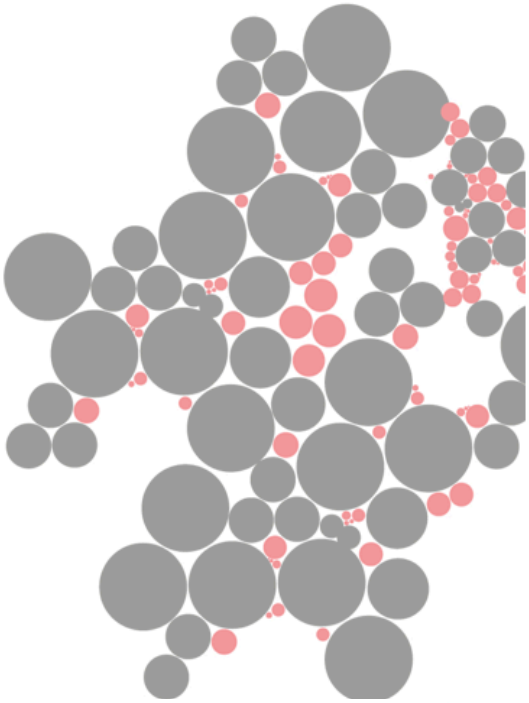

Personality Characteristics and the Active User Paradox

Exploring the associations between geekism, utilitarianism and the Active User Paradox

Bachelor Thesis

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Abstract

In this study the associations between geekism, utilitarianism and the Active User Paradox were explored. The Active User Paradox implies that when users are confronted with new computer programs they apply irrational working strategies. If users learned how to use a program the appropriate way, they would save more time in the long term than the actual learning process would cost. In this research it was expected that geeks and people with a high utilitarian attitude could resist to the AUP. Due to the fact that geeks have a high need for cognition the association between this concept and the AUP was also investigated

To test the hypotheses a mixed design experiment was conducted. For assessing the AUP scores, which refer to peoples challenge seeking- and explorative behaviour, the respondents were asked to solve several tasks within the computer programs *Word* and *Gimp*. In this part of the experiment the respondents were set into two conditions. In the first condition it was transparent for the respondents how many tasks they had to solve whereas it was intransparent for the respondents in the other condition. The aim of the conditions was to investigate whether people apply different strategies depending on the condition and their utilitarian attitude.

For assessing the personality characteristics the Geekism Index, the Need for Cognition Scale and a Utilitarian Scale were used. In total 30 respondents took part in this study. To find associations between the personality traits and the AUP scores correlation analysis was used. To explore the expected interaction effect a multivariate general linear model analysis was conducted.

The main finding of this research is the moderate to strong positive association between need for cognition and people's resistance to the AUP. Further a positive association between geekism and the resistance to the AUP was found, but this is not of certainty. Additionally no main effect of utilitarianism and no interaction effect were found with certainty.

This research provided evidence that the level of need for cognition influences a person's resistance to the AUP. Further geekism and utilitarianism might also have some influence. yet it is not sure to which degree. Therefore future research should focus on investigating people's resistance to the AUP according to their personality characteristics

Samenvatting

Het doel van de onderzoek was om de correlatie tussen geekism, utilitarisme en het Active User Paradox (AUP) te exploreren. Het AUP houdt in dat mensen, als ze geconfronteerd worden met een nieuw computerprogramma op een irrationele manier ermee werken. Als gebruikers eerst zouden leren om alle functies op de juiste manier te kunnen gebruiken, zou het voor hun op lange termijn gezien meer tijd besparen dan het proces van leren zou kosten. In dit onderzoek wordt verwacht dat geeks en mensen met een hoge utilitarisme score zich tegen het AUP kunnen verzetten. Op grond van het feit dat het concept van geekism samengaat met het concept van need for cognition, wordt verder ook naar het verband tussen need for cognition en het AUP gekeken.

Om de hypothesen te kunnen toetsen werd er een experiment met een mixed design opgezet. Voor het verkrijgen van de AUP-scores zijn er opdrachten ontworpen voor de computerprogramma's *Word* en *Gimp*. In het eerste deel van het experiment werden de respondenten in twee verschillende condities geplaatst. De ene conditie houdt in dat aan de respondenten de informatie wordt gegeven hoeveel opdrachten er zijn en in de andere conditie wordt deze informatie niet gegeven. De doelstelling van de condities waren om te onderzoeken of mensen verschillende werkstrategieën gebruiken afhankelijk van de conditie en hun utilitarisme score. In het tweede deel van het experiment werden de persoonlijkheidstrekken van de respondenten met behulp van de Geekism Index, de NCS-Scale en een utilitarisme schaal gemeten. Dertig respondenten hebben in dit onderzoek geparticipeerd. Voor het analyseren van de data zijn er correlatie analysen en een multivariate general linear model analysis uitgevoerd.

De belangrijkste uitkomst van de onderzoek is dat er aangetoond wordt dat er een moderaat tot sterke verband bestaat tussen need for cognition en de vaardigheid zich tegen het AUP te kunnen verzetten. Verder is er een positieve correlatie tussen geekism en het verzet tegen het AUP gevonden, echter was dit niet significant. Bovendien is er geen teken van een hoofdeffect van utilitarisme en geen interactie-effect tussen utilitarisme en de condities gevonden.

Er werd aangetoond in dit onderzoek dat mensen met een hoge need for cognition een hoge weerstand tegen het AUP hebben. Het blijkt ook dat er een samenhang bestaat tussen geekism en het AUP. Dit geeft ruimte voor vervolgonderzoek naar de correlatie tussen persoonlijkheidstrekken het de weerstand tegen het AUP.

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1. Introduction

We are living in a world where the change of technology has a great influence on our daily lives. The most challenging aspect of changes in technology, for humans is to adapt to it and not to fall behind. Adapting to technology includes the exploring of its most effective and efficient use. Yet the problem that we are facing in the 21st computer century seems to be that people are not provided with the necessary '21st century skills', which enable users to fully realize technology's most positive effects (Burkhardt, Gunn, Dawson & Coughlin 2003). Today people are expected to use smartphones, tablets or other technical devices and even for children it is nearly normal to use this technology. However in comparison to the importance of these technologies, not enough effort is put into teaching people, especially the younger generations, the right usage of this technology (Burkhardt et al. 2003). The importance of teaching people the right skills becomes even clearer when having a look at the technology market, which nowadays is overcharged by new trends. For instance if you buy the newest smartphone today it is almost for sure that within only a few weeks there will be a smartphone on the market that has even more and better features. It seems to be almost impossible to master all the innovations that the market provides. However this is not acceptable to our rapid changing society because people are expected to keep themself up to date.

These assumptions of Burkhardt et al. (2003), mentioned above, can be perfectly linked with the research of Carroll and Rosson (1987) about human computer use. What they observed was that when users are confronted with new computer programs, they do not try to learn the necessary skills but rather start immediately working and stick to their old known theories. Carroll and Rosson (1987) called this phenomenon 'the paradox of the active user'. The paradox in these situations is that people could save a lot of time in long-term use when first trying to learn how to use the program more efficiently, than the actual learning process would cost. In their research they further observed that this paradox occurs in different ways to inexperienced and experienced users.

Reminding the fact that making mistakes is part of every human being one could assume that the active user paradox could occur to everyone. Even the biggest genius sometimes makes mistakes. Therefore in this research we will explore people's 'resistance to the active user paradox'. Still, we expect that there are two groups of people, who can completely or at least better than others resist to this phenomenon. Support for this

assumption comes from the research of Schmettow, Noordzij and Mundt (2013), who indicated that there are individual differences in using new computer technologies between the users. According to the concept of 'geekism' developed by Schmettow and Drees (2014) it is expected that people with a high computer enthusiasm and the willingness to put effort into learning about computer systems, have the highest resistance to the active user paradox.

Yet in the context of individual differences in computer use Schmettow et al. (2013) further stated that there is a group of computer users for whom functionality and usability are preferred qualities. Due to the fact that it was mentioned by Carroll and Rosson (1987) that the active user paradox is mainly based on irrational working behavior it can also be expected that people who apply rational and goal orientated working strategies have a high resistance to the active user paradox, too. In this research the concept of utilitarianism will be investigated as a counterpart to geekism. In the following the concepts of the AUP, geekism and utilitarianism will be explained in more detail.

1.1 The Active User Paradox (AUP)

The active user paradox (AUP) was first mentioned by Carroll and Rosson (1987) and is based on two observations of computer use. On one hand people seem to have considerable trouble of learning how to use a computer and on the other their skills tend to be lower than it should be. What is important is that Carroll and Rosson (1987) did not expect that these phenomena occur due design failures of computer technology. Rather they estimate that these phenomena have real motivational and cognitive origins. According to them these two paradoxes arise in the context of two biases. The motivational paradox is grounded in the 'production bias' and the cognitive paradox is grounded in the so called 'assimilation bias'. In case of the production bias the overall goal of users is expected to be throughput. For Carroll and Rosson (1987) this means that people are focused on getting the job done, which is good on the one hand but has some disadvantages on the other hand. Users, that have this motivation, have a higher chance to receive reinforcement quickly but also they do not want to spend any time on learning new and maybe even more effective strategies. Therefore they stick to their habits when new situations appear. In case of the assimilation bias users are expected to transfer prior knowledge to new task, which again can be useful especially when there are similarities between the old and the new programs. Yet, unnecessary prior knowledge can inhibit and confuse the user during the process of learning new strategies. Further Carroll and Rosson (1987) stated that these paradoxes are normal parts of human learning. Additionally in this research it is described how these paradoxes influence

experienced and new users. This means that they actually could occur to everyone what provides support to our decision to talk about users' resistance to the AUP in this research. The main reason, which courses the active user paradox according to Carroll and Rosson (1987) is that people are confronted with so many information that they cannot possibly interpret all of them. As a consequence they ignore most of them and try solving the situations on their own and when they do so, they leave the path of rational working strategies.

The fact that people try to explore the programs on their own is a very common way of learning about new systems as Rieman (1996) found in his field study about explorative learning strategies (1996). Further its has not necessarily to be inefficient if it is supported by for instance manuals or other users. If this is the case, Rieman (1996) expected that explorative learning strategies could even be a very enjoyable method for users. These findings are in contradiction with what Carroll and Rosson (1987) mentioned. According to them a consequence of 'striking out into the unknown' is that things even get worse before they get better.

