to determine gender effects in de- and encoding ability.

1.5. Hypotheses

In this study there are no traditional hypotheses. There is a null hypothesis versus an alternative hypothesis. They are phrased this way so that the reader can clearly tell that the null hypothesis is supported by the data. And as written in the introduction this is a great relief, because this study shows that the people are unable to rate an avatar. Thus, they are able to differentiate between a real person and a virtual one.

Null Hypothesis: There is no information in the filtered avatar for stranger ratings of the self-rating.

Hypothesis: Some aspects of the self-ratings will be predictable by strangers viewing the avatar.

2. Methods

2.1. *Subjects: The Targets/Stimuli*

During a prior study (Renninger, 2004) the behaviour of 82 undergraduate students at the Ludwig Boltzmann Institute of Urban Ethology (46 women and 36 men, average age 24.26) was observed and recorded on videotape during an interview (will be described later in some detail). Of these 82 subjects 30 were chosen at random. A power analysis was performed using the software G-Power (Faul et al., 2009; Faul et al., 2007). The sample size was calculated with an α of 0.05 and a power of 0.80 (Bortz & Döring, 2006). However, the sample size was not calculated using a medium effect (0.3), but the silent movie condition (0.47) from Borkenau and Liebler (1993), as this condition is closest to the stimuli of this study. Thus resulted $N = 24$, which was rounded to an even 30.

With a sample size of 30 targets there was a 50:50 chance of finding any evidence for a signal, which was appropriate for an exploratory study that limits the information available for personality assessment in such a drastic way.

However, it proved useful to proceed with the conventional power computation. For a sample of size 30, the 0.05 significance level of an error sum-of-squares fraction in an accuracy analysis is about 0.8775, corresponding to a slope of about 0.35 in a regression with intercept 0 on standardized variables. In this study multiple comparisons were calculated. The number of comparisons was equal to the number of personality traits in the NEO-FFI, which are 5. Therefore 0.05 has to be replaced by $0.05/5=0.01$. The corresponding sum-of-squares for inaccuracy became about .7975, equivalent to a regression slope of about 0.45 in a regression through the origin on normalized variables. In view of this a signal corresponding to these in magnitude would be detected with power of about 50%. This is high enough for an exploratory study. The canonical correlations analysis from prior studies (see chapter 1) has power about 50% for a signal of roughly the same strength. That strength, corresponding to regression slope 0.45 with no intercept, almost exactly equals the largest effect magnitude reported anywhere in the literature. Thus, I chose a sample size of 30, representing a power of just about 50% at the largest effect magnitude ever reported, which seemed entirely appropriate in a Bayesian context (Jeffreys, 1961). I wanted a 50:50 prior, equipoise between the null and its falsification, so

that the likelihood of the null on the data was equal to its Bayesian posterior likelihood ratio, the parameter of inference that Jeffreys (1961) calls K . This equivocation is entirely appropriate for a study as fraught as this one is with philosophical implications. The null hypothesis (no relation between the filtered avatar and the self-rating) is massively consistent with the data set here. Such a finding – the survival of the null -- is uncommon in the psychological sciences but quite common in the natural sciences, in one of which (bio-anthropology) this thesis is situated.

As mentioned above, the interviews and the avatars were part of a prior thesis. The following section describes how these interviews and the transference of the motions onto the avatars was performed. This section is based on the information given by Renninger (2004) in her dissertation.

2.1.1. Interviews and Avatar Animation

During the interview video footage of the students' expressiveness patterns was collected. Of the collected data (i.e., not all data collected could be transferred onto avatars) $N=90$ participants, I used 30 samples (17 women, 13 men, average age 24.1).

The Interview

The Interviews (Figure 2) had been performed for another study (Renninger, 2004) in the last quarter of the year 2003 at the Ludwig Boltzmann Institute for Urban Ethology. The same interviewer conducted all the interviews, which lasted between 10 to 15 minutes. Figure 2 shows the setup for the interviews.

The students were interviewed in a casual conversation format. This allowed for the observation of facial displays in a situation that was somewhat structured, but involved a degree of behaviour that is commonplace in everyday life as well. The participants were seated in a chair, facing a digital video camera and the interviewer. The video camera was positioned to the left of the interviewer's shoulder. The participants faced it at eye level at a distance of 1.5 metres¹². With the set-up complete the interviewed person was asked four questions (e.g., "Describe your best friend.", and "in ten years, where would your ideal

¹² By marking the position of both the chair and the camera this distance remained the same for all interviewers making it standardised.

place to live be and why?”). The participant and the interviewer were the only persons present during the time of the interview. Afterwards, participants filled out the NEO - Five Factor Inventory (Borkenau & Ostendorf, 1993).



Figure 2: Interview Setup at the Ludwig Boltzmann Institute (LBI) for Urban Ethology

Tracking the Participant's Facial Movements

Each digital video recording was loaded into Adobe® Premiere® Pro (Ver. 2.0, San José, California, USA), a film editing application, which was used to cut and save a 30-second clip. This clip was not chosen at random, but had to match certain pre-requisites (before starting to speak, the target had to sit still with a neutral expression). For the use with the motion-tracking program, a neutral expression was necessary, while looking directly into the camera for the first five frames of the segment. It proved best to start the movie segment during the last few beats of the question (while listening all participants displayed a neutral expression).

For the following processing the software programme Eyematic Facestation™ (Ver. 2.0.2, San Francisco, California, USA) was used. This technology allows an actor to “drive” a fully textured 3D head in real-time using his or her own facial expressions and

head movements. Eyematic's technology results from investigations into how the human brain processes visual information. The research was led by Dr. Hartmut Neven (Hong, Neven & von der Malsburg, 1998), Eyematic chief technical officer and Professor Christoph von der Malsburg (Okada & von der Malsburg, 2001), co-founder and director of the Neuroinformatic Institute in Bochum, Germany. The programme suite¹³ FaceStation consists of four programmes, two of which were used in this project:

1. Eyematic FaceLifterTM - to track pre-recorded computer video files
2. Eyematic FaceDriverTM - the Autodesk® 3ds Max® (Ver. 6, San Rafael, California, USA)¹⁴ plug-in component that receives animation data from FaceLifter.

After cutting and saving the videos, the clips were loaded into Eyematic FaceLifterTM (Figure 3). First an **Initialization Frame** and a **Calibration Frame** had to be set. The initialization frame is the frame on which FaceLifter will search for a human face in the image and determine the positions of the facial features to track. Tracking starts with the calibration frame.

¹³ A programme suite simply is a term to describe a package of programmes.

¹⁴ 3ds Max is a 3D modeling, animation and rendering program from the Media and Entertainment division of Autodesk, Inc.

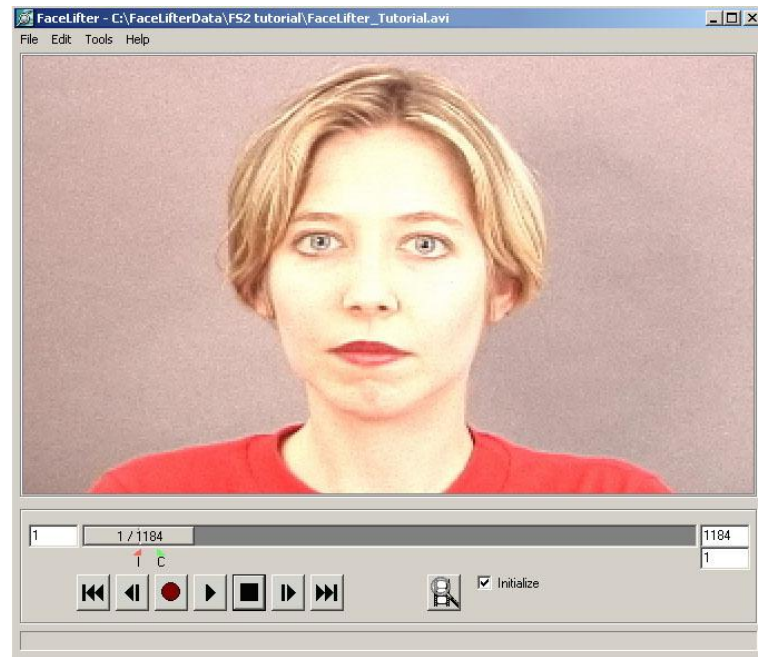


Figure 3: Facelifter Display

After a few frames, virtual markers will appear on the actor's face and will track his/her facial movements for the remainder of the video (Figure 4). Note: It is extremely important that the first seconds of the recorded video contain only a neutral facial expression. The actor should begin talking or acting only after a neutral pose is first established.

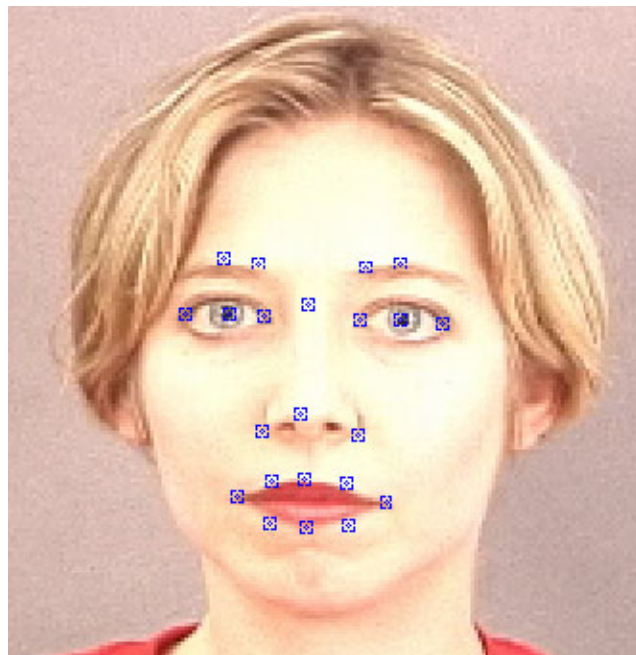


Figure 4: Face after markers' appearance

Facelifter assigns the virtual markers automatically. It requires 2 markers per eyebrow (at the beginning of the eyebrow and the arch), 1 between the eyebrows and above the nose, 3 per eye (1 on each corner, and 1 on the pupil), 3 on the nose (2 on the edge and 1 on the point), and 8 on the mouth (2 on the corner, 3 along the line of the curve of each the upper and lower lip, compare Figure 4). Should one marker be placed incorrectly, e.g. when the eyebrows are of very light colouring, the programme has difficulties recognizing them, the position is adjusted manually. The markers selected for manual reassignments are marked in yellow (see Figure 5).

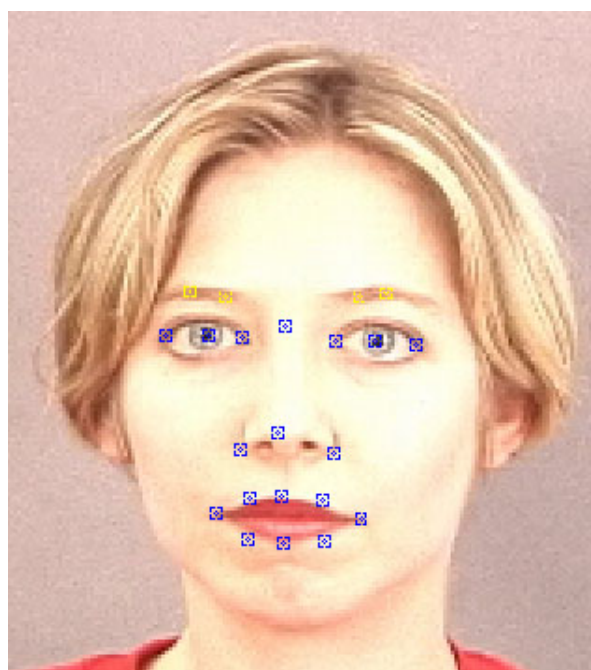


Figure 5: Adjusting the markers manually

With the time slider of the programme set to the first frame, the button “Analyze” is pressed (with the magnifying glass icon).

For the use with 3ds Max®, three kinds of data have to be exported and saved as individual files: the Animation and the Extent Data, as well as a WAV File. The first contains information about the movements of the Targets, the second incorporates the length of the video clip, and the third holds the audio file.

After the movements had been tracked, these data were then exported to Facedriver, which is a standard plug-in for 3ds Max®, a modelling, animation and

rendering programme. The data from the landmarks was transferred onto the avatar through Morph Targets. There are enough Morph Targets to cover all the landmarks.

Facestation imports the data using these Morph Targets. There are three preset groups: (1) facial movements, (2) head and lower teeth rotation, and (3) eye rotation.

