Exploring Perceptions of Presentation Formats: Antecedents and Consequences

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The literature review establishes that perceptions of information presented in different formats differ significantly. In addition, the Elaboration Likelihood Model (ELM) presents a plausible framework for the impact of presentation formats on attitudes as a potential consequence. The first study presents participants with different presentation formats (text graphical, text numerical, text only) and compares perceived and actual processing as a prerequisite for attitude change. Results show a link between processing and attitude certainty but no link between format and processing can be established. Study 2 expands on the measurement of attitude and measures perceived and actual attitude change. The manipulation of involvement is unsuccessful, and participants' perceptions of the three different types of format show no significant difference. Study 3 employs estimated and actual recall as more objective measures and observes a significant difference in participants' estimates of other people's recall depending on the format they had been presented with but a lack of difference in actual recall. Study 4 examines potential antecedents of the perception of formats and explores the issue of self/other perception in the context of 16 different scenarios. The study finds significant self/other differences in the perception of effectiveness of statistics; however, a factor analysis of participants' responses fails to provide an explanation for the split of scenarios with and without a difference; Need for Cognition cannot be established as a potential antecedent. Study 5 successfully demonstrates a difference in perception of the three formats employed, but offers no support for subject background as a possible antecedent. Drawing on this, Study 6 examines whether this difference in perception leads to an observable difference in task performance but is unsuccessful in eliciting an effect. The discussion examines implications of the findings and discusses possible limitations of the methodology.

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Rudloff, D. (2010). *Preference is not based on performance: Biased perception of presentation formats.* Presentation at the BPS Annual Conference, Stratford-upon-Avon, April 14-16, 2010.

Rudloff, D. (2010, February). *Perceived vs. actual impact of presentation format on recall.* Presentation at the University of Leicester School of Psychology Internal Research Seminar Series, Leicester, UK.

Rudloff, D. (2009). *Preference is not based on performance: Biased perception of presentation formats.* Poster at Annual Conference BPS Scotland, Edinburgh, November 28-29, 2009.

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Rudloff, D. (2008). *Indications of a 'better-than-average' effect of perceived effectiveness of statistical information in persuasion.* Poster at the Annual Conference BPS Cognitive Section, Southampton, September 8-10, 2008.

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Chapter 1

Literature Review

1.1 Introduction

> The world is warming up. Already 150,000 people are dying every year because of climate change and, within 50 years, one-third of all land-based species could face extinction. If we carry on the way we are now, by 2100 the planet will likely be hotter than it's been at any point in the past two million years. (Greenpeace, 2008)

> Ariel is asking you to 'Turn to 30' when using your washing machine. Recent research has shown that when people 'Turn to 30' they save, on average, an astounding 41% on their energy consumption! (Procter & Gamble, 2008)

What do these quotes have in common? Apart from touching the issue of energy consumption to some degree, they both use quantitative information or statistics to support their appeal. This approach is not unusual. A quick scan of the daily newspapers, or of any weekday's evening program advertisements, or the promotion material of many charities will give an indication of just how widespread the use of quantitative information is in one form or the other, whether in graphical, numerical or simple textual form.

Every time an article cites statistics, every time a company tries to 'prove' their product's superiority, every time a member of the medical profession lets the 'numbers speak for themselves' they do so because they trust it will help their message. At the same time, the use of numerical information is not fail-safe and depends on a clear understanding of the involved rules and processes which strongly implies that numerical information needs a competent sender *and* recipient in order for the right information to be conveyed and the right effect to be achieved. It follows that any improvement in understanding people's perception, understanding and management of numerical information can make a positive contribution to how information is communicated. Providing health-related and health-relevant information to enable sound decision-making is of particular importance, as making the right decisions can be quite literally a life-or-death issue, and the pitfalls of relying on anecdotal information are particularly great. With the proliferation of publicly available data expectations and requirements for numeracy are increasing; this and a purported shift to the privatisation of health services implies that citizens and services users are capable of making rational, informed choices to select the right health provider or the right service, unaffected by the exact format the presentation is presented in. The current research thus aims to remedy this situation by attempting to gain more insight into the perception of presentation formats, and its antecedents and consequences.