Fu and Gray (2004) also investigated the phenomenon of the AUP and defined it as 'the persistent use of inefficient procedures in interactive tasks by experienced or even expert users when demonstrably more efficient procedures exist'. For their research about the stable suboptimal performance in interactive tasks, they used the study of Carroll and Rosson (1987) as basis. The aim of the study of Fu and Gray (2004) was to investigate where inefficient working strategies come from and why people keep on using them. What they expected was that experience from the past would influence people in their future choices. The three factors that cause this behavior are the frequency of use, the effectiveness and the efficiency of the procedures (Fu& Gray, 2004). The higher the frequency of use, effectiveness and efficiency the higher is the chance that people stick to a procedure. In general the results of this study provided a lot of support to what was assumed by Carroll and Rosson (1987). Most important is that they found evidence for the assimilation and production bias. They were also able to add the point that even if users get knowledge about more efficient procedures that not necessarily implies that they will adopt them. They conclude that users seldom make a 'once-and-for all-decision' (Fu & Gray, 2004). This shows again that people when influenced by the AUP do not follow rational strategies. Also Krisler and Altmann (2008) made research on the working strategies of users. In their study they tried to teach people short cuts on a computer keyboard so that their performance did not rely on the interface of certain program. They assumed that it is possible to train people

towards mastery what makes them able to resist to the AUP. Yet it seems more like that the training helps people to overcome the consequences of the AUP rather than increase their resistance to it. The method they used is more like a brute-force method. In their opinion the AUP is just an inhibitor to skill acquisition (Krisler & Altmann, 2008). As a matter of fact they were able to develop a tool, called HotKeyCoach (HKC) that helped users to acquire deeper structural knowledge about computer programs. Although this research has its implications it provides evidence to the assumption that people who are willing to reach mastery and who are applying rational working strategies, should have a high resistance to the AUP.

1.2 Geekism

With regard to the consulted literature, we would assume that people with a high computer enthusiasm and the willingness to acquire deeper knowledge about a computer program have a higher resistance to the AUP. These people are called ‘Geeks’ (Schmettow et al., 2014). The research of Krisler and Altmann (2008) provides support for the hypothesis that people possibly can resist to the AUP. Evidence for the concept of geekism comes from the study of O’Brien (2007) where he suggested that there is a gifted group of people, who are ‘computer technology talented’ (CTT). Through interviews he tried to identify what drives the people, who are interested in computers and their technology. What the respondents stated was that they were ‘intrinsically motivated to pursue their own technology interests’ (O’Brien, 2007). Hence these people don’t have to be asked to reach mastery for computer programs. Further O’Brien (2007) indicated that people enjoyed the challenging aspects of the tasks. This is especially of interest because gaining pleasure from challenging aspects of a task is also part of the concept of need for cognition (Cacioppo & Petty, 1982). Within this concept people can be subdivided in whether they score high or low. People who are categorized with a high level of need for cognition are expected to be intrinsic motivated, whereas people categorized with a low level of need for cognition have to be motivated through an extrinsic trigger, to perform a task (Cacioppo & Petty, 1982). Furthermore it is stated that a high need for cognition implies the motivation for searching and acquiring information (Barbaro, Pickett & Parkhill, 2015). Therefore it is assumed that geekism is highly positive correlated with the need for cognition (Schmettow et al. 2014). In other words this means that geeks are expected to show a high score on the Need for Cognition Scale, which was developed by Cacioppo, Petty and Kao (1984). To measure how people vary among their affinity for technology, the Geekism Index was developed by Schmettow and

Sander (2013). For further investigation of the concept of geekism Schmettow and Keil (2013) developed an implicit picture story exercise (PSE). Here they found that geeks have clearly other perceptions of technical devices than users with an utilitarian or hedonistic motivation have. These results confirmed again that geeks are more interested in getting deeper knowledge about computers.

1.3 Utilitarianism

In the context of the studies about geekism it was stated the computer users could apply different approaches to adopt new computer technologies (Schmettow et al. 2012). The motivation that users have to work with computers could be based on hedonic, utilitarian or geek reasons.

In the beginning of this study it was assumed that two kinds of computer users could have the possibility to resist to the AUP. On the one hand this would be geeks and on the other hand users, who apply rational working strategies. The concept of utilitarianism was especially reviewed in the context of consumer behavior research. Batra and Athola (1991) mentioned that people with utilitarian reasons are mostly concerned with "expectations of consequences". Further they estimate that utilitarian consumer behavior is task-related and rational. Babin, Darden, Griffin et al. (1993) found in their research on shopping behavior that utilitarian value is based on the necessity of collecting information rather than on recreation. Due to that they concluded that for people with utilitarian values a shopping trip is more like ‘an errand’ and their motivation within this situation is described as ‘getting through it all’. What was found in theses researches can be perfectly linked with how Schmettow et al. (2013) described people with utilitarian motivations referring to situations of computer interaction. According to them a purely utilitarian user thinks of computers as tools to complete a task and to reach certain goals. Therefore they want the product to be designed simple and efficient but do not want to think about it. The qualities that utilitarian users prefer about computer programs are functionality and usability (Schmettow et al., 2013). With this in mind the concept of utilitarianism has a crucial role when trying to investigate how people could resist to the AUP. It is granted that utilitarian users develop more rational strategies for getting a job done. Why this point is especially important is stated in the fact that a low resistance to the AUP is partly grounded on that users have to little utilitarian intentions and because of this, their task performance lacks in efficiency (Carroll & Rosson, 1987). Hence it will be also important to measure utilitarianism besides the concept

of geekism. On top of this it is also interesting whether people can be stimulated to develop rational working strategies as for example through the information that are provided to them.

1.4 Hypotheses

Short, three different concepts are introduced in this work: the active user paradox, geekism and finally utilitarianism. In this research we aim at investigating which type of computer users has the greatest chance to resist to the AUP. From the literature we found that there are relationships between geekism and the AUP and utilitarianism and the AUP. Further it was investigated whether it is possible to stimulate people to develop more rational working strategies. To conduct the study the following hypotheses were formulated:

1. A high score on the Geekism Index is positively related to people's resistance to the AUP.
2. A high score on the Need for Cognition Scale is positively related to people's resistance to the AUP.
3. There is a main effect between people's score on the utilitarian scale and their resistance to the AUP and an interaction effect between utilitarianism and the condition, which are designed in a way that either people are aware of how many tasks they have to solve or not.

2. Method

2.1 Sample

In this research 30 participants took part. These participants were partly collected through a convenience sampling from the close environment of the researchers. The other part was collected via the Sona-sytems of the University of Twente. Through this online system social science students can employee respondents for their research project. All of them had to fulfill a few sampling criteria. Referring to the computer tasks it was at charged that the respondents at least had basic experience with computers and used *Microsoft Paint* or a comparable graphics program at least once. Further people with color blindness were excluded from this research, because the experiment consists of tasks, which are designed, in color. There were no further limitations regarding to age or gender.

2.2 Procedure

Every session consists of the following parts. Before the experiment starts, the participant will be informed about what he can expect of the experimental session and what kind of tasks he will have to solve. After that the participant is asked to fill in the informed consent. Furthermore all participants will be told that there is no time limit given.

The experimental session is divided into two parts. The first part consists of measuring the resistance to AUP whereas the second part will focus on the assessment of personality. For the first part of the experiment the testing-battery includes an interactive computer task and for the second part it includes four different questionnaires. The purpose of using the computer task is to get insight in the degree to which the user is influenced by the active user paradox. At this stage the respondent has to complete three tasks in the free graphic program *Gimp* as well as one in the writing program *Word*. In order to measure only the things of interest and to not distract the respondent from the tasks, the interfaces of the programs were adapted to this research.

In total it is expected that it will take the respondent about 2 hours to complete the experimental session. During the time the researcher will be present so that he can brief the respondent in the beginning and answer questions, if it is not biasing the study (e.g. giving answer to how the task has to be solved). It is further necessary that the researcher is present because he has to organize the computer tasks.

When the computer tasks are finished and all questionnaires are filled in the experiment ends. The respondent will be thanked for his participation and if there all still open questions the research will give answer to participant.

2.3 Assessment of Personality

In this research the independent variable consists of the measure of personality. Three different personality constructs, which are expected to have a great influence on resistance to AUP, were measured. A multi method approach was applied to measure these variables.

2.3.1 Geekism Index (GEX)

The Geekism Index measures the tendency to geekism. The Geekism Index is a questionnaire consisting of 32 items, which should be answered on a seven-point Likert-Scale and was developed by Schmettow and Sander in 2013. This questionnaire is based on two qualitative studies that aimed to define on what elements geekism is based. From the studies of Schmettow & Passlick (2013) and Schmettow & Keil (2013) a lot of information were

raised, which served as a basis for developing the item pool of the questionnaire. Most of the items include terms as ‘computer’ and ‘technical devices’. The respondents are asked to also think about Smartphones, Laptops or Tablets, while filling in the questionnaire. A high score on the GEX indicates that a person has a high predisposition of geekism.

2.3.2 Need for Cognition Scale (NCS)

The tendency to need for cognition is measured by the NCS Scale. In this study the revised version of the need for cognition scale was used (Caccioppo, Petty & Kao, 1984). It consists of 18 items and also has to be answered on a seven-point Likert-Scale. Cacioppo and Petty are generally interested in the differences of information processing between people. They suggested that the need for cognition is predictive for how people deal with tasks and social information. According to this a high score on the need for cognition scale indicates that people are intrinsic motivated to deal with a certain task and to collect additional information. They are motivated to apply their thinking skills and are also able to separate the relevant from the irrelevant information (Cacioppo & Petty, 1982, 1984).

2.3.3 Utilitarian Scale

The Utilitarian Scale measures the tendency of users to utilitarian computer use. Primary the scale was developed to measure hedonic and utilitarian value of shopping behavior (Babin, Darden, Griffin &Darden, 1994). For this study the scale was adjusted to the overall topic and the items refer now to computer programs, as it can be seen in figure 1 beneath. This was done within an expert group. All seven items were adopted and also translated into Dutch and German.

Still the scale consists of several items and is similarly to the other questionnaires scored on a seven-point Likert Scale. A high score on this scale indicates a high tendency to fall for utilitarian behavior. That means that the person will work task-related and rational. Further this person may find value only if the task is completed successfully (refers to ‘getting the job done’) and will be even more satisfied when he did it in a fastidious manner (Babin et al, 1994).

On the contrary a low score on this scale indicates a more hedonic work behavior relating to computer tasks. To give a hedonic value to a behavior is more subjective and revers more to personal characteristics than its utilitarian counterpart. Factors that play a crucial role here are for instance the experience of fun and pleasure rather than task completion (Babin et al, 1994).

Table 1

Items of the Utilitarian Scale

Original items	Adopted items
I accomplished just what I wanted to on this shopping trip.	While working with computer programs I only accomplish tasks that are relevant in the current situation.
I couldn't buy what I really needed	I feel bothered when I am not able to solve a task with a certain computer program.
While shopping, I found just the item(s) I was looking for	While working with a computer I only use functions, which help me to fulfill a certain task.
I was disappointed because I had to go to another store(s) to complete my shopping.	I am disappointed when I need more than one computer program to solve a task.
I feel this shopping trip was successful.	While using computer programs it is important to me to solve my task the most skilful way
I feel really smart about this shopping trip.	When I work with computer programs it is important for me to get results very easy and quick.
This was a good store visit because it was over very quickly	The faster I can solve a task with a certain computer program, the more satisfied I am.