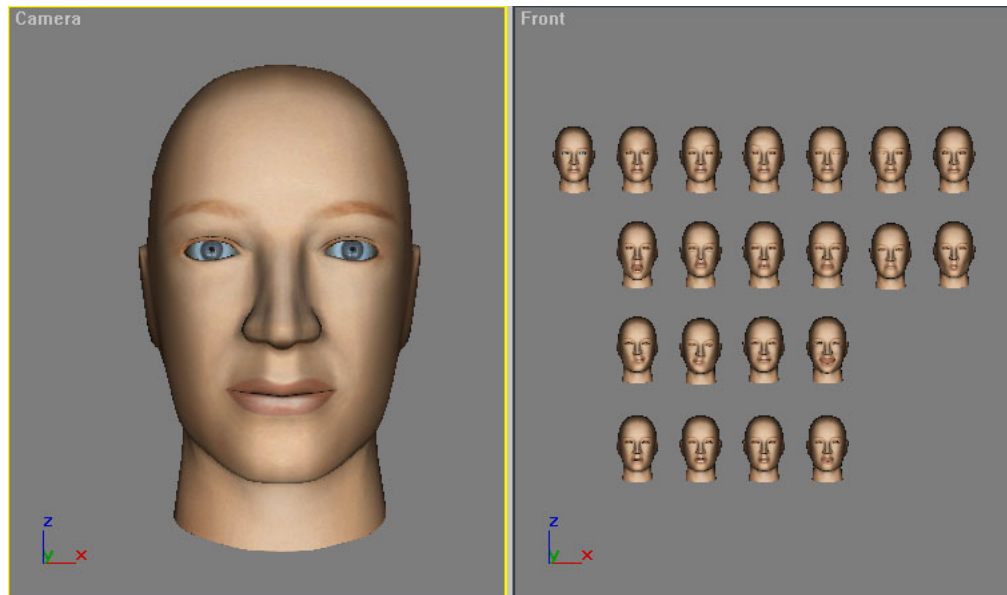


Figure 6: Neutral Head with Individual Morph Targets

This face (Figure 6) has a completely neutral expression, and from now on I will often refer to it as the "neutral head." All the other head models are Morph Targets for the neutral head.

After setting up the Morph Targets, the plug-in can be found in the **Command Panel** (to the right of the screen) under the **Utilities** tab, the panels name is **Motion Capture**. Here, the buttons Import Extent/Tracking Data were used to import the data (the sound = WAV-file was imported separately using the sound options in the properties menu).

Within each of these Morph Targets, 3ds Max® uses a movement analysis programme to graph the participant's movement within that target over time (Figure 7), i.e. each Morph Target is represented by a motion graph. Afterwards a plug-in was used to export the Morph Target activation for every frame. The result is the timeline data for the Morph Target activations.

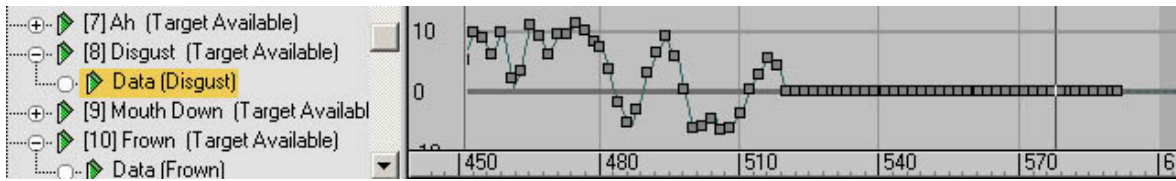


Figure 7: Motion Graphs in Discreet® 3ds Max®

Finally, the movement frames were rendered in 3ds Max® and saved in a resolution of 800x600 pixels. Using Adobe Premiere Pro¹⁵, the timeline of the frames was exported and the frames were assembled into a fluid animation video clip (25 frames per second).

Figure 8 shows a sequence of images representing how the avatar looked after animation.



Figure 8: Avatar Sequence of 30 frames showing only even numbers (36f 030 –36f 058).

2.2. *The Personality Questionnaire: The NEO-PI-R/ NEO-FFI*

In this study the NEO-FFI (NEO Five Factor Inventory) was used. There is a newer version of this questionnaire: the NEO-PI-R (NEO Personality Inventory Revised, Ostendorf, 2004). Instead of replacing the NEO-FFI, it extended it. Besides the five main

¹⁵ Adobe Premiere Pro is a real-time, timeline based video editing software application.

factors (and their 60 questions), there are sub-factors called facets (surveyed with 180 additional questions):

1. Neuroticism
 - a. Anxiety
 - b. Hostility
 - c. Depression
 - d. Self-Consciousness
 - e. Impulsiveness
 - f. Vulnerability to Stress
2. Extraversion
 - a. Warmth
 - b. Gregariousness
 - c. Assertiveness
 - d. Activity
 - e. Excitement Seeking
 - f. Positive Emotion
3. Openness
 - a. Fantasy
 - b. Aesthetics
 - c. Feelings
 - d. Actions
 - e. Ideas
 - f. Values
4. Agreeableness
 - a. Trust
 - b. Straightforwardness
 - c. Altruism
 - d. Compliance
 - e. Modesty
 - f. Tendermindedness
5. Conscientiousness
 - a. Competence
 - b. Order
 - c. Dutifulness
 - d. Achievement Striving
 - e. Self-Discipline
 - f. Deliberation

The NEO-FFI is the short form of the NEO-PI-R. Since all prior studies including the thesis that collected the samples, used the short form, it was used for this study as well. This study used the methodology providing the necessary information: the five factors of personality.

The NEO-FFI was favoured above all other personality questionnaires for the following reasons:

1. I found that this questionnaire was the most widely used. By using the same questionnaire a direct comparison to these other studies was possible.
2. According to Ostendorf and Angleitner (2004), the validity and reliability of the NEO-PI-R is higher than of other personality questionnaires (including the 60 questions which correspond to the NEO-FFI questions).
3. The NEO-FFI takes only five minutes, at most 15, to fill out. Given that all participants had to review two targets, selecting a questionnaire taking only a short time was an absolute necessity.
4. Ostendorf and Angleitner (2004) also showed that if the scales of the NEO-PI-R (and thus the NEO-FFI) are factorised with other more generally constructed questionnaires, such as the California Q-Set (McCrae, Jr & Busch, 1986), there were clear correspondences.
5. The manual of the NEO-PI-R contains a section showing the relationship to other personality questionnaires (mostly concerning the 5 factors and thus also relevant to the NEO-FFI), i.e. if prior studies used a different questionnaire, comparisons could still be drawn.
6. In multidimensional questionnaires, the dimensions Openness, Agreeableness and Conscientiousness are often underrepresented (Ostendorf & Angleitner, 2004). For example, the second most widely used personality questionnaire would be the EPQ-R by Eysenck and Eysenck (1985), based on Eysenck's PEN-Model measuring Psychoticism, Extraversion and Neuroticism. Although correspondences between the dimension Psychoticism and the negative poles of Agreeableness and Conscientiousness were found, these dimensions are not directly measured (Ostendorf & Angleitner, 2004). But for this study, measuring at least one of these two dimensions was an absolute necessity, since Extraversion and Conscientiousness are the two most rateable factors of personality.

7. The NEO-FFI offers two separate forms, one for self (in German form S) and one for stranger ratings (derived from the NEO-PI-R form F), making it the ideal method for comparing the two.

2.2.1. The Variables of the Big Five/NEO

- a) **Extraversion:** is also called social adaptability, it encompasses a keen interest in other people and external events, as well as venturing forth into the unknown with confidence.
- b) **Neuroticism or Emotional Stability:** sometimes the adjustment is examined, due to negative denotation. The bases for Neuroticism are anxiety and volatility; stability and low anxiety at one end as opposed to instability and high anxiety at the other end define this dimension of personality.
- c) **Openness:** asks, how willing people are to make adjustments in notions and activities in line with new ideas or situations. It is measured on a scale of non-conformist and creative versus conventional and down-to-earth.
- d) **Agreeableness:** deals with the question, how compatible one is with other people, mainly how we get along with others, the scale here is trusting and helpful versus suspicious and uncooperative.
- e) **Conscientiousness:** how much does a person consider others when making decisions, hard working and reliable versus lazy and careless limit the scales (Popkins, 1998).

2.3. Procedure

In her study Renninger (2004) gathered and selected realistic expressions and movement style. For this, students were interviewed. These interviews were filmed. Afterwards, the subjects were asked to fill out a personality inventory, in this case the NEO-FFI. The latter was necessary for the testing of self-stranger agreement in the main study. In preparation for this study, a 25s segment was taken from these interviews and used for the generation of the avatar, i.e. the behaviour of the subject during the interview was transferred onto the avatar using Eyematic FacestationTM. During the interview the

participants were asked to look straight into a camera, thus their interview was recorded and measured.

In the main part of the study, I used the collected information and created the animated avatars. The raters were then asked to evaluate two videos using the NEO-FFI (stranger form). There were 30 videos in 4 different conditions. These 120 videos consisted of the 30 original videos (i.e. the 25s segments taken from the interviews), the 30 avatars, and two sub-conditions: 30 avatars without facial expressions and 30 avatars without head movements. The homepage was programmed so that each of the 120 stimuli would be viewed 10 times, after reaching that number the video was taken out of the roster. These two videos each showed either one of the original interviews (called Original Condition or control group) or an avatar belonging to one of these three conditions: (1) the Avatar Condition, (2) the Without Head Movements Condition, and (3) the Without Facial Expressions Condition.

2.4. Main study: Assessment of Personality through the Use of Avatars

The main study consisted of three parts:

- (i) Person Perception
- (ii) Gender Effects
- (iii) Nonverbal Communication.

2.4.1. Part I: Person Perception

In the first part, the participants were shown two videos, taken from a roster of 60 videos (2 conditions à 30 movies: the original interviews and the derived avatar form). For this purpose, I programmed a website showing the videos. Below the videos the questions of the NEO-FFI were displayed in random order, one at a time. After one question was answered the next was displayed. After the 60th item, the homepage reloaded and a new video was displayed.

Projekt Persönlichkeit Und Avatare	
	
46	Er ist selten traurig oder deprimiert.
'starke Ablehnung ☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 'starke Zustimmung Neutral	

Figure 9: Website "Rating Station" (language german)

After having watched both videos and having answered all 120 questions (2x60), the homepage switched to the finishing page, where the participants had to answer a few last questions about: Participation (where did you fill out the questionnaire and where did you hear about it), demographic data (age, gender, job, field of study), usability (ease of use, are 60 questions enough to capture personality, clearness of phrasing) their opinion of the avatar/original movie (emotional reaction to faces, how strong, which conditions did you see [2 avatars, an avatar and a human, 2 human], which avatar condition, realism of avatar on a scale of one to five), and a comments section. The results of these questions were transferred into a database, where they were available for later evaluation.

The database containing the roster of 60 videos was programmed to show every video at least 10 times, i.e. each video was watched by at least 10 different raters. On average each movie was watched 9 ± 2 times. Due to ratings being filtered out afterwards, e.g. because (1) they finished only one rating, (2) did not give their demographic data, (3) admitted (in the commentary section) that they filled out the questionnaire randomly, etc., some of the movies were watched less often. The worst cases were the female target # 36 in the Without Head Movement Condition, the male target #81 in the Original Condition

and the male target # 88 in the Without Head Movement Condition which were rated only 4 times each.

2.4.2. Part II: Gender Effects in Personality Assessment

The data for this part were surveyed the same way as for the first part, however, the data was first split by target and rater sex. This enabled me to determine the influence of gender on the de- and encoding ability.

2.4.3. Part III (Main Part): The Influence of Nonverbal Communication

In the third part of this study two subcategories of the Avatar Condition were created, displaying either only head movements or facial expressions.

2.4.4. Statistical methodology

In Part I ratings were evaluated using Pearson correlations for self- and stranger-ratings for both the Avatar Condition and the Control Group, to see if the computer animated figures were rated differently than the actual persons filmed during the interviews. For Part II these ratings were additionally split by target and rater sex. Two subcategories of the Avatar Condition were created, displaying either only head movements or facial expressions. By again calculating correlation coefficients to determine self-stranger agreement, I was able to determine whether judgements of personality can be made using only facial expressions and head movements as cues.

All statistical analyses are performed with SPSS®16.0.1.

3. Results

3.1. *The Observers*

Together 605 participants were recruited. Women outnumbered men 2:1 (401:204). Participants were approached in the corridors of the Centre of Biology of the University of Vienna. These were mostly female, because on the one hand, there are more female students of biology, and on the other hand, they more readily agreed to participate. When approached the students were not interested in the topic of the study, but the duration, i.e. most refused to participate, because it took too long. The participants were mostly students, with only few exceptions and ranged from 16 to 63 years of age. The mean age of participation was 23 (Figure 10).

Each participant rated two videos, which resulted in 1210 ratings. The raters were recruited at the Ludwig Boltzmann Institute for Urban Ethology.