This chapter gives an overview on the current understanding of how we perceive presentation formats and the consequences of this perception, that is, to what extent they have found to influence the way we perceive and process the information presented to us. Section 1.2 provides a brief definition of the term 'presentation format' adapted in this thesis, while Section 1.3 describes the extent to which presentation formats have been found to affect people's performance in experimental tasks. Section 1.4 looks at the perception of presentation formats. Section 1.5 discusses the factors currently known to underlie the differences in how presentation formats are perceived. Lastly, Section 1.6 briefly reviews the literature on the concept of attitude before discussing the possible mechanisms by which presentation format has been found to influence attitude.

1.2 Definition

In the context of this thesis, the term 'presentation format' refers to the presentation of information in written form only, and as either textual, graphical or numerical representation of the same or equivalent information. It thus explicitly excludes information presented in different modes such as audio or video recordings, or in different media, such as interactive presentations, hypertext, etc. but includes representing numbers and numerical information as, for example, percentages, probabilities, ratios, etc.; and displaying information in a graphical format such as, for example, pie charts, bar charts, line graphs, etc.

1.3 Impact of Presentation Format

This section reviews the key areas in which the impact of presentation format has been researched, beginning with the question whether presentation format affects the type and speed with which the presented information is processed (Section 1.3.1); whether the choice of presentation format can improve comprehension (Section 1.3.2), accuracy (Section 1.3.3), or recall (Section 1.3.4); and whether it can influence risk perception and behavioural intent (Section 1.3.5).

1.3.1 Processing and Processing Speed

Often the choice of presentation format is guided by the wish that the information is presented in a way to allow fast processing by the recipient, in other words, that the information is presented and understood with little delay. Particularly when considering a graphical format in comparison to other, more-text based formats, it would appear plausible to expect the graphical format to lead to a faster processing time than other formats: If examined in terms of number of elements to process, a pie chart illustrating a distribution of quantities arguably contains fewer elements than it would take words to comprehensively describe the same distribution. It is thus surprising that research has focused mostly on comparing numerical and textual representations of information.

For example, Viswanathan and Narayanan (1994) examined the amount of time it took participants to read a pair of labels containing consumer product information and make a comparative judgement, such as which item was of higher or lower value. The pairs of labels consisted of either two labels with verbal information, for example, ‘light’ and ‘extremely light’, two labels with numerical information, for example, ‘9 oz’ and ‘3 oz’, or one verbal and one numerical label, for example ‘light’ and ‘3 oz’. Results showed that participants’ response time for the comparison task was significantly faster when comparing two numerical labels, but there was no difference between comparing a mixed pair of labels and a pair of verbal labels. Viswanathan and Narayanan discuss the possibility this could be caused by numerical information requiring a shorter reading time than verbal information. A series of follow up studies also found an effect of congruity (comparative judgements are made faster if both stimuli are large rather than small) and symbolic distance (comparative judgements are faster the larger the difference between the two stimuli) on the type of comparison. The authors argue that reading time would not be able to account for these effects and conclude it is more likely that with the numerical pair of labels the information was processed at a different level, i.e. surface level. A further study by Viswanathan and Childers (1996), designed to compare the effects of numerical information combined with unit of measurement (e.g., ‘32 mpg’) to text information only (e.g., ‘high mileage’), showed that numerical information was superior to verbal information in terms of participants' processing speed in the context of remembering and evaluating consumer product information. A later study (Childers & Viswanathan, 2000), comparing pairs of either both numerical, numerical and verbal, or both verbal labels, and again using numerical labels which combined numerical information with a unit of measurement, showed similar benefits in processing speed and recall of numerical over verbal information.