2.4 Apparatus

Based on the design of the tasks a Windows Computer is needed on which the programs *Gimp* and *Word* are installed. There is also a printout needed where all task are listed and explained (e.g. when to inform the researcher between the three tasks). Additionally, to give all respondents the same condition, there will be a manual available, which describes the basic operators of the computer program *Gimp*. For instance this manual describes how to select a symbol and how to delete it. This manual will be opened as a PDF file on the computer, which the respondent uses. For the writing program *Word* no manual will be available. In order to analyze how the task was accomplished, the computer program Morae will record the interaction with the task of the respondent. All of these programs will be installed on the researchers computer. Later on the researchers will score the interaction through a list of categorizations of the different operators, which the respondent could have

used. Before the experimental session the characteristics of the operators were scored by three raters and the inter rater reliability was assessed.

2.5 Assessment & Scoring of Resistance to AUP

The dependent variable in this research is the tendency of a person to resist the AUP. It is assumed that people differ in in their resistance to the AUP depending on their personality.

2.5.1 AUP Tasks

The tasks that we used in our experiment for measuring the active user paradox were designed and developed by Julian Keil, who is a Master student at the University of Twente. Within *Gimp* three different tasks are designed. Each of these tasks consists of five subtasks, which are similar. The researchers prepared a tool guide, which explains roughly all needed basic tools of the program *Gimp* and is provided to the participant during the whole session. While solving the task the participant can freely choose between the tools and there will be no time limit. The focus of these tasks mainly lies on selecting, deleting and changing the color of a certain amount of symbols.

The word task consists of a text about the sun, randomly chosen from Wikipedia. There is no further connection between the topic of the text and the task. Within the text several things were adopted in order to create the tasks. For example some parts of the sentences are marked as hyperlinks (these hyperlinks do not work to not interrupt the respondent while he is solving the tasks) or colored different than the rest of the text. In total there are six *Word* subtasks the respondent has to deal with. Again there is no time limit given to the respondent. At the end the respondent is asked to save the document.

GIMP Task 1

During the first task it is asked to only delete items of a certain color and try not to damage other subjects. Between the five subtasks the color of the pictures differs and so does the color, which has to be deleted, too. For example in task 1.1 it is asked to delete all red items. After that the respondent is asked to save the document and go on with the next subtask.

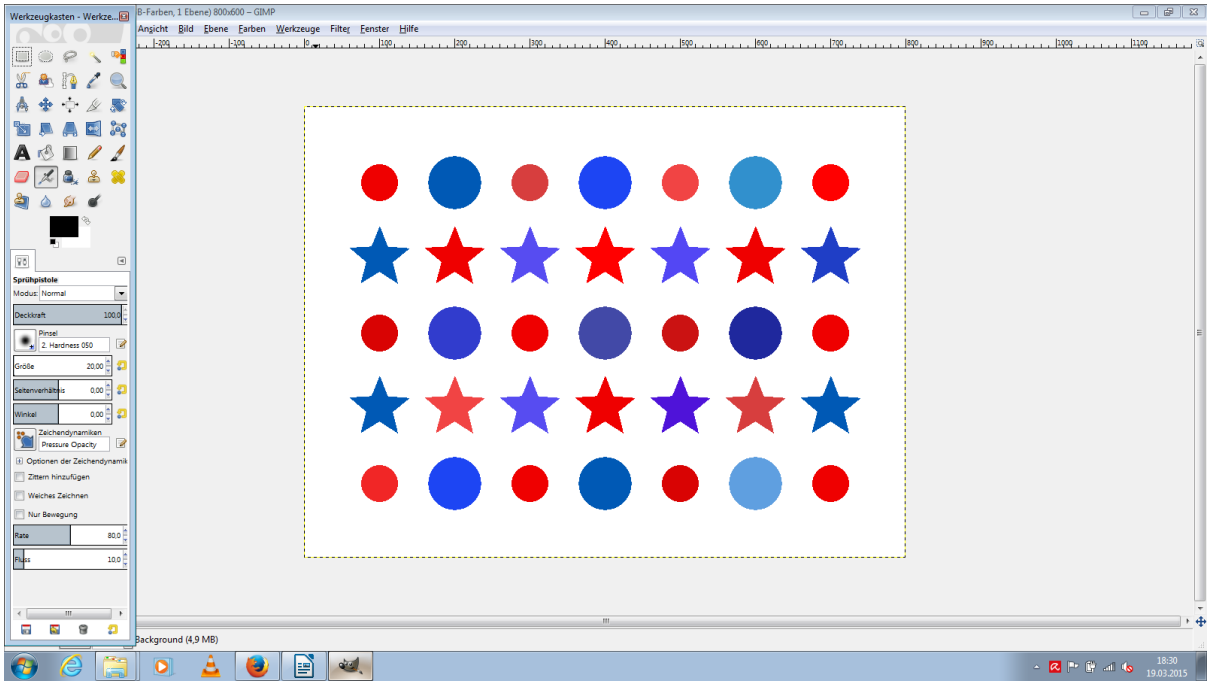

Figure 2. Gimp Task 1

GIMP Task 2

When coming to task two the instruction for the participant is to change the color of certain subjects into a specified new color. For example in task 2.1 it is requested to change the color of all yellow subjects into red. When the task is finished the participant saves the document and goes on with the next subtask. Again there will be five subtasks, which are all nearly the same. Only the color of the stars and circles will change.

GIMP Task 3

For the third task new subjects are added to the task-pictures. Between the already familiar subjects of stars and cycles, lines of different colors are added. Here the task for the participant consists of removing all lines without damaging the other subjects. After fulfilling the task the procedure again is the same. The participant saves the document and continuous with the next subtask where only the colors will change.

The word task consists of a text about the sun, randomly chosen from Wikipedia. There is no further connection between the topic of the text and the task. What is of interested are the changed subject within the text. For example some parts of the sentences are marked as hyperlinks (these hyperlinks do not work to not interrupt the respondent while he is solving the tasks) or colored different than the rest of the text. In total there are six tasks the respondent has to deal with. Again there is no time limit given to the respondent. At the end the respondent is asked to save the document.

Word Task 1-5

The first tasks are almost the same and each of them refers to one different paragraph of the text. The task for the client is to change al hyperlinks, so that they are underlined, bold, written in font style ‘Times New Roman’ and colored in red, green, yellow, orange or purple. Into which color the hyperlinks have to be changed depends on the task.

Word Task 6

In this task the respondent has to change the headlines of the paragraphs into bold, font style ‘Times New Roman’, font size 12 and color them black. Furthermore the task includes to number the paragraphs consecutively (e.g. 1. First Paragraph).

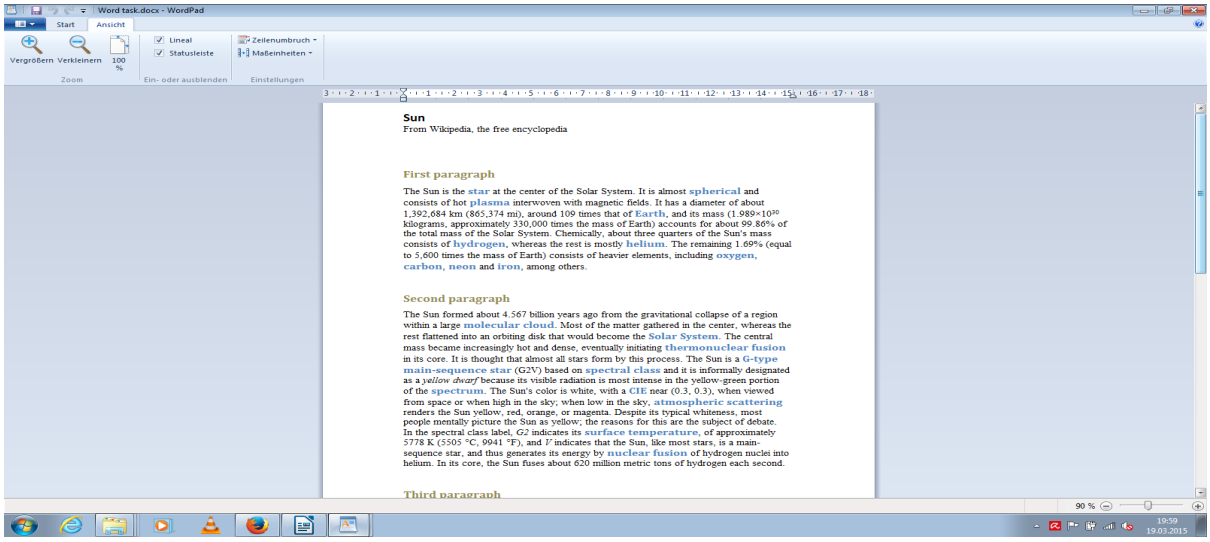

Figure 3. Word Task

2.5.2 AUP Scoring

As it was mentioned above the performance of the respondents are recorded through the computer program *Morae*. In order to analyze the interaction of the respondent the undertaken actions are scored. Therefore the recordings are reviewed and the interaction of the respondent is coded into different methods. Generally methods are a set of operators that achieve a sub goal or goal (John & Kiera, 1996). Finally this delivers a range of qualitative data, which later is translated in quantitative AUP scores. To code the interaction a scheme was developed that valuates the different methods, which the user has used. All operators in this experiment are defined by five characteristics. The five characteristics are specificity, difficulty, complexity, delayed feedback and parameter demands.

Specificity of an operator includes the amount of tasks that can be solved with it, and the amount of different objects that can be manipulated with it. Difficulty is defined by the expected experience of the user with the operator or similar operators and the extent of frequency to which these operators appear in other computer programs. With complexity it is meant how many options or parameters a single operator has. The characteristic of delayed feedback refers to the time, which lies between a change of a single parameter and the point when this change becomes visible. The last characteristic that is used to rate the operators is parameter demands. This characteristic points to how easy an operator can be used without changing any parameters what makes the operator suitable to the most situations. For each operator it was evaluated through an inter-rater analysis whether there is obscurity.