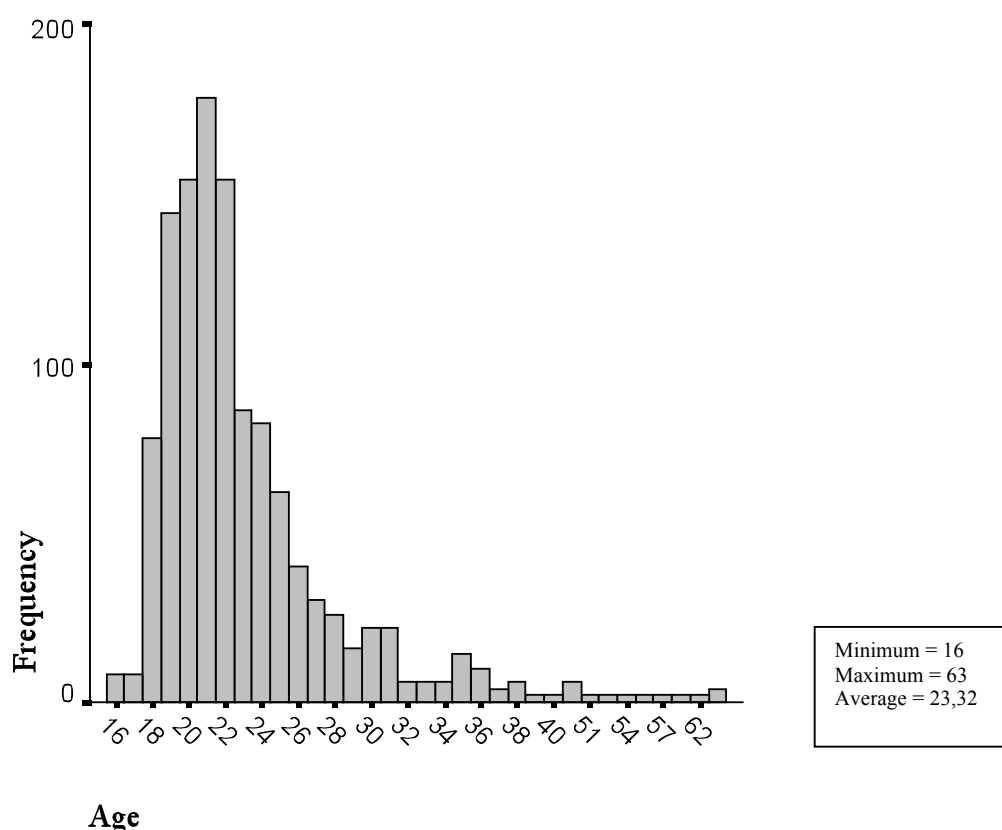


Figure 10: Age of Participants

The minimum and the maximum age were identical for both the female and the male raters. However, the average age was 23.85 for the male group ($SD = 6.49$) and 23.05 for the female group ($SD = 5.90$).

3.2. *Person Perception*

Correlation coefficients were calculated to show the influence of the avatar on self-stranger agreement. The study was designed to test the hypothesis, whether strangers could assess another's personality through the information provided by an avatar, in two ways: first, I provided my observers with two conditions, one featuring the avatar and the other showing the original videos as a control group. By comparing correlation coefficients used to calculate self-stranger agreement for both these conditions, the influence of the avatar on the rateability of the targets could be shown.

The p-value of the resulting two-tailed Pearson Correlations will be Bonferroni adjusted. The number of comparisons is equal to the number of personality factors in the NEO-FFI: five. Thus, results are not statistically significant at the 0.05 level, but at the 0.01 level instead.

3.2.1. Self-stranger Agreement per Condition

To test the rank of self- and stranger-ratings on the five dimensions of the NEO-FFI, a Pearson Correlation was applied.

Of the four conditions defined in the study design, two are presented in this chapter: the Original Condition and the Avatar Condition ($N=30$, i.e. the stranger data were aggregated for each target).

There were no statistically significant correlations for either condition once the results are Bonferroni corrected. Correlations would have had to be at least .47 to remain significant.

Table 6: Self-stranger Agreement Original and Avatar Condition

Condition	Dimension		Condition	Dimension	
Original	Neuroticism	r -.229	Avatar	Neuroticism	r -.107
Original	Extraversion	r -.116	Avatar	Extraversion	r .211
Original	Openness	r .340	Avatar	Openness	r .229
Original	Agreeableness	r -.073	Avatar	Agreeableness	r -.194
Original	Conscientiousness	r .309	Avatar	Conscientiousness	r .235

3.3. Gender Effects

In the next step I analyzed gender effects, i.e. does the gender of the target/rater have an effect on self-stranger agreement.

3.3.1. Gender Effects in Self-stranger Agreement

The following tables (Table 7, 8) depict the self-stranger agreement according to target and rater sex. Original Condition by Target and Rater Sex

Table 7 shows that there are no statistically significant results after Bonferroni Correction.

Table 7: Gender Effects Regarding Self-Stranger Agreement in the Original Condition

	Target sex		Rater sex	
			male	female
Neuroticism	male	r	-.035	-.124
	female	r	-.121	-.097
Extraversion	male	r	-.106	-.389
	female	r	-.099	.119
Openness	male	r	.290	.422
	female	r	.408	-.096
Agreeableness	male	r	-.195	-.183
	female	r	-.098	-.159
Conscientiousness	male	r	.326	.097
	female	r	.294	.198

Calculating the self-stranger agreement for the Avatar Condition (N= 13 men, 17 women), no statistically significant correlations are found (Table 8).

Table 8: Gender Effects Regarding Self-Stranger Agreement in the Avatar Condition

	Target sex		Rater sex	
			male	female
Neuroticism	male	<i>r</i>	-.213	.223
	female	<i>r</i>	.247	-.021
Extraversion	male	<i>r</i>	.361	.017
	female	<i>r</i>	.160	.187
Openness	male	<i>r</i>	.292	.282
	female	<i>r</i>	-.210	.348
Agreeableness	male	<i>r</i>	.524	-.170
	female	<i>r</i>	-.296	-.314
Conscientiousness	male	<i>r</i>	-.234	.191
	female	<i>r</i>	.128	.066

3.4. Nonverbal Behaviour

In the study thus far the agreement between strangers and self was looked at in general terms. This part takes a closer look at facial and head movements.

By using the avatar I was able to control the kind of information displayed by the stimuli. By controlling the nonverbal communication channels the influence of nonverbal behaviour (= head and facial movements) on personality assessment could be determined.

Two subcategories of my avatars were created, an avatar without facial motions and a second avatar without head movements. Using these sub-avatars correlation coefficients were calculated to show the influence of either facial expressions or head movements on self-stranger agreement.

3.4.1. The Influence of Facial Expressions and Head Movements

To test the self- and stranger-agreement on the five dimensions of the NEO-FFI, a Pearson Correlation was applied (N=30).

Of the four conditions defined in the study design, only the two sub-categories are present in this chapter: the Without Facial Expression and the Without Head Movement Condition.

There were no statistically significant correlations in either condition (Table 9).

Results were Bonferroni adjusted.

Table 9: Self-stranger Agreement

Condition	Dimension		Condition	Dimension	
Without Facial Expressions	Neuroticism	r -.181	Without Head Movements	Neuroticism	r -.229
Without Facial Expressions	Extraversion	r .039	Without Head Movements	Extraversion	r .450
Without Facial Expressions	Openness	r -.233	Without Head Movements	Openness	r .072
Without Facial Expressions	Agreeableness	r .057	Without Head Movements	Agreeableness	r -.055
Without Facial Expressions	Conscientiousness	r .406	Without Head Movements	Conscientiousness	r .111

3.4.2. Gender Effects in Self-stranger Agreement

Table 10 shows there are no statistically significant correlations after splitting by target and rater sex.

Table 10: Gender Effects Regarding Self-Stranger Agreement in the Without Facial Expressions Condition

	Target sex		Rater sex	
			Male	female
Neuroticism	male	r	-.331	-.261
	female	r	.027	.121
Extraversion	male	r	.313	-.355
	female	r	.067	.295
Openness	male	r	-.565	-.087
	female	r	-.310	.073
Agreeableness	male	r	-.128	-.028
	female	r	.457	.365
Conscientiousness	male	r	.114	.253
	female	r	.401	.048

Calculating the self-stranger agreement for the Avatar Condition, one statistically significant result was found (Table 11).

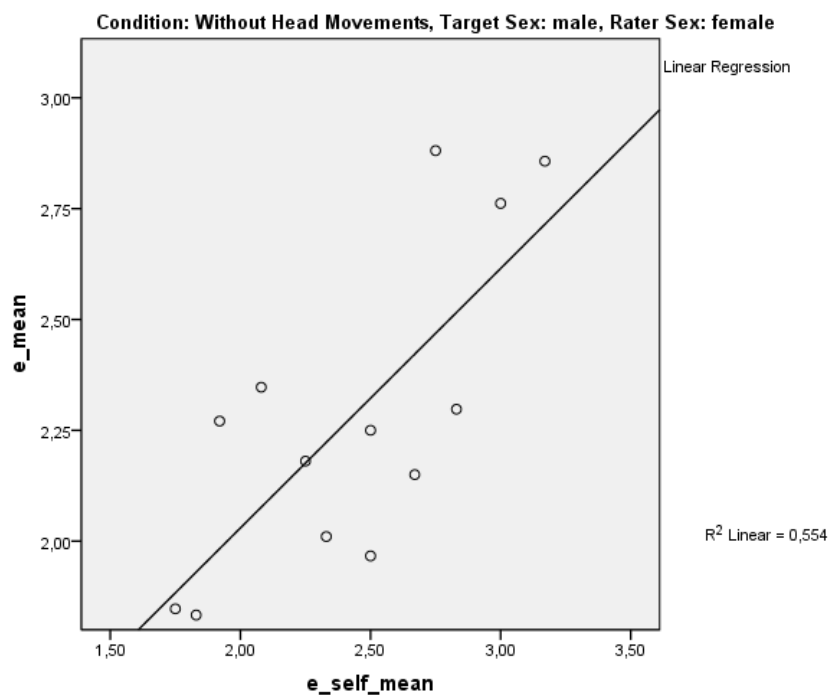
Female raters agreed with the male targets regarding the dimension of Extraversion ($r=0.744$, $p=0.004$). Thus, the self-rating accounted for 55.4% of the variance of the stranger rating on Extraversion.

Table 11: Gender Effects Regarding Self-Stranger Agreement in the Without Head Movements Condition

	Target sex		Rater sex	
			male	female
Neuroticism	male	<i>r</i>	-.343	-.169
	female	<i>r</i>	-.077	-.060
Extraversion	male	<i>r</i>	,123	,744(*)
	female	<i>r</i>	,251	,261
Openness	male	<i>r</i>	-.250	-.043
	female	<i>r</i>	.003	.298
Agreeableness	male	<i>r</i>	-.364	-.373
	female	<i>r</i>	.220	.215
Conscientiousness	male	<i>r</i>	-.168	.235
	female	<i>r</i>	-.103	-.559

* Correlation is significant at the 0.01 level (2-tailed).

Since this correlation is not only the first statistically significant result in this study, but also higher than any found in previous studies, I will take a closer look at it using a scatterplot. As can be seen (Figure 11) there may be no outliers, but there are two clusters of points.

**Figure 11:** Scatterplot for females rating males on Extraversion in the Without Head Movement Condition

4. General Discussion

The general discussion will start by discussing my findings. However, a large part of this discussion will deal with some design issues in this and prior studies discussion, concerning itself with possible ways of improving not only the design of this study, but also that of previous studies.

In this thesis it was assumed, that it would not be possible to discard the Null Hypothesis. And indeed, the Null Hypothesis is supported by my findings. In the course of this study only one correlation was found: When women were rating men in the Without Head Movement Condition, meaning that facial movements were the only information available on Extraversion. However, the scatter plot showed that there were three groups. One of them was uncorrelated and the correlated ones contained either two or three points. Thus, the correlation is not a fair representation of what a correlation is supposed to do. There are five avatars that are different from the others. Furthermore, this correlation does not support my theory. What this scatter plot does very well is support my criticism in chapter 1.2.3. There I stated my doubts that the correlations are the correct statistical method for calculating agreement. This correlation (female rating males on Extraversion in the Without Head Movement Condition) shows that a high correlation can be found, even when there is no agreement. Again, calculating the difference between the self- and stranger-ratings would be the correct method to assess agreement.

On the whole this showed that the participants were unable to rate the avatar. This could be attributed to the fact that the participants did not see the avatar as a human being and therefore saw no sense in attributing it with a personality. This finding per se is a very uplifting one, because it could be interpreted as humans being able to distinguish between the real and a virtual world. Furthermore, they apparently place no great importance on the latter one. And this supports the Null Hypothesis.

However, there is one point that needs clarification. And that is, that even in the Original Condition, which served as control group, no statistically significant correlations were found. Even if my objections to the methodology of prior studies (that the self-concept was never validated and that correlations are not the best way to compare self to stranger ratings) are taken into account, I was unable to reproduce the findings from prior studies. No statistically significant correlations whatsoever (with one exception) were

found.

In the Original Condition at least, there should have been a correlation of at least 0.3, since the cues (e.g. attractiveness) that other studies (e.g. Albright *et al.*, 1988) linked to the high correlations for Extraversion were present. This indicates that there was something wrong with the targets. The question what was wrong is hard to answer, because in what sense did the stimuli in this study differ from those in others?

Of course the reason could be that the stimuli were only shown in a single situation. As Borkenau (2004) found, the agreement increases if the stimuli are viewed in more than one situation. On the other hand, most of the results cited at the beginning of the thesis (see chapter 1.2) were achieved with even less information than available in this study.