At this point it should be noted that in both studies the format referred to as 'numerical' also contained a verbal unit of measurement, and when Viswanathan and Childers revised the descriptions to contain *only* either numerical or verbal information by employing scale items, the effects were reduced or even eliminated. However, it could be argued that the inclusion of a unit of measurement constitutes a more realistic expression of the type and format of information people are likely to encounter outside an experimental setting – very rarely would information be encountered in purely numerical format without any accompanying text, explanation or unit of measurement. Indeed, most of the studies discussed in this chapter – and, in fact, in this thesis – have adopted a similar strategy in categorising presentation formats.

Subsequently, Shen and Hue (2007) were able to demonstrate that numerical and verbal information are processed differently. Participants were presented with either numerical or verbal information regarding, for example, the quality of a consumer product, with either strong or weak arguments being presented first. In this study, numerical information would be displayed in the form of, for example, '90%', whereas verbal information would be displayed as, for example, 'very good'. Participants had to rate the likelihood of purchasing the product, and were instructed to initially anchor their likelihood at 50% and then adjust this rate according to the information they received. Results showed that participants tended to use different processing rules when integrating the new information with the existing information (i.e., additive processing rules when receiving verbal information, but averaging rules when processing numerical information).

Overall, there seems to be a strong case for presentation format to affect processing. Considering that such an effect can be observed when comparing textual and numerical information, it seems quite plausible that a similar, if not more pronounced effect could be found when comparing a graphical presentation format with either a numerical or textual format, as the differences between the formats are more pronounced, too. It also seems likely that apart from processing speed, additional factors may be influenced, such as, for example, comprehension.

1.3.2 Comprehension

If the choice of presentation format can be shown to affect type and speed of processing, this raises the question whether overall comprehension of information would also be affected. This question is particularly interesting because there are two possible arguments, both equally plausible: Either using numbers and graphs improves comprehension by making results of analyses and comparisons more salient and accessible than textual information alone, for example, by providing a visual representation – or it impedes comprehension because it introduces a certain level of numeracy requirement; that is, rather than reading text, participants have to read and correctly interpret numbers and/or graphs.

Parrott, Silk, Dorgan, Condit and Harris (2005) compared participants' perceptions of different types of statistical evidence, where statistical evidence was provided either as text with numerical information (percentages and probabilities) or a bar chart with a short summary of the chart's content. In this study, verbal evidence was perceived to be of higher quality than statistical evidence and was also better understood. Comprehension increased perceived evidence quality and acted as a mediator between statistical form and perceived quality but no correlation was found between numeracy, comprehension, perception of evidence quality and perceived persuasiveness. Once comprehension and perception of evidence quality were controlled for, the presentation format itself was not found to be a significant predictor. This led Parrott et al. to the tentative conclusion that while not being more persuasive *per se*, a visual presentation would improve understanding, and that more research on different forms of visual representation and a more comprehensive look at related, multivariate relationships was needed. However, it has to be noted that this study seems to partly conflate the two conditions, as the bar chart material also contains an explanation of a statistical term; the study also only compared a single type of graphical presentation (the bar chart) in the context of a very specific medical problem, and in a scenario that included conditional probabilities and comparisons over time. It may well be the case that the complexity of the scenario was not conducive to identifying any strong effects of either presentation format.