Table 2

Scoring table for the AUP task interaction

Method ID	Method	Description	Specificity	Difficulty	Complexity	Delayed feedback	Parameter demands
CU	Cut selection	The participant presses the *DEL* key, or selects *Edit > Cut.* This deletes the currently selected area.	high	low	low	low	low
IS	Invert selection	The participant presses *Select > Invert.* This inverts the currently selected area.	high	low	low	low	low
PE	Pencil	The participant optionally selects a new foreground color and a tool size, keeps the mouse button pressed and moves the mouse arrow over an object.	low	low	high	low	medium
PA	Paintbrush	The participant optionally selects a new foreground color and a tool size, keeps the mouse	low	low	high	low	medium

		button pressed and moves the mouse arrow over an object.					
ER	Eraser	The participant optionally selects a tool size, keeps the mouse button pressed and moves the mouse arrow over an object.	low	low	high	low	medium
RS	Rectangle select	The participant presses and pulls the mouse to select an area in form of a rectangle.	medium	low	high	low	low
ES	Ellipse select	The participant presses and pulls the mouse to select an area in form of an ellipse.	medium	low	high	low	low
FS	Fuzzy select	The participant optionally modifies the threshold and selects an area with a similar color by clicking on it.	medium	medium	high	low	medium
CS	Color select	The participant optionally modifies the threshold and selects all areas in the picture with a similar color by clicking on one of them.	medium	medium	high	low	medium
BF	Bucket fill	The participant optionally selects a new foreground color and the affected area (fill whole selection or fill similar colors), and fills an area with a similar color or the selected area with the foreground color by clicking on it.	medium	low	high	low	medium
CR	Crop (ausschneiden)	The participant selects an area of	high	medium	high	low	low

		the image with the crop tool and presses the *Enter* key in order to delete the rest of the image.					
FG	Fill with foreground color	The participant selects *Edit > Fill with FG color* in order to fill the selected area with the selected foreground tool color.	high	low	low	low	low
BL	Blend (Verlaufswerkzeug)	The participant drag-clicks the mouse over the image in order to create a blend of the selected foreground and background colors in the selected area	high	medium	high	low	low

Additionally it is important to look at the explorative behavior of a person. This refers for instance to the use of the lookup function or reading the manual. Explorative behavior like this can be interpreted as an indicator that a person has a lower tendency to fall for the AUP.

Table 3

Scoring table of explorative behavior

Operator ID	Operator	Description	Parameters
LF	Look up function	User opened help system to find out about a specific function. This is scored per viewed function.	Duration
RH	Read handout	User reads the provided handout	Duration, function
U	Undo	User undoes a previously issued function	

On top of that for every action it was scored whether the participant changed the parameters of an operator or did not before he used it. Not to change the parameters of an operator implies less cognitive effort than adjusting the operator to the given task. Therefore a higher AUP score can be calculated for people with a higher default use of parameters.

Table 4

Scoring parameters of operators

Parameter ID	Parameter	Description
DU	Default use	User uses a method without changing parameters
SP	Set parameters	User sets new parameters for a method

Later the behavior of the respondents is coded in table as a sequence of behavior. This table also includes a time stamp for each operator and, in some cases, also the duration (e.g. when the respondents reads the manual) and additional parameters.

Table 5

Example of behavioral coding table

Participant	Task	Subtask	Observation	Time	Method	Duration	Parameters	Additional info
1	1	1	1	00:02	RH	01:12		
1	1	1	2	02:35	PE		DU	
1	1	1	3	02:38	U			
1	1	1	4	02:42	RH	00:46		
1	1	1	5	03:40	CS		SP	
1	1	1	6	03:52	CU		DU	
1	1	1		03:57	END			
1	1	2	1	04:01	CS		DU	
1	1	2	2	04:04	CU		DU	
...	...	...	...	...	...	...	...	...

Through the results ultimately two summary scores are calculated, which provide a number that reflects a person's resistance to the AUP:

1. *Exploratory behavior*: persons with low propensity for AUP should show stronger urge to find out the possibilities of the system.

2. *Challenge seeking:* persons with a low tendency for AUP should show a stronger will to master the task in the most appropriate way, which is observed as choice of more specific, complex and difficult to use functions.

To calculate the AUP scores at first the methods that were coded for one participant were translated into single measures. These measures were calculated either by the sum or the mean of several operators. The sum was calculated for the measures of the amount of parameters set, the method diversity, the duration of reading the handout and for the amount of undo actions. For the specificity, difficulty, complexity, delayed feedback and the parameter demands of the tools that the respondent used a mean value was calculated. For finally calculating the AUP scores the measures were at first separately translated into standardized z-scores. After this a person's tendency to exploration were computed as the mean of the measures undo, read handout and method diversity. A person's tendency for challenge seeking was calculated as the mean of parameterizing, specificity, difficulty, complexity and parameter demands.

2.6 Experimental Design

The experiment used a mixed design. This means that the experiment was designed with two conditions to which the respondents were randomly distributed. Within the conditions information are provided to the participant in different ways. There is one condition where it is clear for the respondent how many tasks he has to solve (transparent) and one condition where it is not clear (intransparent). The aim of this design is to test the expected interaction effect of the third hypothesis. It claims that people apply different strategies depending on the condition and their score on the Utilitarian Scale.

For the transparent condition the experimental set up is very simple. The research only has to upload the *Gimp* task1,2 and 3 when the former task was accomplished. After that the researcher opens the word task. For the intransparent condition the experimental set up requires a little bit more work of the researcher. Remaining to the fact that it is not told to the participant that he has to force a whole range of tasks every subtask (e.g. 1.1 1.2…3.5) has to be uploaded separately. This has to be done in a manner that the participant cannot see how many task are still remaining. The most practical way to do so is to turn the computer away from him while uploading the subtasks.

2.7 Data Analysis

To analyze the data the Statistical Program for Social Science (SPSS) was used. At first for every respondent five different scores were ascertained. Three of these scores refer to the personality questionnaires and the other two refer to the AUP tasks. Here it has to be mentioned that the word tasks were not taken into account during the analysis. It turned out that there was no significant variance. For this reason the AUP scores are only based on the *Gimp* task. To compare the five scores all of them are mean scores and are separately z-standardized.

After this an explorative data analysis was conducted, to get a first overview and to visualize the main characteristics of the data. To visualize the distribution of the scores for each measured construct within our sample, boxplots were made.

The next step was to check whether the used questionnaires were reliable. A reliability analysis was done for each of the three questionnaires. Especially this was important for the Utilitarian questionnaire, because it was primary not designed for this kind of research and for that reason was adapted to this study. The other two questionnaires were just checked for safety reasons.

For testing the first two hypotheses correlations between the personality characteristics and the AUP score were calculated. For testing the third hypothesis, a multivariate general linear model analysis was conducted. Therefore the utilitarian variable was changed from scale into a categorized variable. The calculated median was used as a threshold to divide between low scores and high scores on utilitarianism. In this way we tried to measure the expected main effect of utilitarianism on the AUP scores and an interaction effect between utilitarianism and the two conditions.

3. Results

3.1 Demographics

In total 30 respondents participated in this research. However due to some transcription errors we were only able to use 28 cases. From these 28 respondents sixteen participants were female (57,1%) and twelve participants were male (42,9%). The gender distribution in this sample is almost equal. Further in this sample the lowest age is 19 years and the highest age is 30 years. The mean age lies at 22,68 (SD=2,33) years. All of the respondents were German.

Table 6

Demographic Data

	Percent	M (SD)
Age		22, 68 (2,33)
Gender		
Male	42,9	
Female	57,1	

Note: M=Mean SD=Standarddeviation

At the beginning of the experimental sessions the respondent had to estimate the frequency of his use of several common computer programs on a five-point Likert-Scale. It was obligatory for the participants that they had at least used a graphic program once. The data shows that this is the case because every respondent at least stated that he already had worked with the graphic program *Paint*. However it can be further seen that the mean scores of the frequencies are very low except for *Word*, where the mean score is even very high (m=4,25; SD= 0,52). What is also notably is that the mean score for the frequency of using *Gimp* is very low (m=1,21; SD= 0,50).

Table 2

Descriptive Statistics of Graphical Programs

	Minimum	Maximum	Mean	Std. Deviation
exp_Microsoft_Paint	2	4	2,54	,69
exp_Adobe_Photoshop	1	4	1,82	,98
exp_MacPaint	1	3	1,11	,42
exp_GIMP	1	3	1,21	,50
exp_Paintbrush	1	2	1,11	,31
exp_graphical_programs	1	9	3,61	1,91
exp_Microsoft_Word	3	5	4,25	,52

Additionally the respondents were asked to estimate their own skills about graphical computer programs. The table beneath shows that the average score of the general knowledge about graphical computer programs lies at m= 3,61 with a standard deviation of SD= 1,91. On a range from 0 to 10 no participant estimated his skills with a ten. It can be seen that the respondents estimated their general skills of working with several working programs as low.

3.2 Reliability Testing

In order to can be sure about consistency of the results from the questionnaires, for all of them a reliability analysis was done. In this study we used Cronbach's Alpha as a lower bound estimate of the reliability. For all of the questionnaires Cronbachs's alpha stated a sufficient reliability. Especially the score for the Geekism Index is very high. For the Gex it was α=0,94, for the NCS it was α=0,86 and for the Utilitarian Scale it was α=0,76. A high reliability indicates that the tests we used are consistent. It means that they deliver similar results under consistent conditions.

3.3 Hypotheses Testing

During the explorative data analysis it was found that the mean standardized z-scores of the Gex (z= -0,249) and for the two AUP measures (z= -0,0339; z= -0,0243) lie slightly beneath the mean. The mean standardized z-scores for the NCS (z= 0,0747) and the Utilitarian Scale (z= 0,5731) instead lie above the mean. For the Utilitarian scale the z value lies even clearly above the mean score, whereas NCS z score lies slightly above.

The data of every mean score for each personality and AUP score was also visualized with boxplots. Through the boxplots the distribution of the scores becomes clearly. When having a look at the distributions of the scores of personality measures it becomes apparent that there is sufficient variance within our sample referring to geekism and need for cognition. Only for utilitarianism no negative extremes were found.