Another explanation could be that the participants did not take this study very seriously and thus lacked dedication. Given the fact that unlike other studies, I did not pay my participants, this explanation is likely.

A third explanation could be the quality of the movie. Because this study was performed on the computer, the stimulus material had to meet certain conditions. In this case the size of the files had to be limited to avoid long loading times. Thus, the movies were displayed in a size of 640x480 pixels.

The sample size of this study was small (though not overly so, see for example Carney *et al.*, 2007). Maybe a greater sample size would have improved those correlations. Watson (2000), for example, said that given a sample size great enough, it is possible to find correlations even for Agreeableness. However, finding random correlations would not have improved the study design. The sample size was chosen this way on purpose. And it was found that apparently these 30 targets are unrateable, or the ratio unrateable to rateable targets was skewed towards unrateable. And given the results from prior studies, where the correlations were not very high, so apparently were their samples.

Prior studies have shown that the agreement between self and stranger-ratings is above chance. On the other hand, this self-stranger agreement was very low. If it is above chance, the hypothesis that the participants were unable to rate strangers can be discarded. That these ratings were rather inaccurate could have been because (a) the stranger ratings were compared to the self-concept rather than the true personality, or (b) that some people

sent clearer signals than others. This holds true both for this thesis as for prior studies. Besides rateability, the influence of rating ability should also be studied. And that is where a new study should start.

In the following sections, I will take a closer look at some of the problems in this study, but also how to alter the design to answer those questions.

4.1. Design Issues and Solutions

As explained in chapter 2, the data set was taken from a prior study, i.e. it was raised for a different purpose. Therefore it presented problems that may have been irrelevant in the other study, but turned into interfering variables in the present one. Two possible interfering variables were identified during the evaluation of the data:

- (1) Not looking into the camera: about half of the stimuli looked to the left of the camera obscuring the left side of their face (and about three looked to the right). The results suggested that this might have influenced the stranger ratings. However, I could not prove this in the present study, because it was not designed with such a finding in mind. I had neither the data (no true self-ratings) nor a large enough sample size to perform the correct analyses.
- (2) An attractive, female interviewer conducted all interviews regardless of gender. Therefore, flirting could be a possible interfering variable.

4.2. Stimuli and Target Issues

This part of the discussion concerns itself with the question of how we could raise the accuracy of stranger ratings. The results of this study indicate that the limited communication channels available are not the problem. In fact, the avatars with the limited communication channels were better rateable than the real humans (as seen in the Original Condition). Therefore, I concluded that the problem is probably situated in one of three elements of this study:

1. The Targets: it was found in this study that some of the targets were better rateable than others, although with the data available it was not possible to find a satisfactory explanation for where that difference in rateability originated from.

2. The Raters: some the differences in rating ability may be attributed to the raters simply not paying attention and filling the questionnaire out at random. However, it was found in prior nonverbal communication studies, especially when it comes to studying deception, that some people are more accurate raters than others. After establishing the differences in rateability for the targets, those results could be used to assess why some raters are better than others.
3. The Avatars it became apparent in the course of this study that though the explorative design could resolve many issues, it brought almost as many problems with it. This part of the discussion will deal with some of the technical issues noticed in this study and what the possible solution could be.

4.3. *The Targets*

Prior studies on the accuracy of stranger-judgements of personality have found that only two of five dimensions can be rated accurately: Extraversion and Conscientiousness (given a certain amount of participants Agreeableness can achieve statistically significant results as well). Results only differed regarding which of the two could be rated with the greater accuracy.

However, most of these studies were conducted by using an actual representation of the physical appearance of their target; in other words, most studies were conducted by using either photographs or videos of their targets. Hence, features of physical appearance, such as attractiveness and babyfacedness, become either a cue or a possible confounding variable.

Judgements in these paradigms are made based on what Paunonen (1991) calls extraneous sources of information (criticizing that these paradigms do not deserve the description “Zero Acquaintance” as a consequence). In his article he explains that due to those extraneous sources of information, observers and targets are “not strangers in strict sense of the word”, since “observers may use valid cues about the target behaviour derived at the time of the experiment itself, cues that go beyond social desirability or base rate considerations”. For example, if the target is talkative, smiles and chats with his neighbour, he will be rated as high in sociability; if he is carefully groomed and his books are in a neat pile, he will be rated as high in orderliness. This also explains why studies in the past

found such high accuracy for observable domains of behaviour such as Extraversion, Conscientiousness and to a lesser degree Agreeableness (Paunonen, 1991).

These extraneous sources of information are described as e.g. attractiveness and features of attractiveness, such as hairstyle and the way one dresses. Some of the statistically significant results in judging the personality of a stranger could only be achieved because of these extraneous sources of information, e.g. Albright and colleagues (1988) found that ratings of Conscientiousness were based on ratings of neatness of dress.

However, this study based its judgements of personality by strangers on nonverbal communication. Thus, studies in nonverbal communication have to be considered. In nonverbal communication studies results were not quite as straightforward. Judges were able to assess e.g. personality, because their targets signalled their personality through nonverbal communication, i.e. accuracy of judgement by nonverbal communication depends on two factors: the ability of the target to properly encode his signals (rateability of the target), and the ability of the rater to decode those signals (rating ability of the rater). As a consequence, studies in nonverbal communication have shown that there are differences in people's rateability, but also in people's aptitude in decoding these nonverbal cues.

In short, this study tacitly assumed that there would be differences in the rateability of the targets (as well as the reading ability of the raters). In other words, if this is not considered, the entire study would have seemingly failed, because it was unsuccessful in producing high and statistically significant correlations (although it should be mentioned that Kenny and Kashy, 1994, mentioned in their paper that the correlations in personality studies seldom were higher than 0.3, except for Extraversion). To counteract this, the targets should be divided into groups according to their rateability.

The first step to separating the targets into groups would be to survey what the members of either group, i.e. the rateable versus the non-rateable targets, have in common. At this point there was no way to subtract the additional confounding variable of the observers' rating ability. I needed to find a way to group the targets beforehand. Funder and Sneed (1993) performed a study where self-stranger and self-acquaintance agreement was tested. In this study, they found that people were rated with a low accuracy when they

were either reserved and inexpressive or fearful and timid. Targets rateable with high accuracy were those that were not only expressive in voice, face and gestures, but also showed a high enthusiasm and energy level (i.e. seemed full of energy).

To separate the targets in groups the Behavioural Q-Sort was used (see Appendix C), which is used to catalogue a person's behaviour during a conversation. Unfortunately, the Behavioural Q-Sort can only be used when the interaction between targets is indeed a conversation and not an interview. Furthermore, body as well as vocal cues are needed for the assessment of the behaviours. Thus, with the targets available for this study, the Behavioural Q-Sort could not be used, but could be used in future research, to group the targets beforehand and thus, maybe even uncovering some new information concerning the possibilities I considered in this study.

Another negative influence on the targets' rateability has to be considered. The segments of the videos that were transferred onto the avatar were chosen according to the computing abilities of Eyematic Facelifter, and not the representativeness of the targets' behaviour. As such, the segments showed the targets engaged in a reasonably continuous speech. However, the duration of speech is also an indicator of personality. For example, it was shown that manipulating pitch and duration parameters in a synthetic speech interface could also create the impression of Introversion or Extraversion (Nass & Lee, 2001). Whether the chosen segments were representative of the targets' personality or not is unclear. Furthermore, the survey was conducted online (even though the participation via the intranet far exceeded the almost non-existent participation via the internet). To ensure short loading times only very short segments were chosen (30 seconds). This also reduced the rendering time for the movies. In future, it would probably be better to use the entire interview.

However, this study had a problem in common with most studies involving student samples. The participants in this study were all volunteers recruited at diverse educational institutes. As such, only a certain personality type volunteered. A closer look at my sample shows that the maximum Extraversion score was 3.17 (3 persons), while the minimum score was 1.58 (1 person). Most of the students had scores between 2.25 and 2.65. Although, I positively tested for the representativeness of my sample in comparison to the

average Neo scores, it has to be noted that there were no extremely high or low extraverts in this sample. As such, the speed duration of the targets should have been about equal.

Furthermore, in this study many known cues of high signal value such as attractiveness (a.o. Borkenau & Liebler, 1992) or even speech rate (e.g., Nass & Lee, 2001), since I showed silent movies, there was no way for the raters to determine how many words were spoken in what amount of time), were taken away. But, this study is based on the theory that people can form judgements of personality based on the information available. Taking some of those cues away should not have influenced the perceivers rating ability.

Nevertheless, to solve this problem, the entire interview would have to be shown. But then, two things have to be considered. For one, the interviews would have to be shorter than 15 minutes. Given the time necessary to fill out the NEO-FFI approximately 3 minutes would be conceivable (even though the file size of the avatars could become a problem). But, secondly, with the whole interview used as a stimulus a problem arises. Because of this the choices from the interview become even more limited, since with increasing length the chance for unwanted behaviour (such as touching their face with their hands) rises as well. Even if such behaviours act as a further indicator of personality, the program Eyematic Facelifter cannot track them.

This would be another argument against using Eyematic Facelifter in future for the animation of the stimuli and to use conventional means instead (see chapter 9.3.4). In that case, these behaviours could be monitored (and measured) and their value for the assessment of personality could be assessed.

Furthermore, it would be best to base the information about the targets not only on their self-assessments. Studies have shown (e.g. Hough, 1997) that people distort their responses to self-report inventories. Besides self-ratings, gathering ratings by close acquaintances and relatives may be a good idea.

This is not necessarily done consciously, i.e. people lie, instead they could have a distorted self-image. It is believed that some people are unable to judge their own personality (keyword: falsifiability of personality questionnaires). To counteract this, some

studies included acquaintance-ratings as well, e.g. parents or spouses (see 2.2.2 Acquaintanceship Effect). However, acquaintanceship studies have shown that even those results are not perfect (compare Funder et. al. 1995 and Watson, 2000). I.e. if the self-score were not correct than self-stranger correlation would be low, even if the stranger assessment were correct, the acquaintanceship correlations however should be high, e.g. when comparing parent scores amongst each other. However Funder showed that they only agreed to 0.5. Therefore, it would be necessary to include stranger ratings as well, but only from talented raters. Thus, the suggestion (in chapter 1.2.3) to include true-self ratings by professionals i.e. psychiatrists. If ratings by psychiatrists are unavailable, comparing the ratings of talented raters could assess rateability.

Lastly, since the participation via the Internet proved disappointing, the study should be limited to on-site participation. Thus, the size and quality of the movies could be increased (though, if the movies are not installed locally on the rating computers, lags could still be a problem), making them easier to rate as well.

To summarize the changes concerning the targets: (1) a pre-study is necessary to determine talented raters. The study design needs to be changed to classic (instead of embedded), i.e. one rater has to rate multiple movies. If e.g. 10 raters do so, than the results can be compared inter- and intra-rater. A low self-stranger correlation is first compared to the results by the other raters. If the results are the same across raters this would mean that the problem lies with the target, e.g. distorted self-image. (2) With the help of the talented raters the targets can be grouped. Acquaintanceship ratings and the Behavioural Q-Sort would also need to be considered. With this dataset it should be possible not only to measure differences in rateability (such as was done in this first, explorative version of this study), but also rating ability.

4.4. *The Raters*

Disregarding random answering as a factor, it became apparent that some people were better at rating targets than others. If I was to separate my targets into two groups using the behavioural Q-Sort (after re-recording them in a conversation format, including body and vocal information), I could first gather stranger assessment to confirm that the Behavioural Q-Sort indeed enables the differentiation between well- and non-rateable

targets. Once, this is established, a second set of stranger assessment could be collected. Only this time, observers would be asked to view stimuli from the best group, as well as the worst group (if possible from either gender). For example, an observer was unable to rate a target correctly, even though, he proved highly rateable thus far. Demographic as well as personality data on all observers were gathered alongside their ratings. These observers who were unable to rate the most rateable targets were then compared to each other to find similarities. To eliminate random answering as a confounding variable, it would be necessary to alter the personality questionnaire for future studies.

There are two ways to falsify personality questionnaires: Giving random answers, and lying. To counteract this you either insert infrequency scales or repeat the questions asked. The first consists of items that everyone would answer the same way, e.g. “I frequently walk up the stairs on my hands”. If most of these items are answered in an unexpected way, the answers were probably given randomly. The double items are against liars, they enable the cross-check of the answers. If he answered all these double questions the same way, the participant probably told the truth (Buss, 2002). In short, repeated questions and infrequency scales will be added to the Neo Five Factor Inventory (if that was be the personality questionnaire used).

4.5. *The Avatars*

One of the greatest problems faced was the positioning of the camera relative to the interviewer. Influencing factors such as gaze avoidance could not be rated properly, since eye contact with the interviewer could sometimes, or in the avatar conditions, mostly be interpreted as gaze avoidance. In the future, the interviews should be conducted and recorded via video chat. The video chat window should be positioned in a way that lets the interviewees look straight into the camera. To further analyze the influence of gaze direction, additional cameras could be set up to film the person from the left and right. This setup would make it possible to differentiate between actual gaze avoidance (either via eye or head movements) and an offset focus point. To test the influence of symmetry, the facial expressions on one side of the avatar’s face could be shut off.