Related research such as Hawley, Zikmund-Fisher, Ubel, Jancovis, Lucas and Fagerlin (2008) found that, in a direct comparison of bar graphs, pictographs, modified pictographs ('sparkplugs'), pie charts, modified pie graphs ('clock graphs'), and tables as a decision aid for treatment choices, tables best supported *verbatim knowledge*, defined as 'the ability to correctly read numbers from graphs' (p. 449), whereas pie charts aided *gist knowledge*, defined as 'the ability to identify the essential point of the information presented' (ibid). Yet, even though presentation format influenced the type and extent of recall, quality and type of treatment choice were affected only indirectly through the mediating variable of overall knowledge (combined gist and verbatim knowledge). Hawley et al. subsequently suggest that the choice of presentation format should depend on whether the intent is to provide precise information, for example risk communication in a clinical setting, or to provide a general impression or recommendation. However, Vahabi (2010) came to a different conclusion when examining which format, numerical or verbal, would best facilitate comprehension of probabilistic information regarding breast cancer screening. Numerical information was presented as percentages (e.g., '7%')[1], whereas in the verbal format, the probabilistic information was conveyed by expressions such as 'somewhat likely' or 'moderately greater'. Comprehension was measured by providing a number of statements to participants, each with four possible interpretations, and participants had to select the most appropriate interpretation. Participants' comprehension was substantially and significantly improved when the verbal information was presented, with participants in the verbal format group achieving an average comprehension score of 46.0 (out of possible 64) versus 28.4 in the numerical format group. The magnitude of this difference was retained even for participants indicating a preference for the numerical format, and also held true for participants with comparably low levels of education. At first glance, this appears contradictory to Hawley et al.'s (2008) findings as in the pair of formats as used by Vahabi, the numerical format provides arguably more precise information. However, since the task format was a variant of multiple-choice design, it seems plausible that for this type of task gist knowledge may have been more relevant than verbatim knowledge, and participants' superior performance in the verbal information condition consistent with Hawley et al after all.

1.3.3 Accuracy

If presentation format can affect overall comprehension of information, it appears more than plausible that accuracy in performing a task may also be affected, since accuracy could well be understood as a consequence of correctly understanding the presented information. Carey and White (1991) compared participants' accuracy when having to perform either graphical or numerical forecasting tasks, in both cases based on graphical data. Results showed that participants performed more accurately when responses were also elicited in

[1] In one case, information was presented as natural frequency because '7 in 1,000,000' would have been disproportionately difficult to be correctly understood as a percentage ('.000007%')

graphical format. However, considering that the task was based on interpreting graphical data, this allows for the possibility that the study demonstrated a benefit of congruency between presented format and response format rather than a superiority of the graphical format itself; an appropriate control would have been to examine numerical and graphical responses to numerical forecast data. Carey and White's findings may further be confounded by the sample consisting entirely of students of either a Business Statistics or a Master in Business Administration degree, a sample whose numeracy and forecasting skills could arguably be much higher than average due to their degree subject.

While Viswanathan and Childers (1996, for a more detailed description, see pages 4ff) found that numerical information would result in a higher accuracy, their findings are not comparable with Carey and White's, since Carey and White compared graphical and numerical formats, whereas Viswanathan and Childers compared verbal and numerical formats. What is needed is a study combining all three formats to enable a better comparison.

Sanfey and Hastie's (1998) study fulfils this requirement, with the results suggesting that different presentation formats do indeed result in participants weighing information differently. Participants were given information about a fictitious runner's motivation and previous performances in one of eight different formats: table with numbers, simple text, narrative text, and five types of bar graphs. The simple text merely presented the information contained in the table in a verbal format, while the narrative text briefly described the runner's biography, their motivation and background. When participants were asked to predict the runner's finishing times, both textual formats led to more accurate predictions than the graphical alternatives, while not differing significantly from each other. Sanfey and Hastie suggest that the textual format made participants rely more on forming explanations for the runner's motivations than the numerical or graphical information and conclude:

> Conventional wisdom has it that graphic displays make it easier for a judge to assimilate information and make a judgement than does a textual format, but the results of the present study provide some evidence countering this view. In fact, both the textual formats produced more accurate judgements than did any of the bar graph displays (Sanfey & Hastie, 1998, p. 103).

However, if participants' reliance on the text to form explanations is the deciding factor, it seems plausible to expect a significant difference between the two textual formats, as the narrative format by its very nature would provide a more thorough and potentially more powerful explanation of the runner's motivation.