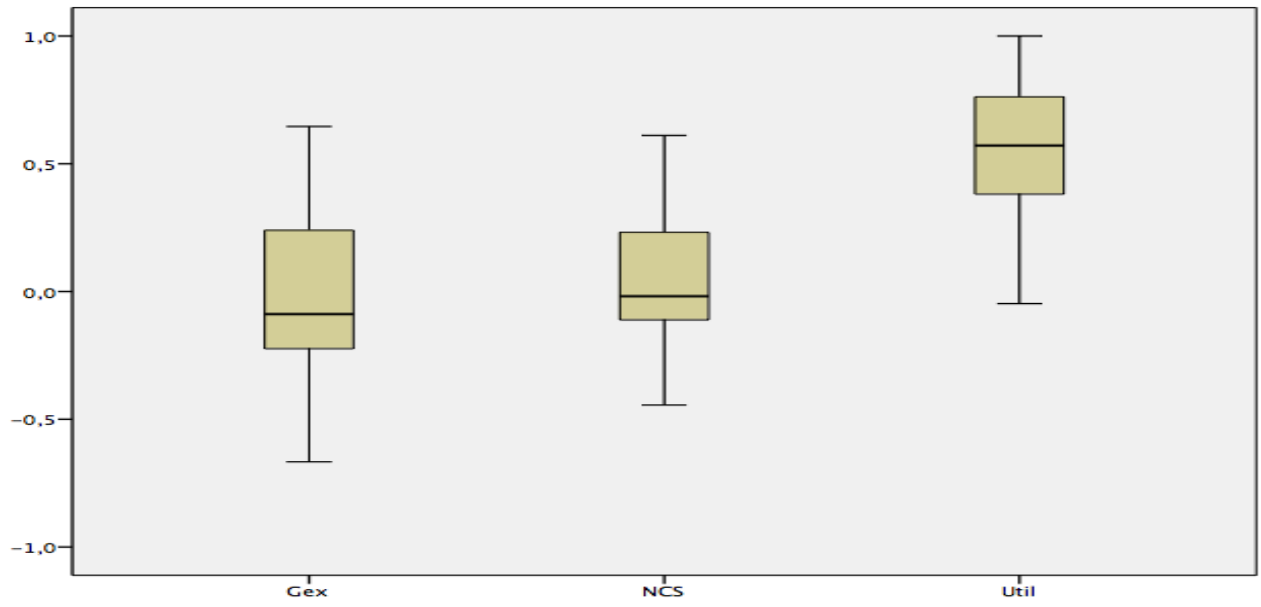

Figure 4. Distribution of GEX, NCS and Util scores

In the cases of the AUP also outliers can be seen quickly. For the measure of the AUP_explore respondent 11 has a score that is highly above all the other scores and also for the AUP_challenge variable two outliers were found (13, 22). Again our measures confirm sufficient variance.

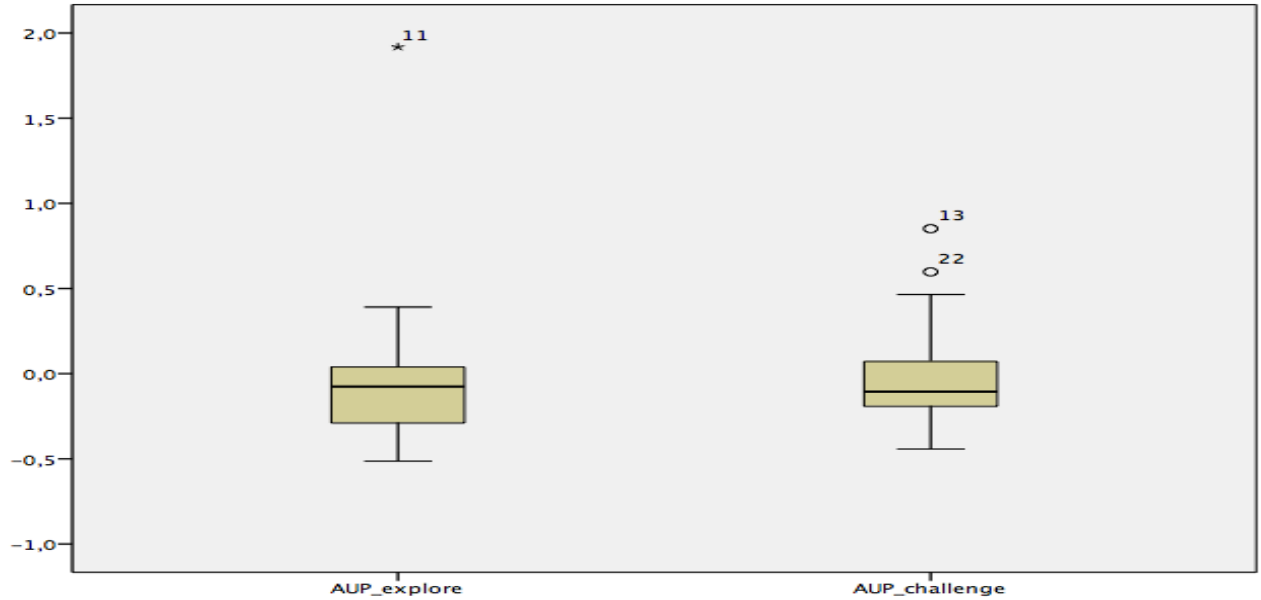

Figure 5. Distribution of AUP_explore and AUP_challenge scores

3.3.1 Personality Characteristics and the Resistance to the AUP

The correlations between geekism and the AUP and need for cognition and the AUP were calculated, in order to test the first two hypotheses. It was expected to find positive correlations between these measures. While we did this, we also checked on the correlations between the personality characteristics. Table 7 shows these correlations. The Pearson Correlation between Gex and NCS is positive with the value of 0,55. When someone scores high on geekism also a high score on need for cognition can be expected. Between Gex and the Utilitarian Scale there is a negative correlation with the value of -0,61. The Pearson correlation between NCS and the Utilitarian Scale is also negative with the value of -0,42. What can be seen is that the first two assessed correlation are above the threshold of 0,5 and therefore can be labeled as strong. The correlation between the NCS measure and the Utilitarian measure is just beneath this threshold and is labeled as medium.

Additionally the personality characteristic scores do all correlate with each other on a significant level. Either they are significant on the level of 0,01 or 0,05.

Table 7

Correlations between Personality Characteristics and AUP Scores

		Gex	NCS	Util	AUP_explore	AUP_challenge
Gex	Pearson Correlation	1	,55**	-,61**	,20	,25
NCS	Pearson Correlation		1	-,42*	,12	,49**
Util	Pearson Correlation			1	-,19	-,07
AUP_explore	Pearson Correlation				1	,10
AUP_challenge	Pearson Correlation					1

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

*. Correlation is significant at the 0.05 level (2-tailed).

Next we had a closer look at the correlations from the hypotheses, which we expected to find. For hypothesis one it was expected to find a positive correlation between the Gex measure and the AUP measures. Indeed a positive correlation between these two measures was found but both are small (<0,3) and none of them was significant. The correlation between the Gex and AUP-explore has a value of 0,20 and the correlation between Gex and AUP-challenge has a value of 0,25. The consequence is that the first hypothesis cannot be approved with sufficient certainty.

For the second hypothesis it was expected to find positive correlations between the NCS measures and the two AUP measures. The correlation value between NCS and AUP-explore is 0,12, which is labeled to be small and was also not significant. Between NCS and AUP-challenge the correlation value is 0,49, which was additionally approved as to be of sufficient certainty. These results allow us to partly adopt the hypothesis.

3.3.2 Main & Interaction Effect

In the third hypothesis it was assumed that a main effect could be found between the score on the Utilitarian Scale and the AUP measures. Additionally an interaction effect between the condition in which the respondent was placed and his score on the Utilitarian Scale was expected. From the general linear model analysis it can be seen that there was neither a main effect nor an interaction effect found. In table 8 it can be seen that the effects we tried to find are not of certainty, what is supported by the 95% confidence intervals that show a great range. In statistical terms this means that our hypothesis cannot be approved.

Table 8

Coefficient table of testing main and interaction effects

Dependent Variable	Parameter	B	Std. Error	t	Sig.	95% Confidence Interval	
						Lower Bound	Upper Bound
AUP_explore	util_nom	,41	,23	1,76	,09	-,07	,89
	Condition	,11	,23	,48	,64	-,36	,57
	util_nom* Condition	-,31	,35	-,88	,39	-1,02	,41
AUP_challenge	util_nom	,01	,16	,09	,93	-,32	,35
	Condition	,01	,16	,08	,94	-,31	,33
	util_nom* Condition	,02	,24	,08	,94	-,48	,56

Another point that goes along with the third hypothesis is the correlation between Utilitarianism and the AUP scores. Referring to the interaction effect it was expected that a negative correlation between utilitarianism and the AUP would exist. The Pearson correlation for the utilitarian scores and the AUP- explore scores is -0,19 and the value of the Pearson correlation between the Utilitarian Scale and the AUP-challenge scores is -0,07. Whereas the first score still can be labeled as a small correlation the other correlation value indicates that there is no correlation at all because it is lower than the threshold of 0,1. None of them is of certainty. Further it is interesting that no significant correlation between the AUP scores exists. These findings are listed in table 7.

To get more insight if there is a difference between the two conditions we calculated the means of the effectiveness scoring for each condition. To compare them we conducted an independent samples t-test. For this analysis case 13 was excluded.

Table 9

Mean Effectiveness Scoring Within Conditions

	Condition	N	Mean	Std. Deviation	Std. Error Mean
Effectiveness	unaware	216	,9408	,20	,01
	aware	173	,9633	,17	,01

One can see that there is a small difference between the mean effectiveness scores of the two conditions but the independent sample t-test showed that this is not significant.

4. Discussion

The aim of this research was to investigate which personality characteristics possibly could influence people's resistance to the Active User Paradox. Through the review of the literature we found that especially the concept of geekism and utilitarianism seemed to be of great interest. Due to the fact that it is closely related to the concept of geekism also the influence of need for cognition on the AUP was examined. Indeed the most interesting finding arises from this relation. We found that people with a high need for cognition have a higher chance to resist to the AUP referring to their challenge seeking motivation. During our study we were further not able to find strong and certain associations to approve the other hypotheses. To interpret our findings we will also have a closer look at the observations we made during the scoring sessions.

4.1 Geekism and the AUP

The first hypothesis was: 'A high score on the Geekism Index is positively related to people's resistance to the AUP.' As already mentioned there is no statistical significant correlation between these two constructs. Referring to the fact that our sample showed a sufficient variance within the scores on geekism these findings become even more interesting. Although our sample included sufficient respondents with a geek predisposition we were not able to confirm the hypothesis. To review where these findings possibly come from it can be helpful to use the qualitative observations we made.

What we observed during the scoring session is perfectly in agreement with what Carroll and Rosson (1987) and Fu and Gray (2004) stated. The production and assimilation bias, which were described as the main triggers for the AUP, were observed while scoring the performances of the respondents. On average respondents used inefficient methods to solve the tasks, because they did not discover the more efficient ones. For example a lot of respondents used the 'eraser' to delete items. Only a few found methods as for instance 'colour select' and even when they found it not all of them were able to set the parameters right. Still the question remains why even the people with a geek predisposition were not able to resist to the AUP. To give answer to this it is useful to look again at the study of Krisler and Altmann (2008). In their research they wanted to train their respondents towards mastery of a certain computer program. Therefore they provided learning opportunities to the respondents. Two of their main principals for designing adequate learning opportunities were that users should have many learning opportunities and that the learning events should minimize task interruption.