The avatar, due to its lack of wrinkling, i.e. no wrinkling of the forehead, no wrinkles at the corners of the eyes or mouth, etc. seemed somewhat unrealistic. Facestation

works by measuring changes in contrast, as such only regions high in contrast, i.e. the mouth or the eyes, can be measured. Besides obvious problems, such as people with blond eyebrows (sometimes these are almost invisible) not offering enough changes in contrast to be properly measured, there are also those problems concerning the Morph Targets. 12 of the Morph Targets are assigned to movements of the mouth. Even the Morph Target frown is only a downward of the lips.

Facestation, in short, has the following problems:

- i. The cues are almost centred on the lower half of the face, even though studies have shown that the upper half is more important
- ii. Facial expressions seem unrealistic, incomplete, and are even impossible to reproduce, because of these limitations, e.g. the Duchenne Smile, which would require wrinkling at the corner of the eyes.
- iii. Very limited number of Morph Targets.

Also, head movements could not replace body movements. In future research, body movements, as well as speech should be included, to properly assess the importance of each communication channel compared with each other. The Ludwig Boltzmann Institute performed a study, where personality could be assessed by having someone dance in front of a camera. Maybe, the same technology used in that experiment, could be used to register body movements for this experiment.

A future setup, therefore, could include two cameras (one for the face and for the body), as well as a good recording device for speech.

Here is a list of the advantages and disadvantages of the avatar created using Eyematic Facestation:

Advantages Avatar and Facestation:

- Possibility to control extraneous sources of information
- Possibility to control communication channels
- Targets filmed in natural interaction, displaying mostly natural behaviour

- Fast and easy to use
- Not as cost intense as other methods
- No computer programmer necessary
- Behaviour of targets can be altered as suitable for study
- Facestation records information about behaviour such as duration and speed

Disadvantages

- Limited amount of Morph Targets
- Motion recording centred around eyes and mouth (the latter being dominant)
- No information outside MT, e.g. wrinkling at corner of eyes
- Avatars can seem unrealistic (only as good as their programmer)
- Faulty motion recording, e.g. if head turned slightly away from camera, movement of eye could not be recorded
- Motions recorded only at certain speed, e.g. blinking ignored
- Motions provided by MT, in essence all Avatars display same motions in different order and intensity

In the end another method is probably preferable. One possibility could be as follows: First, an avatar is created whose facial expressions are manipulated via virtual Action Units¹⁶ (AUs). Then the behaviour of the targets could be coded using the computer program, Observer. The facial expressions could then be transferred by manipulating the AUs in succession. When creating a computer animation, for example, of a bouncing ball, the first frame is locked when the ball is on the floor, a few frames later the ball is placed in the air, and on the last frame the ball is on the floor again. Though the programmer only positions the ball in three of, for example, 30 frames, the computer calculates the motion in between. In other words, it calculates what motions would be necessary to get from one

¹⁶ Action Unit is a term used in the Facial Action Coding System (FACS) by Fridlund (1994). According to FACS, a facial expression is a high level description of facial motions, which can be decomposed into certain muscular activities called “Action Units” (AUs). FACS identifies 58 action units, which separately or in various combinations are capable of characterizing any human expression (Fridlund, 1994). An AU corresponds to an action produced by one or a group of related muscles (Fabri & Moore, 2004). Action Unit 1, for example, is the inner-brow-raiser, a contraction of the *frontalis, pars medialis* muscle (Ekman & Friesen, 1978).

position to the other. The same technique could be used for animation of facial expression or the animation could occur frame by frame.

4.5.1. Rater Bias Concerning the Avatar

One problem I faced with the avatar was the seeming unfriendliness of the female avatar, once it was animated. The most likely influence of this seeming unfriendliness occurred for the dimensions Agreeableness and Extraversion. In summary, the avatars, both male and female, were always underestimated when it came to Extraversion and Agreeableness. With a few exceptions (when women rated the male avatar in the Avatar and the Without Head Movements Condition on Extraversion) all those differences were statistically significant. Though the difference occurred across both target genders, it should be noted that when females rated males on Agreeableness and Extraversion in the Original Condition, they underestimated them as well. However, no such bias existed for females in the Original Condition.

On the whole, the dimension of Agreeableness seemed to be hard to rate in strangers, and rater bias leaned towards underestimating the targets when it came to Agreeableness (i.e. the self-ratings are higher than the stranger ratings). It is difficult to say how much of this bias has to be attributed to the technical difficulties of the avatar.

However, the problem of the bias seems to have been worsened by the avatar. At this point, I can only speculate why the animated female avatar seemed so unfriendly. It could be because the head movements and thus the changing angles of regard distorted the facial expressions. However, I cannot confirm this reasoning with a 100% clarity, since the problem extended over the Conditions Without Head Movements (no changing angles of regard) and Without Facial Expressions (only the neutral expression could be distorted) as well. Nevertheless, I believe it is the most likely explanation, and that the other results simply mirror the general bias that exists for the dimension of Agreeableness.

4.5.2. What Is Motion Capture and Why Was Eyematic Facelifter Used?

To transfer the motions of my targets onto avatars, I employed the programme Eyematic Facelifter. In this chapter, the principles of motion capture and how the Facelifter differs from those will be briefly explained.

In today's movies, computer animated characters are no longer a novelty. Basically, there are two methods for creating these virtual characters: the first is to program the character from scratch, meaning that a computer animator builds this character more or less frame by frame, the way an animator used to draw a cartoon character. The other method is to transfer the motions of an actor onto the avatar, hence the term "motion capture".

To elaborate on some of the problems of motion capture, I would like to fall back on two recent examples of motion capture in the film industry: *The Polar Express* and *The Lord of the Rings*.



Figure 11: Screenshots "Making Of Polar Express"

First, I would like to talk about the "Polar Express" (Warner Brothers, 2004, Figure 11). For motion capture to work, the actor is put in a suit covered in motion sensors, while additional sensors are attached to his face. The picture (Figure 11) shows the actor, Tom Hanks, in his sensor suit and his virtual counterpart in the movie.

In my study the digital video of the interview with the targets was loaded into Eyematic Facelifter™, a movement-tracking programme. Facelifter automatically recognises human faces in a standard video signal. It assigns 22 virtual markers to points of the head, eyes, nose and mouth. Facelifter, then tracks those virtual markers, monitoring their position 60 times per second, for the duration of the video clip.

After these movements have been tracked, these data are exported to Eyematic Facedriver™, standard plug-in for Discreet's Discreet® 3ds Max®™, an animation programme.

Using Facelifter not only made the motion capture simpler and easier on the targets (no distraction from the sensors and no endless preparation time when setting the dots), but also cheaper. Suffice it to say that the Polar Express has been the most expensive animation picture to date (and still critics complained that the animation seemed a little stiff from time to time).

In the "Lord of the Rings" (New Line Cinema, 2002), the sensor suit was used as well, but only to capture the body movements of the virtual character Gollum. For his facial expressions, the animators instead chose to film Andy Serkis (the actor of Gollum) in "action" and then transferred those facial expressions, again almost frame by frame, onto the avatar. This was the only way, they felt, they could capture the whole spectrum of his motions and transfer them onto the avatar in fullness. The results perhaps make them right, because no critic ever complained about Gollum showing signs of stiffness.

The disadvantages of both these methods should be obvious: The first is an intrusion on the targets. They would have to be prepared with the sensors, and any effort to make them feel and behave naturally afterwards seems quite unrealistic. The second method, though more feasible, has one great disadvantage: a single video filmed from a distance of 1.5 metres would not be detailed enough to provide the information necessary for hand-to-hand animation (besides which, the facial sensors mostly still need to be affixed to be used as reference points).

I will now continue to explain the workings of Eyematic Facestation™, and clarify why this method was employed, despite its many shortcomings. Facestation measures the motions not through sensors. Instead it detects the motions on a video, by surveying contrasts in texture. The areas around the eyebrows, the eyes and the mouth are full of contrasts. Dark eyebrows on light skin, dark eyeballs on white and darker mouth on pale skin, for example. The advantage of this method is that a person can be filmed in a natural interaction; theoretically one could employ a hidden camera, as long as it is set in a way that it films the person's face from the front, and the analysis takes place after the event

and not during. The disadvantage should be fairly obvious as well. Since the programme is only able to recognise contrasts, only motions concerning the eyebrows, eyes and mouth are recorded.

After setting the landmarks, the motions are transferred from the stimulus material onto the avatar with the use of 23 templates. One can imagine this the following way: Facelifter has one neutral head, meaning a head with a neutral facial expression. This is the basic head and the head that is visible. Underneath that neutral head, there are 23 animated heads. Each of these heads is able to perform one expression and one expression only. For example, one head only opens and closes it's left eye. The neutral head is akin to a Jack in a Box. The 23 animated head are stuffed inside the neutral head. When recording the movements of the targets using the contrast method, the programme interprets those motions using those 23 templates, called Morph Targets (MT). If there is no template for the motion displayed, e.g. lip biting (a sign for anxiety (Fridlund, 1997)), then the motion is either ignored or a template closely resembling the motion is employed.

Another problem is that fast motions, such as blinking, cannot be considered either. Should a target blink constantly, the programme either shows him batting his eyes now and then or ignores the motion altogether. In short, should either of those problems arise, it is best to simply choose another target not displaying these problems (as was done in this study). Thus, it is necessary to survey a surplus of targets.

A far bigger problem, especially since the aim of this project was the assessment of emotion, is that, as mentioned before all motions are limited to the eyebrows, eyes and mouth or high contrast areas. This means that facial muscle movement, even in such visible form as wrinkling around the corner of the eyes, is completely ignored. A good example to demonstrate this problem is a Duchenne smile, which consists of the movements of the *orbicularis oculi* and the *zygomaticus major*, in other words, the corners of the mouth are turned up and the eyes slightly compressed, wrinkling the corners of the eyes and displaying laughter lines. Though the avatar is able to turn up the corner of its mouth (albeit not with facial muscles), the avatar is unable to crinkle his eyes. As a consequence, the avatars employed in this study would be unable to display a Duchenne smile.

4.6. *Other Methodological Issues*

It became noticeable in this study that people seldom answer in extremes, i.e. on a scale between 1 and 5; they would choose the answers 2 to 3. A seven-point scale would therefore seem the preferable method allowing for more accurate ratings. This of course would have to be implied from the start to make results comparable.

On average, participants needed $\frac{3}{4}$ of an hour to fill out this study. Using the Norman 20 trait scale, instead of the NEO could shorten this time considerably, maybe even allowing more targets to be rated in a single sitting.

4.7. *Practical Applications*

Avatars have recently made the news thanks to the new movie by Hollywood director, James Cameron: Avatar. Some of the most successful movies of the last years were computer-generated. Studios such as Pixar and Dreamworks Animation have gained their reputations with such computer-generated movies.

Avatars have also become quite popular in advertising. Should a company choose to represent itself with an avatar and hire a firm to program this avatar, there is the possibility that this avatar could represent the company in a negative fashion, because its signalled personality could be contrary to the image the company has created for itself. This could even go so far, that this avatar could evoke antipathy in the viewer because of, e.g. a highly neurotic personality. With this technology, said company could cast a person based on her character to represent their firm and use motion capture to transfer not only their motions, but also said personality on a virtual counterpart.

The advantages for science and the commercial world of using avatars, and through them the ability to control the communication channels should be quite obvious.