In a related experiment, Feldman-Stewart, Kocovski, McConnell, Brundage, and Mackillop (2000) compared a series of graphical and numerical presentation formats, such as bar charts, line graphs, numerical tables, pie charts, etc. in simulated treatment-decision tasks. While the choice of format seemed to affect participants' accuracy, the results were inconclusive such that vertical bars appeared to be most beneficial for accuracy in choice tasks, whereas numbers were more helpful for accuracy in estimation tasks; the effect also varied depending on whether the task required participants to attend to gross-level or detail-level information. Additionally, participants were asked to indicate their preferred format. However, preference was not related to performance as participants' performance did not significantly improve when solving a task using their preferred format. A problematic issue with the design is that it seems to conflate numerical presentation of information with graphical presentation, whereas it would possibly have been more appropriate to either exclude the numbers format, or examine the contrast between numerical and graphical format in more detail.

In addition to comparing graphical versus numerical vs textual formats, research has also examined the impact of varying the format of numerical presentation. Gigerenzer and colleagues (Gigerenzer & Hoffrage, 1995; Gigerenzer, 1996; Hoffrage, Lindsey, Hertwig, & Gigerenzer, 2000; Hoffrage, Kurzenhäuser, & Gigerenzer, 2005; Kurz-Milcke, Gigerenzer, & Martignon, 2008) have argued that people have an overall preference for information presented as natural frequencies, defined as 'simple counts that are not normalised with respect to base rates' (Kurz-Milcke et al., 2008, p. 55), particularly when contrasted with probabilities. For example, Hoffrage et al. (2000) found that a presentation of information in terms of either natural frequencies (e.g., 5 out 10,000) or probabilities (e.g., .0005%) influences the ease and accuracy with which participants solve the relevant statistical problems. Two groups, law professionals and law students, were presented with information about DNA test results from a criminal court case. The two groups found the correct solution 68% (professionals) and 44% (students) of the time when presented with information in a natural frequency format; yet, when presented with information as a probability, accuracy dropped to 13% and 1% respectively. This is particularly striking considering the educational background of the participants, who, due to their professional and academic training, could have been expected to perform at a higher accuracy level. In a related study, Gigerenzer and Hoffrage (1995) found that when presented with information in a natural frequency format, such as '103 out of every 1,000 women at age forty get a positive mammography in routine screening', participants found the correct solution faster and more often than when presented with information in a probabilistic format, such as 'The probability that a woman at age forty will get a positive mammography in routine screening is 10.3%' (both examples taken from Gigerenzer & Hoffrage, 1995). Gigerenzer and Hoffrage argue that while probabilities are computationally easier to parse because the prior probabilities are part of the information already given, processing them is still counter-intuitive. Thus, when given a choice, people will prefer to handle frequencies, or transpose the probability information into frequency information – which will be easier to understand even though it is computationally more complex. The observation that (relative) computational simplicity does not translate into (relative) ease of understanding might go a long way towards explaining the amount of difficulty encountered when processing numerical information.

However, these findings are not supported by a study by Waters, Weinstein, Colditz and Emmons (2006) who compared information presented as either text only or text plus graphical display in the context of a medical decision-making task; in addition, the numerical information contained in the text was presented as either a percentage or a frequency. Participants receiving the information in a text plus graphic format performed significantly more accurately, and numerical information as percentage led to a higher degree of accuracy than information presented as frequency – whereas Gigerenzer and colleagues have argued that frequencies are computationally less complex and hence should have increased accuracy.

Lastly, Miron-Shatz, Hanoch, Graef and Sagi (2009) compared three different presentation formats in the context of providing information about a hypothetical abnormal prenatal screening test result. This information described the probability of the foetus developing Down syndrome, in comparison to a foetus with a normal test result. This information was either given as in format of 1-in-N (e.g., 'One out of N women'), in a probability format (e.g., 'The probability [...] is N %') or in a visual format (e.g., displaying a figure with 1 black dot and N-1 grey dots to illustrate the relevant distribution)[2]. Participants were then asked to indicate the probability that the foetus would develop Down syndrome. Miron-Shatz et al. found that the frequency format led to higher accuracy in participants' responses. This effect was particularly pronounced for participants who were low in numeracy.