In the conducted experiment of this study we also gave the possibility to the respondents to learn about the tasks. What we expected was mainly based on the research about geekism of Schmettow et al. (2013; 2014). People with a geek predisposition would search for learning opportunities and participants with no geek predisposition would fall for irrational working strategies. Indeed we were able to observe a difference in the behavior of the respondents. Some of them didn't open the manual that we provided and some did. During the experimental sessions it seemed that the respondents used the manual quite a lot. Yet when we scored the videos it became clear that they most of the time just opened it for a quick moment and scanned it. Very often the respondents just scrolled up and down and only a few really stopped to read it in detail. Support for this comes from the low AUP-explore scores. As a matter of fact one could conclude that the learning opportunities, which we provided, did not really stimulate the respondents. In fact they are not congruent with the guidelines of good learning opportunities as Krisler and Altmann (2008) described it. On the one hand we just provided one opportunity and on the other hand every time when the participant wanted to use the manual the task interaction was disrupted.

There was only one participant (11), who has a really high AUP-explore score. It turned out that he read the manual for a very long time. Due to that the methods he used had a high complexity but still he had to undo a lot of his actions and it did not lead to a higher resistance to the AUP. For sure this is just a single case but it raises the question whether explorative behavior really reflects a higher resistance to the AUP. For further investigation it might be interesting here to have a closer look at the explorative behavior of people and adapt the learning opportunities to it. One could also possibly think of lowering the weighting of the handout-reading operator for calculating the AUP explore scores.

4.2 NCS and the AUP

The second hypothesis was: 'A high score on the Need for Cognition Scale is positively related to people's resistance to the AUP.' For this hypothesis we partly found significant evidence. Our results showed no certainty for the association between the NCS and the AUP-explore score, but the association between the NCS and the AUP-challenge score is of a high certainty. Within our sample the mean score for need for cognition was slightly above the expected mean and the data showed sufficient variance for this measure.

When having a closer look at the approved association, the result is not very surprising and even fits perfectly because the two constructs are very similar. Barbaro et al (2015) conceptualized need for cognition as to seek and acquire information. Likewise a high

AUP-challenge score implies that people are able to find appropriate ways to solve tasks and to resist the AUP. Given that a respondent has a high score on both scales he will choose more specific and complex functions and therefore will be able to resist the AUP. A good example for this kind of behavior is respondent 22, who showed high scores for both measures. While scoring his task interaction it became noticeable that he was one of the few who really set the parameter in an appropriate way. He was able to change threshold for the tool 'color select' in a way that all items of one color were deleted at the same time.

For the second association between the need for cognition and explorative behavior no effect could be found with certainty. Nevertheless some respondents showed extreme high explorative behavior. Respondent 20 for instance had no clue how to change the background colors within *Gimp*. Yet she kept trying to change the color of the items and ultimately finished the task using figures with different colors to change the items. In order to change the items green for instance she used given images of plants. Conspicuous in this case is that she has a low AUP-explore score. How is this possible? A possible answer to that might be a narrow definition of the construct of exploring. In principal there are two ways of getting information. On the one hand there is the adequate way of using the manual but on the other hand trial and error is also a way of searching information and exploring a computer program. Of course the trial and error is most of the time very inefficient but still it can lead to results and shows also some kind of willingness to explore. Although respondent 20 showed a low AUP-explore score, her scores on the NCS-scale and also the AUP-challenge score were clearly above the mean z-score (NCS z= .20; AUP- challenge z= .21). As already mentioned in the context of hypothesis one, again it might be helpful the review the calculation of the AUP scores. What provides even more support for this assumption is the observed task interaction of respondent 17. Here we were able to observe that he rather kept running the same failure and trying to adapt to it than searching for another method. However he has a high z- mean score for the measure of AUP-explore (z= .39).

The questions that comes up now is why is there a correlation between NCS and The AUP score but not between the GEX and the AUP score, although research has shown that geekism implies also need for cognition (Schmettow et al, 2014). A possible answer to this could be that, however geekism per definition implies need for cognition, it is not the same the other way around. There is a significant correlation between these two constructs, but clearly need for cognition is not the same as geekism. Need for cognition provides the basis for the concept of geekism, but does not include geekism in his own definition.

4.3 Interaction Effect Between Utilitarianism and the Conditions

The third hypothesis was: 'There is a main effect between people's score on the utilitarian scale and their resistance to the AUP and an interaction effect between utilitarianism and the condition in the experimental set up.' As described in the method section we used a between subject design to set up our experiment. The two conditions implied that the respondent is either aware of how many tasks he has to solve or not.

We looked at the results but we were not able to find any statistical proof for our hypothesis. There is neither a main effect of utilitarianism nor a main effect of the conditions on the AUP score. Further we were also not able to find any interaction effect between the measure of utilitarianism and the conditions. To put it in another way, people in the two different conditions did not develop different working strategies.

However we found that the mean utilitarian score is very high above what people are expected to score. Within the utilitarian measure there are almost only high values, hence there is not much variance. This could possibly provide the answer to why we were not able to find an interaction effect. Through putting the people into two different conditions we expected to find that people would apply different working strategies according to their utilitarian predisposition. Due to the fact that seemingly all respondents had high utilitarian predisposition we were only able to discover small differences referring to how effective the participants solved the tasks. As it was already mentioned respondents in the transparent condition worked slightly more effective than respondents in the 'intransparent' condition. Yet it has to be mentioned that these findings are not of certainty. We conclude that these findings are based on the fact that people in the transparent condition are more able to divide their workload, because of the experimental design. They know that they have to solve several similar tasks and therefore they invest more effort in the beginning to find adequate methods.

A difference that nevertheless occurred between the two conditions was that respondents in the 'intransparent' condition seemed to be more stressed. This assumption is based on their observed behavior. During the session these respondents kept asking how long it would take to accomplish the tasks and how many tasks they still have to solve. Further some of them speculated what these tasks really measure, so that they could show the right interaction. Although the researchers were not allowed to give answer to these questions, the respondents kept asking. Another factor that caused stress for the 'intransparent' condition might be the interaction with the researchers. Due to the fact that the researchers uploaded

every subtask, the interaction between the respondents and the researcher was higher than in the transparent condition. This could also be a possible explanation for the lower mean effectiveness scores in the intransparent condition, because the respondents felt observed by the researchers what raised their level of stress.

In the context of testing the main effect the results were also surprisingly. Carroll and Rosson (1987) stated that people would not work rational and because of that they could not resist to the AUP. Based on this we assumed that people with higher utilitarian attitudes would have a higher resistance to the AUP because they consider the computer as a tool to accomplish a task and therefore work in a rational manner (Schmettow et al. 2013). Although our sample included a lot of respondents with utilitarian attitudes no effect was found. To provide an answer to these findings it is helpful to look at our observations again.

The task interaction that we observed perfectly fits with the 'production bias', which has the overall goal of throughput. As it is further stated people with this motivation could receive reinforcement quickly (Carroll & Rosson, 1987). Indeed the respondents seemed to be only concerned in getting their job done. For people with utilitarian reasons the expectations about the consequences play a major role (Batra & Athola, 1991). That is why we conclude that even though our respondents had high utilitarian scores, for them no reinforcement or advantage was to gain through solving the tasks in an appropriate way. The best example for this is respondent 25. He scored the highest possible score on the Utilitarian Scale but also has a high failure ratio. During the scoring session it became clear that he just wanted to finish the task no matter how many mistakes he made. In order to avoid this bias in future research one might think about the design of the tasks and make them more appealing for the participants.

4.4 Strength and Limitations

The aim of this study was to proof two hypotheses. On the one hand we assumed that people's resistance to the AUP depends on personality characteristics and on the other that users differ in how much effort they put into resisting the AUP. Although we were not able to proof these hypotheses this means not that this correlations and effects do not exist. What we found was for instance that utilitarianism, which is also a personality characteristic, has a great influence on a persons resistance to the AUP. Besides that we found partly evidence for the sub thesis that need for cognition is an important trigger to resistance to the AUP. It has also been shown that our used materials worked well. For sure it was expected for the used questionnaires to work out well because they were already in use and tested. Especially it was

interesting for the AUP tasks to see that they worked as well. This method was designed by Julian Keil and in experimental use for the first time but it was also easy to handle for the researchers. Another strength of this study is the theoretical framework that was used. All of the constructs that are part of the study are well explored. Only geekism and the AUP still provide space for more future research. Further the sample of this research was very good, except for the variance within the utilitarianism measure. For the rest the variance and the sample size were sufficient. Unfortunately not all cases that we selected could be used. Hence the used sample was ultimately smaller than originally planned N=30. For future research the sample method should be adapted especially for measuring utilitarianism.

Finally there are a lot of opportunities left to further investigate whether people with a geek predisposition really have better resistance to the AUP. Still some doubts exist that this is really the case. In the research of Fu and Grey (2004) two biases were mentioned. With one of this biases we already dealt in this research but until now not much attention was given to the second one called 'assimilation bias'. Can we be sure that geeks, who are experts in some way, really try to search for new methods and not just trust on their own skills? If this would be the case on could suggest that the AUP influences almost every user. For future research I would suppose to shift the focus on motivational aspects and to investigate what could motivate people to resist to the AUP.

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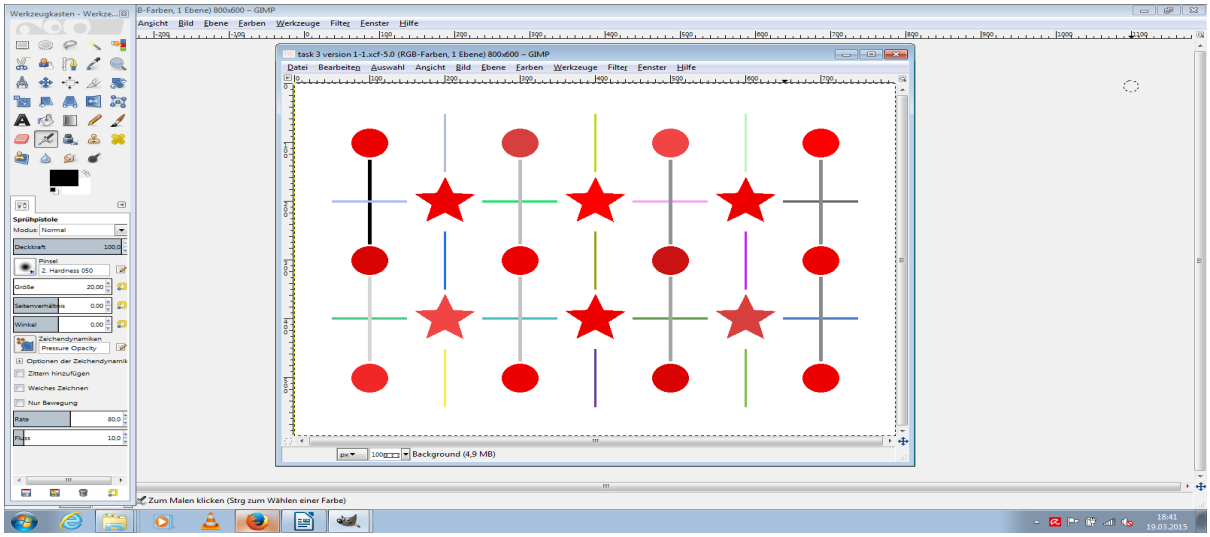
Appendix