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7. Appendices

Appendix A: Distribution of Video Files and Raters

Table 12: Distribution of Video Files

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	11f	8	.8	.8	.8
	11fov	12	1.1	1.1	1.9
	11fwhmv	11	1.0	1.0	2.9
	11fwmim	9	.9	.9	3.8
	15m	6	.6	.6	4.3
	15mov	8	.8	.8	5.1
	15mwhmv	10	.9	.9	6.0
	15mwmim	10	.9	.9	7.0
	16m	11	1.0	1.0	8.0
	16mov	11	1.0	1.0	9.1
	16mwhmv	9	.9	.9	9.9
	16mwmim	8	.8	.8	10.7
	19f	11	1.0	1.0	11.7
	19fov	9	.9	.9	12.6
	19fwhmv	8	.8	.8	13.3
	19fwmim	8	.8	.8	14.1
	20f	10	.9	.9	15.0
	20fov	9	.9	.9	15.9
	20fwhmv	10	.9	.9	16.8
	20fwmim	11	1.0	1.0	17.9
	21m	11	1.0	1.0	18.9
	21mov	9	.9	.9	19.8
	21mwhmv	8	.8	.8	20.5
	21mwmim	8	.8	.8	21.3
	23m	10	.9	.9	22.2
	23mov	9	.9	.9	23.1
	23mwhmv	10	.9	.9	24.0
	23mwmim	11	1.0	1.0	25.0
	24f	11	1.0	1.0	26.1
	24fov	10	.9	.9	27.0
	24fwhmv	7	.7	.7	27.7
	24fwmim	9	.9	.9	28.5
	26m	8	.8	.8	29.3
	26mov	9	.9	.9	30.2
	26mwhmv	10	.9	.9	31.1
	26mwmim	6	.6	.6	31.7
	31f	7	.7	.7	32.3
	31fov	12	1.1	1.1	33.5
	31fwhmv	6	.6	.6	34.0
	31fwmim	8	.8	.8	34.8

	Frequency	Percent	Valid Percent	Cumulative Percent
33m	8	.8	.8	35.5
33mov	9	.9	.9	36.4
33mwhmv	10	.9	.9	37.3
33mwmim	11	1.0	1.0	38.4
34f	10	.9	.9	39.3
34fov	9	.9	.9	40.2
34fwhmv	5	.5	.5	40.6
34fwimim	10	.9	.9	41.6
36f	9	.9	.9	42.4
36fov	11	1.0	1.0	43.5
36fwhmv	4	.4	.4	43.9
36fwimim	8	.8	.8	44.6
37f	11	1.0	1.0	45.7
37fov	5	.5	.5	46.1
37fwhmv	9	.9	.9	47.0
37fwimim	10	.9	.9	47.9
40m	9	.9	.9	48.8
40mov	6	.6	.6	49.3
40mwhmv	7	.7	.7	50.0
40mwmim	11	1.0	1.0	51.0
42f	10	.9	.9	52.0
42fov	8	.8	.8	52.7
42fwhmv	8	.8	.8	53.5
42fwimim	8	.8	.8	54.3
44f	9	.9	.9	55.1
44fov	8	.8	.8	55.9
44fwhmv	8	.8	.8	56.6
44fwimim	10	.9	.9	57.6
45f	6	.6	.6	58.1
45fov	8	.8	.8	58.9
45fwhmv	6	.6	.6	59.5
45fwimim	9	.9	.9	60.3
47m	9	.9	.9	61.2
47mov	13	1.2	1.2	62.4
47mwhmv	9	.9	.9	63.2
47mwmim	12	1.1	1.1	64.4
49f	9	.9	.9	65.2
49fov	9	.9	.9	66.1
49fwhmv	8	.8	.8	66.8
49fwimim	5	.5	.5	67.3
54f	9	.9	.9	68.1
54fov	8	.8	.8	68.9
54fwhmv	7	.7	.7	69.6
54fwimim	8	.8	.8	70.3
56m	10	.9	.9	71.3
56mov	7	.7	.7	71.9
56mwhmv	6	.6	.6	72.5

	Frequency	Percent	Valid Percent	Cumulative Percent
56mwmim	8	.8	.8	73.3
64m	11	1.0	1.0	74.3
64mov	6	.6	.6	74.9
64mwhmv	11	1.0	1.0	75.9
64mwmim	11	1.0	1.0	76.9
70f	8	.8	.8	77.7
70fov	7	.7	.7	78.4
70fwhmv	5	.5	.5	78.8
70fwmim	10	.9	.9	79.8
75f	8	.8	.8	80.5
75fov	8	.8	.8	81.3
75fwhmv	6	.6	.6	81.9
75fwmim	11	1.0	1.0	82.9
81m	8	.8	.8	83.6
81mov	4	.4	.4	84.0
81mwhmv	9	.9	.9	84.9
81mwmim	7	.7	.7	85.5
82f	9	.9	.9	86.4
82fov	9	.9	.9	87.2
82fwhmv	12	1.1	1.1	88.4
82fwmim	16	1.5	1.5	89.9
86m	7	.7	.7	90.5
86mov	10	.9	.9	91.5
86mwhmv	10	.9	.9	92.4
86mwmim	13	1.2	1.2	93.7
88m	12	1.1	1.1	94.8
88mov	8	.8	.8	95.6
88mwhmv	4	.4	.4	95.9
88mwmim	10	.9	.9	96.9
89f	8	.8	.8	97.6
89fov	9	.9	.9	98.5
89fwhmv	7	.7	.7	99.1
89fwmim	9	.9	.9	100.0
Total	1058	100.0	100.0	

Appendix B: The Targets (detailed description)

Table 13: Description of the targets by comment, picture and their stranger ratings

Target	Cond.	Diff. N	Diff. E	Diff. O	Diff. A	Diff. C
11f	0	-0,20	-0,69	0,16	0,16	0,22
11f	1	-0,07	-1,48	-0,21	-0,74	0,01
11f	2	-0,21	-1,11	-0,21	-0,71	-0,19
11f	3	-0,52	-1,30	-0,73	-0,96	-0,28
- Attractiveness: average - Smiling: high, interspersed with small laughs - Eye contact: off and on - Movement: little besides small nods, except when breaking eye contact - Position relative to camera: looks sideways at interviewer - Comments: frequently breaks eye contact, then strong head movements						
15m	0	-1,12	0,66	-0,44	-0,12	0,61
15m	1	-1,01	0,59	-0,75	-0,21	0,73
15m	2	-0,98	0,39	-0,69	-0,43	1,11
15m	3	-1,14	0,08	-0,94	-0,68	0,75
- Attractiveness: average - Smiling: average - Eye contact: mostly - Movement: high (blinks a lot, nods and shakes head, versus the end shrugs with expression indicating not understanding) - Position relative to camera: a little off-center, but looks almost straight into camera - Comments: low movement and smiling in first third, doesn't become animated until question finished, very responsive to interviewer						
16m	0	-0,15	-1,15	-1,07	-1,27	0,62
16m	1	-0,56	-0,63	-0,80	-1,59	0,71
16m	2	0,17	-1,43	-1,11	-1,74	0,56
16m	3	-0,73	-0,45	-1,66	-1,75	-0,18
- Attractiveness: average - Smiling: average (only one strong smile) - Eye contact: mostly - Movement: high (strong nod versus the end, head dips low almost to lower edge of screen) - Position relative to camera: looks sideways at interviewer - Comments: With 9 misses apparently by far the worst target to rate						
19f	0	1,15	0,31	-0,85	-0,66	-0,94
19f	1	0,95	-0,01	-1,02	-1,27	-0,71
19f	2	1,00	-0,29	-0,77	-1,21	-0,67

19f	3	0,96	-0,48	-0,96	-1,39	-0,96
- Attractiveness: average/ high - Smiling: high (constant, strong smiling after questions, even laughs once) - Eye contact: off and on (looks down with half closed eyes once) - Movement: average (3 head movement to emphasize point) - Position relative to camera: looks sideways at interviewer (but less then others above) - Comments: Long question posing period, does not start real movement until second half, at beginning a lot of movements with no Morph Target counterpart, such as wetting of lips, pressing lips together, etc.						
20f	0	1,70	-0,10	-0,79	0,34	-0,49
20f	1	1,63	-0,68	-0,67	-0,33	-0,71
20f	2	1,23	-0,26	-0,75	-0,69	-0,41
20f	3	1,14	-0,60	-1,12	-0,77	-0,68
- Attractiveness: average - Smiling: low at beginning, average towards end - Eye contact: off and on - Movement: little (except for small nods) - Position relative to camera: almost looking straight into camera - Comments: keeps lowering eyes (looking down with half-closed lids)						
21m	0	-0,06	-0,63	-1,33	-0,45	-0,68
21m	1	-0,44	-0,26	-1,69	-0,73	-0,86
21m	2	-0,74	-1,09	-1,84	-1,01	-0,59
21m	3	-0,66	-0,08	-1,85	-1,36	-0,64
- Attractiveness: low - Smiling: constant but average - Eye contact: at first off and on, then constant - Movement: little, limited to eye movement - Position relative to camera. Straight into camera - Comments: Seems unfocused in first third						
23m	0	-1,03	-0,55	-0,79	-0,10	-0,11
23m	1	-0,99	-1,02	-1,24	-0,66	0,08
23m	2	-0,81	-0,94	-1,22	-0,58	0,57
23m	3	-1,20	-0,48	-1,49	-0,88	0,41
- Attractiveness: low - Smiling: constant, even laughs once at half time - Eye contact: constant - Movement: low (some nods sideways, and one strong nod down towards the end) - Position relative to camera: looks a little sideways at interviewer - Comments: Smiles by lifting left corner of mouth, only once smile with whole mouth, but still left corner higher						
24f	0	-0,02	-0,23	0,77	0,43	-0,41
24f	1	-0,23	-0,33	0,70	-0,34	-0,56

24f	2	-0,49	-0,47	0,80	-0,46	-0,55
24f	3	-0,48	-0,40	0,58	-0,28	-0,66
- Attractiveness: low when still, but average when animated - Smiling: alternating (starts with big smile, then small, in between only implied smile, then a big smile and from then on constant small smile until end of sequence) - Eye contact: mostly - Movement: keeps swivelling head sideways - Position relative to camera: keeps alternating between almost straight looks at camera, and sideways looks (eyes look towards front to keep eye contact with interviewer) - Comments: Very high rateability, when lowering level to 0,05 difference only rateable in Original Condition, seems to be surprised by question at first (briefly wide-eyed), then looks as if thinking for a while, when loosing eye contact gives impression to think about question - O Overall impression: concentrates on interviewer as well as questions, but seems a little shy						
26m	0	0,44	-0,54	-0,13	-0,32	-1,14
26m	1	0,23	-0,23	-0,41	-0,92	-0,68
26m	2	0,68	-0,60	-0,34	-0,47	-0,42
26m	3	0,39	-0,20	-0,47	-0,85	-0,96
- Attractiveness: low - Smiling: at first only hinted at, later genuine and constant - Eye contact: little, does not start making eye contact until very end - Movement: little, limited to slight nodding gestures - Position relative to camera: almost straight into camera - Comments: looks uneasy about situation						
31f	0	0,17	-0,50	-0,68	-0,47	-0,27
31f	1	0,28	-0,84	-1,14	-1,80	-0,65
31f	2	0,33	-1,03	-0,51	-0,83	-0,77
31f	3	-0,22	-0,43	-0,75	-0,88	-0,57
- Attractiveness: high (when animated) - Smiling: strong when speaking - Eye contact: little (lets her gaze drift to and fro with only brief eye contacts, almost like a presentation) - Movement: high (strong head or nod movements) - Position relative to camera: almost straight, only slight turn towards right - Comments: first fourth of sequence, seems to be having problem understanding interviewer, leans forward (as if trying to catch things better), then leans back in gesture of sudden enlightenment (rocks back, head tilted backwards, eyes half closed, slight smile), seems to have something in her mouth						
33m	0	0,81	0,38	-0,82	-0,44	-0,65
33m	1	0,14	0,32	-1,51	-0,94	-0,37
33m	2	0,89	0,18	-1,38	-1,10	-0,12
33m	3	0,21	0,31	-1,21	-1,11	-0,41
- Attractiveness: average (when animated) - Smiling: high						

▪ Eye contact: constant ▪ Movement: a lot (strong inclinations of head, but also movements with no Morph Target counterpart such as shrugging, scratching of head and pointing) ▪ Position relative to camera: almost straight into camera ▪ Comments: besides looking unkempt, he also seems grumpy or moods at beginning, livens up when animated						
34f	0	1,14	0,00	-0,61	-0,64	0,10
34f	1	0,74	-0,82	-1,09	-1,72	-0,01
34f	2	0,88	-0,31	-0,78	-1,33	-0,08
34f	3	0,55	-0,12	-1,24	-1,51	-0,21
▪ Attractiveness: average ▪ Smiling: low (slight, sometimes only hinted at) ▪ Eye contact: mostly ▪ Movement: only limited, does not move in last third of sequence ▪ Position relative to camera: slightly off-center, focus on interviewer ▪ Comments: seems sleepy						
36f	0	0,02	-0,06	-0,41	0,15	-0,15
36f	1	0,21	-0,31	-0,85	-0,11	-0,01
36f	2	0,08	-0,52	-0,96	-0,49	0,22
36f	3	-0,20	-0,42	-0,93	-0,54	0,80
▪ Attractiveness: high (only one wearing discernible make-up) ▪ Smiling: constant (seems a little forced) ▪ Eye contact: mostly (sometimes loses focus, stares into void) ▪ Movement: very expressive, facially (note worthy eye brow raise) as well as with head movements ▪ Position relative to camera: almost straight into camera ▪ Comments: seems to give full attention to task, very high rateability, at level 0,5 only Original remains (because of Openness)						
37f	0	-0,63	0,89	0,17	0,72	-0,83
37f	1	-0,36	0,18	-0,38	-0,14	-0,18
37f	2	-0,81	0,47	-0,37	-0,38	0,12
37f	3	-1,16	0,51	-0,49	-0,49	0,02
▪ Attractiveness: average (slightly unkempt, greasy hair and skin) ▪ Smiling: only slight ▪ Eye contact: at beginning evasive (looks to lower right), towards the end constant ▪ Movement: only small movements ▪ Position relative to camera: facing the camera, but seldom looks in ▪ Comments: seems very shy						
40m	0	0,51	0,17	0,07	-1,22	-0,64
40m	1	0,72	-0,24	-0,22	-1,27	-0,76
40m	2	0,68	-0,29	-0,21	-0,82	-0,73
40m	3	0,50	-0,31	-0,55	-1,13	-1,19