In conclusion, there is a strong body of evidence suggesting that type of presentation format does affect participants' accuracy, though findings have been inconclusive as to which format provides the most benefit to accuracy (see Gigerenzer & Hoffrage, 1995; Waters et al., 2006, for conflicting accounts).

[2] E.g., N would be displayed as either 1 out of 25, 4% or as 24 grey dots.

1.3.4 Recall

Previous research has also examined to what extent using different presentation formats would affect recall of the presented information, a brief overview of which is here included for completeness' sake. For example, Dickson (1982) presented participants with bogus experience reports of different household appliances brands. The reports were manipulated on three different factors: Priming (primed vs. unprimed), Type of Information (case, i.e. personal information, vs. statistical information), and Consequences (described vs. not described). Participants were then asked to judge the appliance brands' failure rates, rate the reports' vividness and complete several recall tasks. Dickson found that both priming and the description of consequences improved recall and judgement. Providing vivid case information did not affect participants' recall but it did distort their judgements. Interestingly enough, subjects' judgement of failure rates was not consistent with presented data; however Dickson suggests that participants appeared not to have been sufficiently susceptible to the manipulation and may have relied on personal experience.

In contrast to this, Viswanathan and Childers (1996) (see also page 4) and Childers and Viswanathan (2000) demonstrated an improvement in recall when a numerical presentation format was used rather than a verbal presentation format. However, a more recent study by Prangsma, van Boxtel, Kanselaar and Kirschner (2009) suggests that visualisation of content may not necessarily be beneficial to recall, which would be more consistent with Dickson's (1982) findings than with those of Viswanathan and Childers. In Prangsma et al.'s study, participants (pupils from a vocational middle school) worked through a set course text in pairs, before receiving learning tasks in one of four presentation formats: *Textual* (text with fill-in blanks); *Concrete Visualised* (text accompanied by pictures of photo-realistic drawings of relevant historic terms); *Abstract Visualised* (text accompanied by pictures of abstract concepts such as 'cause' or 'change'); or *Combined* (using all three formats); afterwards pupils' learning success was measured through a free recall test. Although there was no significant difference in recalling the information, pupils nevertheless gave different evaluations for the individual presentation formats, with the textual format being perceived as significantly more difficult than the concrete format, and associated with significantly fewer learning gains. Interestingly enough, pupils did evaluate the non-text type of visualisation as superior to the other types, but unfortunately Prangsma et al. did not explore this any further. Thus, while the results of the main study do not support the idea that presentation format influences recall, the study nevertheless suggests that the formats are perceived differently.

Prangsma et al. offer a number of possible explanations for the discrepancy between perception and accuracy observed in their study: (1) That the initial presentation of the learning material had been sufficient enough for pupils to learn the relevant information, that is, requiring no further practice and, related to that, (2) that the subsequent learning task had not been complex enough to elicit different learning outcomes; (3) that out of habit students disregarded the additional pictorial information and used only the main text information in the learning task; (4) that 'classroom dynamics and attention span differences' (p. 381) were of greater impact than the different learning tasks; (5) that historical content did not lend itself to being presented in visualisations as opposed to 'previous studies on learning with visualisations by other researchers [that] were mainly done in the domain of science' (p. 382); and (6) that there was no established 'sign language' in the context of history as a teaching subject such that it was difficult for students to understand and appreciate the visualisations. Prangsma et al. do not offer any hypotheses about why pupils nevertheless evaluated the formats in the learning tasks differently but suggest that 'future research should therefore pay attention to affective aspects of learning with different type of visualisations' (p. 383), implying that the evaluations had an affective rather than cognitive basis. It should also be pointed out that their study suffered from a number of methodological issues:

Firstly, it is questionable whether varying the task itself allows an accurate evaluation of the types of visualisation, as the different tasks would require different cognitive skills from pupils. Alternatively the task could have been held constant while varying how the material was presented in the classroom. Furthermore, pupils were not randomly allocated to the individual conditions, but were allocated by the teachers, according to skill. Lastly, pupils worked in dyads so that the results represented the outcome of a cooperation rather than the individual pupil's aptitude or effort.