Syntax

```
DESCRIPTIVES VARIABLES=Gender Age
  /STATISTICS=MEAN STDDEV MIN MAX.

FREQUENCIES VARIABLES=Gender
  /ORDER=ANALYSIS.

DESCRIPTIVES  VARIABLES=exp_Microsoft_Paint  exp_Adobe_Photoshop  exp_MacPaint
exp_GIMP exp_Paintbrush exp_graphical_programs exp_Microsoft_Word
  /STATISTICS=MEAN STDDEV MIN MAX.

DESCRIPTIVES VARIABLES=Gex NCS Util AUP_explore AUP_challenge
  /STATISTICS=MEAN STDDEV MIN MAX.

EXAMINE VARIABLES=Gex NCS Util
  /COMPARE VARIABLE
  /PLOT=BOXPLOT
  /STATISTICS=NONE
  /NOTOTAL
  /MISSING=LISTWISE.

CORRELATIONS
  /VARIABLES=Gex NCS Util AUP_explore AUP_challenge
  /PRINT=TWOTAIL NOSIG
  /MISSING=PAIRWISE.

EXAMINE VARIABLES=AUP_explore AUP_challenge
  /COMPARE VARIABLE
  /PLOT=BOXPLOT
  /STATISTICS=NONE
  /NOTOTAL
  /MISSING=LISTWISE.

RECODE Util (Lowest thru 0.5714=1) (0.5714 thru Highest=2) INTO Util_nom.
VARIABLE LABELS  Util_cat 'utilitarianism'.
EXECUTE.
GLM AUP_explore AUP_challenge BY util_nom Condition
  /METHOD=SSTYPE(3)
  /INTERCEPT=INCLUDE
  /EMMEANS=TABLES(util_nom) COMPARE ADJ(LSD)
  /EMMEANS=TABLES(Condition) COMPARE ADJ(LSD)
  /EMMEANS=TABLES(util_nom*Condition)
  /PRINT=PARAMETER
  /CRITERIA=ALPHA(.05)
  /DESIGN= util_nom Condition util_nom*Condition.
```

Computer Tasks

Gimp task 3



Experiment Material

EINWILLIGUNG NACH AUFKLÄRUNG

GW.07.130

Ich, …….. (*Name des Respondenten)*

willige ein, an einer Untersuchung mitzumachen, die durchgeführt wird von

Julian Keil

Ich bin mir bewusst, dass die Teilnahme an dieser Untersuchung freiwillig ist. Ich kann meine Teilnahme jederzeit beenden und die Daten, die sich aus der Untersuchung ergeben, zurückbekommen oder löschen.

Die folgenden Punkte wurden mir erklärt:

1. Das Ziel dieser Untersuchung ist es Einsicht in die Nutzungsmöglichkeiten von Nutzeroberflächen von Programmen zu bekommen.
2. Meine Aufgabe wird es sein, unterschiedliche Fragebögen auszufüllen und verschiedene Aufgaben mit den Programmen *GIMP* und *Microsoft Word* auszuführen.
   Die gesamte Untersuchung wird ungefähr 120 Minuten dauern. Am Ende wird der Untersucher erklären, worum die Untersuchung ging.
3. Teilnahme an dieser Untersuchung sollte keinen Stress oder Unbehagen hervorrufen.
4. Die Daten, die sich aus der Untersuchung ergeben, werden anonym verarbeitet und können darum nicht mit meinem Namen in Verbindung gebracht werden.
5. Der Untersucher wird alle weiteren Fragen zur Untersuchung jetzt oder im weiteren Verlauf beantworten.

Für eventuelle Beschwerden über diese Untersuchung können Sie sich an die Schriftführerin der ethischen Kommission der verhaltenswissenschaftlichen Fakultät der Universität Twente Frau J. Rademaker wenden. (Telefon: 053-4894591; e-mail:j.rademaker@utwente.nl, Postfach 217, 7500 AE Enschede).

Unterschrift Untersucher: …… Datum: ……..

Unterschrift Respondent: …… Datum: ……..

Geschlecht:_____
Alter: _____

Bitte ankreuzen, wie oft du die folgenden Programme bisher benutzt hast. (nur ein Kreuz pro Zeile)

	noch nie	**selten**	**manchmal**	**oft**	**täglich**
Microsoft Paint	O	O	O	O	O
Adobe Photoshop	O	O	O	O	O
MacPaint	O	O	O	O	O
GIMP	O	O	O	O	O
Paintbrush	O	O	O	O	O

Wie bewertest du deine bisherige Erfahrung mit Grafikprogrammen allgemein auf einer Skala von 0 (überhaupt keine Vorkenntnisse) bis 10 (sehr viel Erfahrung)?
_____

Aufgabenteil 1 (GIMP)

1)

- Öffne die Datei **task 1 version 1.**
- Entferne alle **roten** Objekte im Bild, versuche die anderen Objekte so wenig wie möglich zu beschädigen.
- Speichere das Bild.

2)

- Öffne die Datei **task 1 version 2.**
- Entferne alle **grünen** Objekte im Bild, versuche die anderen Objekte so wenig wie möglich zu beschädigen.
- Speichere das Bild.

3)

- Öffne die Datei **task 1 version 3.**
- Entferne alle **violetten** Objekte im Bild, versuche die anderen Objekte so wenig wie möglich zu beschädigen.
- Speichere das Bild.

4)

- Öffne die Datei **task 1 version 4.**
- Entferne alle **blauen** Objekte im Bild, versuche die anderen Objekte so wenig wie möglich zu beschädigen.
- Speichere das Bild.

5)

- Öffne die Datei **task 1 version 5.**
- Entferne alle **grünen** Objekte im Bild, versuche die anderen Objekte so wenig wie möglich zu beschädigen.
- Speichere das Bild.

Sind alle Aufgaben bis hier abgeschlossen, so wende dich an den Experimentleiter.

Aufgabenteil 2 (GIMP)

1)

- Öffne die Datei **task 2 version 1.**
- Wähle einen **grünen** Farbton und färbe alle **blauen** Objekte im Bild in dieser Farbe ein.
- Speichere das Bild.

2)

- Öffne die Datei **task 2 version 2.**
- Wähle einen **blauen** Farbton und färbe alle **orangenen/braunen** Objekte im Bild in dieser Farbe ein.
- Speichere das Bild.

3)

- Öffne die Datei **task 2 version 3.**
- Wähle einen **roten** Farbton und färbe alle **gelben** Objekte im Bild in dieser Farbe ein.
- Speichere das Bild.

4)

- Öffne die Datei **task 2 version 4.**
- Wähle einen **grünen** Farbton und färbe alle **pinken/violetten** Objekte im Bild in dieser Farbe ein.
- Speichere das Bild.

5)

- Öffne die Datei **task 2 version 5.**
- Wähle einen **blauen** Farbton und färbe alle **braunen** Objekte im Bild in dieser Farbe ein.
- Speichere das Bild.

Sind alle Aufgaben bis hier abgeschlossen, so wende dich an den Experimentleiter.

Aufgabenteil 3 (GIMP)

1)

- Öffne die Datei **task 3 version 1.**
- Entferne alle Balken, versuche die roten Kreise und Sterne so wenig wie möglich zu beschädigen.
- Speichere das Bild.

2)

- Öffne die Datei **task 3 version 2.**
- Entferne alle Balken, versuche die blauen Kreise und Sterne so wenig wie möglich zu beschädigen.
- Speichere das Bild.

3)

- Öffne die Datei **task 3 version 3.**
- Entferne alle Balken, versuche die grünen Kreise und Sterne so wenig wie möglich zu beschädigen.
- Speichere das Bild.

4)

- Öffne die Datei **task 3 version 4.**
- Entferne alle Balken, versuche die gelben Kreise und Sterne so wenig wie möglich zu beschädigen.
- Speichere das Bild.

5)

- Öffne die Datei **task 3 version 5.**
- Entferne alle Balken, versuche die orangenen Kreise und Sterne so wenig wie möglich zu beschädigen.
- Speichere das Bild.

Sind alle Aufgaben bis hier abgeschlossen, so wende dich an den Experimentleiter.

Aufgabenteil 4 (Microsoft Word)

Das geöffnete Textdokument enthält Text von Wikipedia.org. Hyperlinks im Text sind mit blauer Schriftfarbe gekennzeichnet.

1) Verändere alle Hyperlinks im ersten Absatz, sodass sie unterstrichen, **fett,** in der Schriftart Times New Roman und mit **roter** Schriftfarbe formatiert sind.
2) Verändere alle Hyperlinks im zweiten Absatz, sodass sie unterstrichen, **fett,** in der Schriftart Times New Roman und mit **grüner** Schriftfarbe formatiert sind.
3) Verändere alle Hyperlinks im dritten Absatz, sodass sie unterstrichen, **fett,** in der Schriftart Times New Roman und mit **gelber** Schriftfarbe formatiert sind.
4) Verändere alle Hyperlinks im vierten Absatz, sodass sie unterstrichen, **fett,** in der Schriftart Times New Roman und mit **orangener** Schriftfarbe formatiert sind.
5) Verändere alle Hyperlinks im fünften Absatz, sodass sie unterstrichen, **fett,** in der Schriftart Times New Roman und mit **violetter** Schriftfarbe formatiert sind.
6) Verändere alle Textüberschriften, sodass sie **fett**, in der Schriftart Times New Roman, in der Schriftgröße 12 und in schwarzer Schriftfarbe formatiert sind. Füge außerdem eine Nummerierung (z.B. "1. First paragraph") hinzu.
7) Speichere das Textdokument.

Nach Fertigstellung der obigen Aufgaben bitte umblättern.

Bitte ankreuzen, wie oft du **Microsoft Word** bisher benutzt hast. (nur ein Kreuz)

noch nie	**selten**	**manchmal**	**oft**	**täglich**
0	0	0	0	0

Auf den nächsten Seiten folgen zwei Fragenlisten. Fülle diese bitte aus.

Geben sie für jede Aussage an, in wie fern sie auf Sie zutrifft.