- Attractiveness: average
- Smiling: small to hinted at smiling
- Eye contact: no (gaze unfocused)
- Movement: low (except once wetting of lips, no Morph Target), shifts head in first half by nuances
- Position relative to camera: straight into camera
- Comments: only target filmed neck up without shoulders

42f	0	0,41	-0,12	-0,59	0,05	-0,23
42f	1	0,44	-0,55	-0,70	-0,87	-0,15
42f	2	0,61	-0,34	-0,86	-1,25	-0,17
42f	3	0,33	-0,48	-0,88	-1,45	-0,13

- Attractiveness: average
- Smiling: high
- Eye contact: constant
- Movement: not much, some strong head movements and occasional blinking, but moves eyes more than head
- Position relative to camera: straight into
- Comments: seems to take the interview very seriously, gives full attention to interviewer

44f	0	0,51	-0,07	-0,27	-0,05	0,25
44f	1	1,10	-0,61	-0,50	-0,48	-0,45
44f	2	1,11	-0,67	-0,48	-0,66	-0,01
44f	3	0,89	-0,38	-0,52	-0,67	-0,16

- Attractiveness: average
- Smiling: only little, looks serious, but laugh at end
- Eye contact: mostly
- Movement: low
- Position relative to camera: shoulders straight, but looks past camera
- Comments: alert gaze, full attention on Interviewer, seems at ease and natural

45f	0	0,88	-0,68	-0,97	-0,52	-0,79
45f	1	0,58	-0,66	-1,09	-1,09	-0,85
45f	2	0,83	-0,45	-1,04	-0,75	-0,59
45f	3	0,89	-0,37	-0,76	-0,63	-0,74

- Attractiveness: average (slight skin problems)
- Smiling: little
- Eye contact: little
- Movement: little head movements and mimic, only one turning of head with smile
- Position relative to camera: looks past camera
- Comments: closed, un-communicative gaze

47m	0	1,07	-0,99	-1,19	0,47	-0,39
47m	1	0,48	-0,74	-1,29	-0,11	0,15
47m	2	0,95	-0,74	-1,37	-0,02	-0,39
47m	3	0,81	-0,81	-1,22	-0,09	-0,28

- Attractiveness: low - Smiling: slight smile during speaking - Eye contact: little (looks to the right, then up, at the end slightly unfocussed, but returns attention later) - Movement: completely rigid, only movement occasional blinking and mouth, once a short nod - Position relative to camera: straight into - Comments: goes completely rigid at beginning and only blinks from time to time, expression deer in the head lights would be an apt description						
49f	0	-0,56	0,21	-1,17	-0,88	-0,75
49f	1	-0,49	-0,03	-0,97	-1,62	-1,09
49f	2	-0,04	-0,60	-1,29	-1,44	-0,66
49f	3	-0,36	0,21	-1,18	-1,27	-0,97
- Attractiveness: low to average due to unkempt exterior, greasy hair and pimples - Smiling: constant - Eye contact: off and on, more off than on - Movement: little, except for small sideways head motions - Position relative to camera: after first questions moves head to look past camera - Comments: one of the only females with low rateability						
54f	0	1,10	-0,47	-0,30	-0,38	-0,69
54f	1	0,90	-0,79	-1,12	-1,23	-0,24
54f	2	0,65	-0,01	-0,94	-1,03	-0,46
54f	3	0,42	-0,77	-0,82	-1,32	0,18
- Attractiveness: average (pierced eyebrow) - Smiling: little to none, one laughter - Eye contact: low - Movement: little, one small nod up, one down, licks lips, only real movement laughter - Position relative to camera: at first straight into, after question looks over, sometimes under camera, seems completely unfocussed - Comments: is chewing gum						
56m	0	-0,83	0,21	-0,65	0,21	0,22
56m	1	-1,21	0,30	-0,90	0,05	0,18
56m	2	-1,27	0,00	-1,03	-0,36	0,24
56m	3	-1,14	0,19	-1,09	-0,09	-0,21
- Attractiveness: high - Smiling: constant - Eye contact: off and on, looks at Interviewer, but gaze also drifts all over - Movement: a lot, strong head movements, only at one point does he hold completely still - Position relative to camera: straight into - Comments: is very animated						
64m	0	0,05	-0,48	-0,26	0,57	-0,30
64m	1	-0,57	-0,32	-0,35	-0,12	-0,52

64m	2	-0,40	-0,28	0,01	0,39	-0,50
64m	3	-0,48	-0,49	0,12	0,30	-0,50
- Attractiveness: average (gains when in motion) - Smiling: high - Eye contact: constant - Movement: strong head movements - Position relative to camera: off-center to the left, looks sideways at interviewer - Comments: obviously talking to someone outside camera, very high rateability (first of two males), at 0,5 keeps without facial expression and without head movement condition, just misses other two by 0,07						
70f	0	-0,70	0,79	-0,72	0,18	-0,01
70f	1	-0,41	-0,21	-1,24	-0,67	0,30
70f	2	-0,22	-0,04	-1,25	-0,78	0,38
70f	3	0,32	-0,81	-1,46	-0,68	0,72
- Attractiveness: average (gains when in motion) - Smiling: high - Eye contact: off and on, but rather seldom, once casts gaze down - Movement: a lot, strong head movements - Position relative to camera - Comments: seems attentive to interviewer, some motions probably hard for computer to animate						
75f	0	0,60	-0,01	-0,75	-0,42	-0,27
75f	1	0,75	-0,23	-0,61	-0,28	-0,34
75f	2	0,37	0,06	-0,91	-0,68	-0,23
75f	3	1,00	-0,19	-0,54	-0,39	-0,49
- Attractiveness: average - Smiling: little, mostly hinted at, one real open mouth smile - Eye contact: off and on, sometimes loses focus - Movement: relatively strong head movements, body more animated than face - Position relative to camera: looks past camera - Comments: draws back at beginning						
81m	0	-0,17	0,51	-0,57	-0,84	0,41
81m	1	-0,20	0,13	-1,41	-1,21	1,01
81m	2	-0,24	0,29	-1,82	-1,50	0,74
81m	3	-0,26	0,07	-1,48	-1,32	0,75
- Attractiveness: average - Smiling: little, when does strong creasing of corner mouth - Eye contact: seldom, doesn't increase until end - Movement: Some without MT at beginning, lot of head movements - Position relative to camera: mostly straight - Comments: no						

82f	0	0,84	-0,79	-0,56	-0,03	-0,84
82f	1	0,10	0,00	-0,47	-0,75	0,22
82f	2	0,05	-0,42	-0,74	-1,09	-0,47
82f	3	-0,19	-0,29	-0,75	-0,90	-0,51
- Attractiveness: low to average - Smiling: little, seems forced - Eye contact: concentrates on camera and not interviewer - Movement: little - Position relative to camera: straight into camera - Comments: seems to take questions seriously, smiles even during preparation, but this seems very forced						
86m	0	-0,48	-0,08	-0,10	-0,09	0,92
86m	1	-0,75	-0,32	-0,27	-0,18	0,49
86m	2	-0,33	-0,74	-0,25	-0,28	0,72
86m	3	-0,67	-0,11	-0,22	-0,11	0,75
- Attractiveness: high (very kempt exterior) - Smiling: high, laughs twice - Eye contact: almost constant - Movement: starts movements slowly, but then very animated (laughs, crinkles corners of eyes, slight sideways nods) - Position relative to camera: straight into camera - Comments: high rateability, but only at 1 level						
88m	0	0,62	-0,35	0,06	-0,67	-1,00
88m	1	0,33	-0,30	-0,37	-1,20	-1,00
88m	2	-0,08	-0,36	0,05	-0,82	-0,45
88m	3	0,34	-0,53	-0,10	-1,05	-0,73
- Attractiveness: high - Smiling: high - Eye contact: mostly, loses focus from time to time - Movement: little - Position relative to camera: slightly past camera - Comments: while waiting a little grumpy						
89f	0	0,88	-0,11	-1,05	-0,32	-1,00
89f	1	0,80	-0,51	-1,25	-0,86	-0,87
89f	2	0,74	-0,49	-1,28	-0,74	-0,26
89f	3	0,56	-0,67	-1,30	-1,01	-0,84
- Attractiveness: high - Smiling: a lot - Eye contact: seldom						

-
- Movement: only movement turning of head to look past camera, at once time looks into the air (up)
 - Position relative to camera: never looks at camera, alternates between looking left and right past camera
 - Comments: no

Coloured areas indicate a difference between self and stranger lower than ± 0.5 (the mean difference between the NEO-FFI self- and stranger scores)

Some Possibilities for description:

- Attractiveness: low – average – high
- Smiling: low – average – high
- Eye contact: mostly – off and on – little – never
- Movement: a lot – some – little – not
- Position relative to camera: looks into camera – looks sideways at interviewer
- Comments

Some noteworthy observations:

- Almost no female wears make-up
- Always discernible when first question is asked and when finished
- At beginning of interview (either during preparation or first question) faces set in neutral expression
- In general obvious that a conversation, only seeming looks into camera if at all

Table 14: Differences between self-stranger ratings corrected for positive and negative

Stimulus	Condition	Diff. N	Diff. E	Diff. O	Diff. A	Diff. C ¹⁷	> 0.5	Sum
11f	0	.21	.67	.19	.18	.23	4	11
11f	1	.00	1.35	.22	.70	.03	3	
11f	2	.15	1.06	.23	.85	.14	3	
11f	3	.56	1.25	.71	1.01	.18	1	
15m	0	1.05	.53	.26	.01	.74	2	6
15m	1	1.04	.52	.71	.25	.76	1	
15m	2	1.01	.45	.61	.34	1.13	2	
15m	3	1.18	.07	.96	.75	.82	1	
16m	0	.15	1.15	1.07	1.27	.62	1	4
16m	1	.56	.63	.80	1.59	.71		
16m	2	.16	1.51	1.18	1.87	.67	1	
16m	3	.73	.45	1.66	1.75	.18	2	
19f	0	1.15	.31	.89	.64	1.01	1	3
19f	1	.90	.04	.98	1.31	.60	1	
19f	2	.92	.34	.76	1.25	.67	1	
19f	3	.94	.52	1.02	1.28	1.05		
20f	0	1.65	.03	.69	.26	.41	3	6
20f	1	1.66	.69	.75	.29	.67	1	
20f	2	1.23	.26	.75	.69	.41	2	
20f	3	1.12	.55	1.16	.85	.59		
21m	0	.00	.67	1.38	.45	.71	2	5
21m	1	.44	.26	1.69	.73	.86	2	
21m	2	.74	1.09	1.84	1.01	.59		
21m	3	.64	.05	1.95	1.50	.63	1	
23m	0	1.04	.62	.76	.20	.06	2	5
23m	1	.91	1.09	1.26	.75	.04	1	
23m	2	.75	1.02	1.22	.59	.64		
23m	3	1.26	.42	1.52	.92	.39	2	
24f	0	.01	.14	.93	.46	.31	4	13
24f	1	.31	.35	.69	.34	.37	4	
24f	2	.49	.47	.80	.46	.55	3	
24f	3	.56	.44	.62	.28	.51	2	
26m	0	.41	.74	.05	.31	1.05	3	12
26m	1	.41	.26	.33	.80	.66	3	
26m	2	.68	.60	.34	.47	.42	3	
26m	3	.37	.17	.43	.82	.92	3	
31f	0	.17	.50	.68	.47	.27	4	8
31f	1	.28	.84	1.14	1.80	.65	1	
31f	2	.33	1.03	.51	.83	.77	1	
31f	3	.22	.43	.75	.88	.57	2	
33m	0	.84	.52	.69	.44	.61	1	8
33m	1	.33	.27	1.62	1.05	.53	2	
33m	2	.82	.11	1.45	1.09	.09	2	
33m	3	.21	.31	1.21	1.11	.41	3	
34f	0	1.08	.18	.60	.65	.11	2	8
34f	1	.78	.86	1.13	1.77	.07	1	
34f	2	.91	.33	.77	1.38	.04	2	
34f	3	.39	.17	1.42	1.92	.20	3	
36f	0	.02	.09	.42	.13	.20	5	14
36f	1	.23	.36	.84	.04	.07	4	
36f	2	.08	.52	.96	.49	.22	3	
36f	3	.14	.65	.94	.41	1.06	2	