Overall, it thus appears that the findings regarding the impact of presentation format on recall are inconclusive, in a manner similar to the findings regarding the impact of presentation format on accuracy.

1.3.5 Risk Perception And Behavioural Intent

When examining the impact of presentation format, the perception and communication of risk has often been the focus, for two main reasons: (1) talking about risk is nearly synonymous with talking about probability and chance, and (2) the communication and perception of risk is often associated with a genuine impact on the health and lives of people, particularly in a medical context, for example regarding risk factors, choice of treatments, etc. The current subsection provides an overview on the use of presentation formats in the context of risk communication and perception; however, it is beyond the scope of this thesis to provide a comprehensive overview, and what follows has to be incomplete because of space restrictions.

If the choice of presentation format affects the perception of risk, and the subsequent behaviour based on the understanding of the risk, this would furthermore suggest that presentation format can also be used as a means of persuasion – after all, persuasion usually consists of the presenting of information with the intent to influence behavioural intent or behaviour itself. In turn, this intent sometimes takes the form of trying to persuade the recipient to take action in order to mitigate risk factors, and the research and literature between persuasion and risk perception thus overlap to an extent.

Forrow, Taylor and Arnold (1992) found that presenting the same information on the outcome of a treatment in a different format could influence physicians' decision-making. Physicians were presented with individual paragraphs containing information on treatment outcomes, either in terms of an absolute change or a relative change:

- Absolute change: 'A randomized controlled study of over 6,000 men with 'mild' hypertension (DBP 90-104) shows that the drug treatment regimen used reduced overall mortality over the 5 years of the study from 7.8% in the 'usual care' control group to 6.3%, a statistically significant reduction in total mortality of 1.5% over those 5 years' (p. 122).
- Relative change: 'When 7,825 men were studied in a 5-year randomized controlled trial, a 'special' program of pharmacologic treatment of 'mild' hypertension (DBP 90-104) reduced the overall mortality rate by 20.3% compared with that in the control group of men who received usual medical care. (This difference was statistically significant)' (ibid.)

Participants then had to indicate the likelihood of initiating treatment, based on the information presented. It is important to note that participants only read one paragraph at a time, and hence treatment decisions were made individually, rather than based on a comparison of two or more treatments. The mere act of presenting information in a different format seemed to affect the physicians' decisions and for approximately half of the participants, the second presentation led to a different treatment decision. In the overwhelming majority of cases this meant physicians indicating an increased likelihood of treatment when presented with the relative risk reduction. This suggests that the presentation in relative change conveyed a larger magnitude of change than the presentation in absolute terms.

Stone, Yates and Parker (1997) similarly found that using different presentation formats to present risk-related information led to a significant difference in participants' decision-making. Stone et al. used either numbers or stick figures to illustrate the different levels of risk associated with two versions of a consumer product, and in addition the price for the more risky (and of lower quality) of the two items was displayed. Participants were then asked how much they would be willing to pay for the less risky (and of higher quality) version. Results showed that when information was presented in a graphical format, it led to a significant increase in the amount of money participants were willing to pay for the less risky item. Stone et al. give three possible explanations for this effect: (1) a *humanisation effect*, whereby the stick figures evoke an affective reaction based on their shape, which increases participants' intent to reduce risk. However, a replication of the study which used asterisks as a graphical, non-humanised format found a similar difference between graphical and numerical presentation and thus suggests that the humanisation effect is not the correct explanation; (2) a *discreteness effect* whereby the stick figures emphasise the potential risk by being discrete entities rather than a single number, which also require more time for participants to count and process. However, the results did not change when continuous bar graphs were used instead of stick figures, which led Stones et al. to conclude that (3) the *graphical explanation* was the most likely, whereby it was a property of the graphical format as such, rather than any specific graphical format, that affected participants' willingness to pay more for risk mitigation. The authors suggest that the graphical format serves to increase the subjective risk estimate, and makes any difference between values more salient. However, it seems problematic, if not circular, to explain a difference between a numerical and a graphical format by a reference to a graphical explanation. Without further elaboration as to the actual properties, it is difficult to argue that this explanation should apply outside the very limited parameters of a comparison of values, in the context of risk perception and intent to mitigate risk. Furthermore, Feldman-Stewart, Kocovski, McConnell, Brundage, and Mackillop (2000, described in more detail on page 10) found that a graphical format, such as vertical bars, appeared to improve participants' performance in choice tasks; however, at the same time, numbers seemed to improve performance at estimation tasks. This appears to be inconsistent with Stone et al.'s (1997) conclusions towards a general graphical explanation, as in this study, the graphical format's benefits did not extend to all types of tasks.