Ich würde komplizierte Probleme einfachen Problemen vorziehen.	Völlig unzutreffend	O	O	O	O	O	O	O	Trifft voll und ganz zu
Ich trage gerne die Verantwortung für eine Situation, die sehr viel Denken erfordert.	Völlig unzutreffend	O	O	O	O	O	O	O	Trifft voll und ganz zu
Denken entspricht nicht dem, was ich unter Spaß verstehe.	Völlig unzutreffend	O	O	O	O	O	O	O	Trifft voll und ganz zu
Ich würde lieber etwas tun, das wenig Denken erfordert, als etwas, das mit Sicherheit meine Denkfähigkeit heraus fordert	Völlig unzutreffend	O	O	O	O	O	O	O	Trifft voll und ganz zu
Ich versuche, Situationen vorauszuahnen und zu vermeiden, in denen die Wahrscheinlichkeit groß ist, dass ich intensiv über etwas nachdenken muss.	Völlig unzutreffend	O	O	O	O	O	O	O	Trifft voll und ganz zu
Ich finde Befriedigung darin, angestrengt und stundenlang nachzudenken.	Völlig unzutreffend	O	O	O	O	O	O	O	Trifft voll und ganz zu
Ich denke nur so viel, wie ich muss.	Völlig unzutreffend	O	O	O	O	O	O	O	Trifft voll und ganz zu
Ich denke lieber über kleine, alltägliche Vorhaben nach, als über langfristige.	Völlig unzutreffend	O	O	O	O	O	O	O	Trifft voll und ganz zu
Ich mag Aufgaben, die, wenn ich sie einmal erlernt habe, wenig Nachdenken erfordern.	Völlig unzutreffend	O	O	O	O	O	O	O	Trifft voll und ganz zu

Die Vorstellung, mich auf mein Denkvermögen zu verlassen, um es zu etwas zu bringen, spricht mich an.	Völlig unzutreffend	O	O	O	O	O	O	O	Trifft voll und ganz zu
Die Aufgabe, neue Lösungen für Probleme zu finden, macht mir wirklich Spaß.	Völlig unzutreffend	O	O	O	O	O	O	O	Trifft voll und ganz zu
Ich finde es nicht sonderlich aufregend, neue Denkweisen zu lernen.	Völlig unzutreffend	O	O	O	O	O	O	O	Trifft voll und ganz zu
Ich habe es gern, wenn mein Leben voller kniffliger Aufgaben ist, die ich lösen muss.	Völlig unzutreffend	O	O	O	O	O	O	O	Trifft voll und ganz zu
Abstrakt zu denken reizt mich.	Völlig unzutreffend	O	O	O	O	O	O	O	Trifft voll und ganz zu
Ich würde lieber eine Aufgabe lösen, die Intelligenz erfordert, schwierig und bedeutend ist, als eine Aufgabe, die zwar irgendwie wichtig ist, aber nicht viel Nachdenken erfordert.	Völlig unzutreffend	O	O	O	O	O	O	O	Trifft voll und ganz zu
Wenn ich eine Aufgabe erledigt habe, die viel geistige Anstrengung erfordert hat, fühle ich mich eher erleichtert als befriedigt.	Völlig unzutreffend	O	O	O	O	O	O	O	Trifft voll und ganz zu
Es genügt, dass etwas funktioniert, mir ist es egal, wie oder warum.	Völlig unzutreffend	O	O	O	O	O	O	O	Trifft voll und ganz zu
Normalerweise denke ich intensiv über Sachen nach, selbst wenn diese mich nicht persönlich betreffen.	Völlig unzutreffend	O	O	O	O	O	O	O	Trifft voll

Die folgenden Aussagen enthalten Begriffe wie “Computer“ oder „technische Apparate“. Bitte denken Sie dabei auch an Laptops, Smartphones, Tablets und andere technische Geräte.
Falls Ihnen eine Frage unklar ist, oder sie aus anderen Gründen keine Antwort geben können oder wollen, lassen Sie diese Frage einfach unbeantwortet.

1	Ich möchte verstehen, wie Computerteile oder Software funktionieren.	Trifft auf mich überhaupt nicht zu	O	O	O	O	O	O	O	Trifft auf mich vollkommen zu
2	Wenn jemand Hilfe mit dem Computer braucht, versuche ich so gut wie möglich zu helfen.	Trifft auf mich überhaupt nicht zu	O	O	O	O	O	O	O	Trifft auf mich vollkommen zu
3	Privatsphäreeinstellungen am Computer oder im Internet ist sehr wichtig für mich.	Trifft auf mich überhaupt nicht zu	O	O	O	O	O	O	O	Trifft auf mich vollkommen zu
4	Komplizierte Vorgänge mit technischen Geräten schrecken mich ab.	Trifft auf mich überhaupt nicht zu	O	O	O	O	O	O	O	Trifft auf mich vollkommen zu
5	Ich habe schon einmal technische Geräte zweckentfremdet oder modifiziert.	Trifft auf mich überhaupt nicht zu	O	O	O	O	O	O	O	Trifft auf mich vollkommen zu
6	Objektivität ist wichtig für mich.	Trifft auf mich überhaupt nicht zu	O	O	O	O	O	O	O	Trifft auf mich vollkommen zu
7	Ich habe nicht das Gefühl, viel Kontrolle über meine technischen Geräte zu haben.	Trifft auf mich überhaupt nicht zu	O	O	O	O	O	O	O	Trifft auf mich vollkommen zu
8	In meiner Freizeit verbringe ich nicht mehr Zeit am Computer oder anderen technischen Geräten als andere Menschen.	Trifft auf mich überhaupt nicht zu	O	O	O	O	O	O	O	Trifft auf mich vollkommen zu
9	Wenn ich mir ein neues Computergerät kaufe, ist mir die Leistung wichtiger als die äußere Erscheinung.	Trifft auf mich überhaupt nicht zu	O	O	O	O	O	O	O	Trifft auf mich vollkommen zu

10	Es motiviert mich, technische Geräte zu optimieren oder an meine Wünsche anzupassen.	Trifft auf mich überhaupt nicht zu	O	O	O	O	O	O	O	Trifft auf mich vollkommen zu
11	Ich habe schon einmal ein Projekt oder eine Arbeit von mir frei ins Internet gestellt, bzw. würde dies tun.	Trifft auf mich überhaupt nicht zu	O	O	O	O	O	O	O	Trifft auf mich vollkommen zu
12	Ich denke es gibt Menschen, die mich einen Computerfreak nennen würden.	Trifft auf mich überhaupt nicht zu	O	O	O	O	O	O	O	Trifft auf mich vollkommen zu
13	Das Innenleben technischer Geräte oder das Programmieren von Software interessiert mich nicht.	Trifft auf mich überhaupt nicht zu	O	O	O	O	O	O	O	Trifft auf mich vollkommen zu
14	Ich vermeide die erweiterten Optionen meiner technischen Geräte.	Trifft auf mich überhaupt nicht zu	O	O	O	O	O	O	O	Trifft auf mich vollkommen zu
15	Ich teile gerne meine Ideen und Projekte mit anderen.	Trifft auf mich überhaupt nicht zu	O	O	O	O	O	O	O	Trifft auf mich vollkommen zu
16	Herausfordernde Aufgaben an technischen Geräten reizen mich.	Trifft auf mich überhaupt nicht zu	O	O	O	O	O	O	O	Trifft auf mich vollkommen zu
17	Ich verfüge über ein großes Wissen, was Computergeräte betrifft (Hardware/Software).	Trifft auf mich überhaupt nicht zu	O	O	O	O	O	O	O	Trifft auf mich vollkommen zu
18	Ich versuche so wissenschaftlich wie möglich an Dinge heranzugehen.	Trifft auf mich überhaupt nicht zu	O	O	O	O	O	O	O	Trifft auf mich vollkommen zu
19	Ich bin interessiert an technischen Produkten, welche vielseitig einsetzbar sind.	Trifft auf mich überhaupt nicht zu	O	O	O	O	O	O	O	Trifft auf mich vollkommen zu

20	Ich investiere viel Zeit und Mühe damit, Dinge mit Computergeräten/Software auszuprobieren.	Trifft auf mich überhaupt nicht zu	O	O	O	O	O	O	O	Trifft auf mich vollkommen zu
21	Es ist wichtig, dass sich jeder Gedanken macht, was er ins Internet hochläd und was nicht.	Trifft auf mich überhaupt nicht zu	O	O	O	O	O	O	O	Trifft auf mich vollkommen zu
22	Ich eigne mir gerne Wissen bezüglich technischen Geräten (Hardware/Software) an.	Trifft auf mich überhaupt nicht zu	O	O	O	O	O	O	O	Trifft auf mich vollkommen zu
23	Ich habe schon des Öfteren technische Geräte geöffnet, um zu sehen, wie diese von innen aussehen.	Trifft auf mich überhaupt nicht zu	O	O	O	O	O	O	O	Trifft auf mich vollkommen zu
24	Mir ist es wichtig, dass Menschen freien Zugang zu meinen Projekten oder Arbeiten haben.	Trifft auf mich überhaupt nicht zu	O	O	O	O	O	O	O	Trifft auf mich vollkommen zu
25	Mir gefällt es, technische Geräte genau so steuern zu können, wie ich es möchte.	Trifft auf mich überhaupt nicht zu	O	O	O	O	O	O	O	Trifft auf mich vollkommen zu
26	Technische Geräte verwende ich teilweise anders als vorhergesehen.	Trifft auf mich überhaupt nicht zu	O	O	O	O	O	O	O	Trifft auf mich vollkommen zu
27	Ich finde es toll, dass sich Computerbenutzer gegenseitig bei Problemen helfen, z.B. auf Webforen.	Trifft auf mich überhaupt nicht zu	O	O	O	O	O	O	O	Trifft auf mich vollkommen zu
28	Viele Einstellungsmöglichkeiten an technischen Geräten finde ich abschreckend.	Trifft auf mich überhaupt nicht zu	O	O	O	O	O	O	O	Trifft auf mich vollkommen zu

29	Wenn es Probleme mit technischen Geräten gibt, muss mir meistens jemand anderes helfen.	Trifft auf mich überhaupt nicht zu	O	O	O	O	O	O	O	Trifft auf mich vollkommen zu
30	Ein technisches Produkt muss für mich schön aussehen.	Trifft auf mich überhaupt nicht zu	O	O	O	O	O	O	O	Trifft auf mich vollkommen zu
31	Ich mag technische Geräte, die sehr viele verschiedene Funktionen haben.	Trifft auf mich überhaupt nicht zu	O	O	O	O	O	O	O	Trifft auf mich vollkommen zu
32	Ich investiere viel Zeit und Mühe damit, Dinge mit Computergeräten/Software auszuprobieren.	Trifft auf mich überhaupt nicht zu	O	O	O	O	O	O	O	Trifft auf mich vollkommen zu
33	Ich achte sehr bewusst auf den Umgang meiner eigenen Daten bezüglich der Privatsphäre.	Trifft auf mich überhaupt nicht zu	O	O	O	O	O	O	O	Trifft auf mich vollkommen zu
34	Mein Studium/meine Arbeit hat viel mit der Technik von Computern oder mit Software zu tun	Trifft auf mich überhaupt nicht zu	O	O	O	O	O	O	O	Trifft auf mich vollkommen zu

Vielen Dank für die Teilnahme am Experiment!