¹⁷ Range = 0.00 to 1.95

Stimulus	Condition	Diff. N	Diff. E	Diff. O	Diff. A	Diff. C ¹⁷	> 0.5	Sum
37f	0	.72	.94	.23	.88	.80	1	11
37f	1	.31	.16	.45	.17	.24	5	
37f	2	.74	.44	.35	.32	.16	4	
37f	3	1.26	.60	.55	.53	.02	1	
40m	0	.47	.14	.00	1.20	.64	3	9
40m	1	.62	.21	.22	1.27	.67	2	
40m	2	.72	.30	.29	.88	.72	2	
40m	3	.63	.27	.44	1.02	.95	2	
42f	0	.29	.09	.35	.09	.04	5	13
42f	1	.48	.49	.66	.93	.21	3	
42f	2	.63	.34	.81	1.30	.19	2	
42f	3	.33	.47	.97	1.52	.13	3	
44f	0	.58	.12	.08	.00	.43	4	12
44f	1	1.09	.63	.42	.47	.42	3	
44f	2	1.22	.58	.39	.60	.05	2	
44f	3	.82	.50	.42	.60	.15	3	
45f	0	.72	.55	.97	.44	.70	1	4
45f	1	.33	.74	1.32	1.33	.77	1	
45f	2	.72	.28	1.02	.83	.61	1	
45f	3	.79	.44	.69	.75	.73	1	
47m	0	1.03	1.00	1.23	.45	.41	2	9
47m	1	.27	.73	1.27	.28	.20	3	
47m	2	.95	.74	1.37	.02	.39	2	
47m	3	.76	.83	1.20	.12	.07	2	
49f	0	.69	.22	1.19	.92	.73	1	6
49f	1	.48	.03	.93	1.62	1.10	2	
49f	2	.04	.60	1.32	1.50	.70	1	
49f	3	.32	.30	1.33	1.31	1.07	2	
54f	0	1.10	.47	.29	.37	.69	3	7
54f	1	.87	.87	1.09	1.44	.13	1	
54f	2	.63	.08	.93	1.02	.42	2	
54f	3	.54	.66	.66	1.12	.02	1	
56m	0	.94	.13	.66	.18	.16	3	12
56m	1	1.31	.35	.84	.05	.19	3	
56m	2	1.24	.07	1.05	.32	.25	3	
56m	3	1.11	.27	1.11	.00	.23	3	
64m	0	.03	.53	.37	.61	.13	3	15
64m	1	.64	.31	.28	.03	.56	3	
64m	2	.40	.28	.01	.39	.50	5	
64m	3	.50	.46	.12	.27	.52	4	
70f	0	.75	.85	.73	.17	.16	2	9
70f	1	.47	.25	1.30	.72	.36	3	
70f	2	.27	.00	1.26	.71	.47	3	
70f	3	.25	.84	1.36	.73	.58	1	
75f	0	.60	.01	.75	.42	.27	3	12
75f	1	.69	.11	.51	.20	.13	3	
75f	2	.37	.06	.91	.68	.23	3	
75f	3	1.00	.19	.54	.39	.49	3	
81m	0	.29	.56	.61	.63	.19	2	8
81m	1	.13	.02	1.41	1.33	1.00	2	
81m	2	.24	.29	1.82	1.50	.74	2	
81m	3	.26	.07	1.48	1.32	.75	2	
82f	0	.84	.79	.56	.03	.84	1	10
82f	1	.10	.00	.47	.75	.22	4	
82f	2	.03	.43	.72	1.08	.44	3	
82f	3	.17	.33	.78	.92	.54	2	

Stimulus	Condition	Diff. N	Diff. E	Diff. O	Diff. A	Diff. C ¹⁷	> 0.5	Sum
86m	0	.49	.13	.11	.15	.94	4	14
86m	1	.68	.45	.34	.21	.43	4	
86m	2	.32	.79	.28	.27	.72	3	
86m	3	.64	.15	.25	.22	.65	3	
88m	0	.52	.18	.16	.53	1.02	3	12
88m	1	.30	.31	.40	1.38	.90	3	
88m	2	.16	.38	.00	.87	.51	3	
88m	3	.42	.50	.21	1.02	.73	3	
89f	0	.88	.11	1.05	.32	1.00	2	4
89f	1	.80	.51	1.25	.86	.87		
89f	2	.74	.49	1.28	.74	.26	2	
89f	3	.73	.76	1.39	1.08	.98		

Appendix C: Behavioural Q-Sort (German)

The Riverside Behavioral Q- sort: Ein Instrument zur Beschreibung von Verhalten in sozialen Interaktionssituationen

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Deutsche Adaptation:

Birgit Spinath¹, Frank M. Spinath² und David C. Funder. Copyright 2000.

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RBQ Items

- Scheint sich bewusst zu sein, dass er/sie gefilmt wird oder an einem Experiment teilnimmt (unabhängig davon, ob die beobachtete Reaktion darauf positiv oder negativ ist).
- Befragt PartnerIn (stellt z.B. eine Reihe von Fragen).
- Gibt von sich aus viele Informationen über sich selbst.
- Erscheint interessiert daran, was PartnerIn zu sagen hat.
- Versucht die Interaktion zu kontrollieren. (Beurteilen Sie dies unabhängig davon, ob dieser Versuch erfolgreich ist oder nicht.)
- Dominiert die Interaktion. (Beurteilen Sie dies unabhängig von der Absicht der Person. Wenn die Person die Interaktion beispielsweise deswegen dominiert, weil der/die PartnerIn wenig aktiv ist, sollte ein hohe Einstufung vorgenommen werden.)
- Wirkt entspannt und scheint sich wohl zu fühlen.
- Zeigt soziale Fertigkeiten (unternimmt z.B. etwas, damit PartnerIn sich wohl fühlt, hält die Kommunikation in Gang, unterhält PartnerIn oder macht Komplimente).
- Verhält sich reserviert und emotional ausdruckslos (zeigt z.B. kaum Gefühlsregungen; agiert steif und förmlich).
- Lacht häufig. (Beurteilen Sie dies unabhängig davon, ob das Lachen aufgesetzt/„nervös“ oder echt zu sein scheint.)
- Lächelt häufig.
- Zeigt lebhaftes körperliches Interaktionsverhalten; bewegt sich viel.
- Scheint PartnerIn zu mögen (würde z.B. vermutlich gerne mit ihm/ihr befreundet sein).
- Zeigt ein unbeholfenes zwischenmenschliches Verhalten (scheint z.B. nicht zu wissen, was er/sie sagen könnte; nuselt/murmelt vor sich hin; versäumt es, auf Gesprächsangebote des/der PartnerIn einzugehen).
- Vergleicht sich selbst mit anderen (unabhängig davon, ob diese anwesend sind oder nicht).
- Zeigt große Begeisterung und ein hohes Maß an Energie.
- Zeigt sich vielseitig interessiert (spricht z.B. über viele verschiedene Themen).
- Spricht lieber *zu*, als *mit* dem/der PartnerIn (hält z.B. einen Monolog; ignoriert, was PartnerIn sagt).
- Drückt häufig Zustimmung aus. (Nehmen Sie eine hohe Einstufung vor, wenn er/sie ungewöhnlich oft zustimmt, z.B. zu jeder Aussage des/der PartnerIn. Eine niedrige Einstufung bedeutet ein ungewöhnlich geringes Ausmaß an Zustimmung.)
- Äußert Kritik (an irgend jemand oder irgend etwas; Nehmen Sie eine niedrige Einstufung vor, wenn er/sie Anerkennung oder Lob ausdrückt.).
- Ist gesprächig (so weit Sie es in dieser Situation beobachten können).
- Erscheint unsicher (scheint z.B. empfindlich oder übermäßig sensibel zu sein).
- Zeigt körperliche Anzeichen innerer Anspannung oder Angst (z.B. nervöse Bewegungen, zitternde Stimme). (Nehmen Sie eine mittlere Einstufung vor, wenn Sie keine Anzeichen für Angst beobachten. Nehmen Sie eine niedrige Einstufung vor, wenn solche Anzeichen fehlen, obwohl Sie sie aufgrund der Umstände erwarten würden.)
- Zeigt ein hohes Ausmaß an Intelligenz. (Ausschlaggebend ist, was die Person in der Interaktion zeigt, nicht, was bei der Person latent vorhanden sein könnte oder auch nicht. Nehmen Sie also eine

- hohe Einstufung nur dann vor, wenn die Person tatsächlich etwas Intelligentes tut oder sagt. Nehmen Sie eine niedrige Einstufung bei geringer gezeigter Intelligenz vor. Nehmen Sie eine mittlere Einstufung vor, wenn Sie diesbezüglich keine Informationen erhalten haben.)
- Zeigt Mitgefühl für PartnerIn. (Nehmen Sie eine niedrige Einstufung bei einem ungewöhnlichen Mangel an Mitgefühl vor.)
 - Bringt Humor in die Situation ein.
 - Sucht Bestätigung durch PartnerIn (bittet z.B. um Zustimmung, verhält sich Lob heischend).
 - Zeigt herablassendes Verhalten (verhält sich, als ob er/sie gegenüber dem/der PartnerIn in einer oder mehrerer Hinsicht überlegen wäre. Nehmen Sie eine niedrige Einstufung vor, wenn die Person sich so verhält, als sei sie selbst unterlegen.).
 - Erscheint sympathisch (dem/der anderen Anwesenden).
 - Fragt PartnerIn um Rat.
 - Scheint sich selbst für körperlich attraktiv zu halten. (Wahrscheinlich werden Sie bei der Einschätzung nonverbale Hinweise nutzen, z.B. äußeres Styling, Posieren u.ä.)
 - Agiert gereizt.
 - Drückt emotionale Wärme aus (gegenüber einer anderen Person; z. B. durch Äußerungen wie „meine gute Freundin/mein guter Freund“ etc.).
 - Versucht zu untergraben, zu sabotieren oder zu behindern (entweder das Experiment oder den/die PartnerIn).
 - Drückt Feindseligkeit aus (unabhängig davon, gegenüber wem oder was).
 - Weist ein ungewöhnliches oder unkonventionelles Erscheinungsbild auf.
 - Verhält sich ängstlich oder schüchtern.
 - Hat eine ausdrucksstarke Mimik, Stimme oder Gestik.
 - Zeigt Interesse an Fantasievorstellungen und Tagträumen. (Nehmen Sie eine niedrige Einstufung nur dann vor, wenn solche Interessen ausdrücklich verneint werden.)
 - Drückt Schuldbewusstsein aus (über irgend etwas).
 - Hält PartnerIn auf Distanz, vermeidet das Entstehen zwischenmenschlicher Beziehungen jeglicher Art. (Nehmen Sie eine niedrige Einstufung vor, wenn er/sie Verhaltensweisen zeigt, um sich dem/der PartnerIn anzunähern.)
 - Zeigt Interesse an intellektuellen oder geistigen Inhalten (z.B. durch eine ausführliche oder begeisterte Diskussion über eine intellektuelle Idee).
 - Scheint Freude an der Interaktion zu haben.
 - Sagt oder tut im Laufe dieser Interaktion interessante Dinge.
 - Sagt negative Dinge über sich selbst (ist z.B. selbstkritisch; äußert Gefühle von Unzulänglichkeit).
 - Zeigt Ehrgeiz (z.B. durch eine leidenschaftliche Diskussion von Karriereplänen, Zensuren/Bewertungen, Möglichkeiten, Geld zu verdienen).
 - Gibt anderen die Schuld (an irgend etwas).
 - Drückt Selbstmitleid oder das Gefühl aus, ungerecht behandelt zu werden.
 - Zeigt sexuelles Interesse (lässt z.B. erkennen, dass er/sie sich zum/zur PartnerIn hingezogen fühlt, drückt Interesse an einer Verabredung oder sexuellen Belangen aus).
 - Tritt fröhlich auf.
 - Gibt angesichts von Schwierigkeiten/Hindernissen auf. (Nehmen Sie eine niedrige Einstufung vor, wenn die Person mit ungewöhnlicher Beharrlichkeit agiert.)
 - Verhält sich in einer stereotypen männlichen/weiblichen Art und Weise. (Verwenden Sie die üblichen Stereotype entsprechend des Geschlechts der Person. Nehmen Sie eine niedrige Einstufung vor, wenn die Verhaltensweisen der Person dem Stereotyp des anderen Geschlechts entsprechen.)
 - Bietet Ratschläge an.
 - Spricht flüssig und kann Ansichten und Vorstellungen klar ausdrücken.
 - Hebt Errungenschaften der eigenen Person, von Familienmitgliedern oder befreundeten Personen hervor. (Nehmen Sie eine niedrige Einstufung vor, wenn die Person Misserfolge dieser Personen besonders hervorhebt.)
 - Konkurriert mit PartnerIn. (Nehmen Sie bei kooperativem Verhalten eine niedrige Einstufung vor.)
 - Spricht mit lauter Stimme.
 - Macht sarkastische Äußerungen (sagt z.B. Dinge, die er/sie nicht wirklich so meint, gibt spöttische Kommentare ab, die nicht unbedingt lustig sind).
 - Berührt PartnerIn körperlich oder tut dies beinahe. (Gemeint ist jegliche Art körperlicher Nähe, einschließlich eines ungewöhnlich nahen Beieinandersitzens.) (Nehmen Sie eine niedrige

Einstufung bei einer ungewöhnlichen Vermeidung von Körperkontakt vor, z.B. bei einem großen Abstand zwischen den Personen.)

- Hält konstant Blickkontakt zu PartnerIn. (Nehmen Sie eine niedrige Einstufung bei ungewöhnlich wenig Blickkontakt vor.)
- Scheint in der Interaktion nicht bei der Sache zu sein.
- Spricht schnell. (Nehmen Sie eine niedrige Einstufung vor, wenn die Person langsam spricht.)
- Verhält sich spielerisch (macht z.B. Scherze).
- PartnerIn fragt die Person um Rat.

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