In a meta-analysis comparing the persuasiveness of narrative versus statistical evidence, Allen and Preiss (1997) observed a slight advantage of statistical information and argued that this advantage is a consequence of the higher information content, that is, statistical information is seen as 'summary information across a large number of cases' (p. 126). A major caveat applies to these findings: Allen and Preiss were concerned with statistical and narrative *evidence* as a subtype of information, which is understood to be supporting information to a main body or a conclusion. As such, the results are not informative about the effect of using either type of information on its own.

Greene and Brinn (2003) compared the use of narrative evidence versus statistical evidence, presented in an attempt to decrease participants' behavioural intent to use tanning beds. The narrative evidence consisted of a short narrative relaying the relevant information, while the statistical version contained 'statistical proof or evidence' (p. 448). It is unclear to what extent this refers to the material in the statistical condition containing numerical information, or whether the term refers to the structure of the information provided (i.e., a proof). Both types of evidence were effective in reducing behavioural intent, and the statistical evidence was more effective than the narrative format. However, the example of statistical evidence as used in the study reads, 'The myth regarding tanning bed use is that the UVA rays emitted are safer than the sun, but this is not true' (p. 448). If this is a typical instance of statistical evidence as used in this study, it is very unlike the type of statistical or numerical material used in the majority of studies reviewed in this chapter, where this type of format more likely would have been categorised as a representation of the verbal format, which makes the results less comparable.

There is also good evidence that it is not only the quality and quantity of data available which determine participants' performance. Even when provided with sufficient, precise information on risk, people may still choose to disregard the numerical information and rely on anecdotes as a source of information. Freymuth and Ronan (2004) presented participants with two vignettes about two patients who had suffered from the fictitious SCIMAS disease and who each had been treated with a different medication. Vignette A served as the control condition. It consisted of information describing the drug Fluortrexate and giving its effectiveness as 50%; this information was presented in conjunction with ambiguous anecdotal evidence so that participants were unable to determine whether the treatment had worked successfully or not. Vignette B consisted of information describing the drug Tamoxol and containing two additional pieces of information: the base rate for a successful treatment, which was set at 30%, 50%, 70% or 90%; and anecdotal information which was positive, negative or ambiguous, creating twelve different version of Vignette B. Every participant was presented with two vignettes: Vignette A with ambiguous information on the effectiveness of Fluortrexate, and one of the twelve versions of Vignette B. They were then asked which of the two drugs they would choose were they to find themselves to be diagnosed with SCIMAS. Overall, participants seemed to weight the anecdotal information greater than the base rate information. For example, when participants were faced with a choice of either Fluortrexate with 50 % effectiveness and ambiguous anecdotal evidence, or Tamoxol, described as displaying 30% effectiveness and paired with positive anecdotal evidence, participants tended to choose Tamoxol even though the base rate of success was lower than for Fluortrexate.

Base rate information was weighted more strongly only when Vignette B also contained ambiguous anecdotal information.

Evidence furthermore indicates that varying the type of numerical presentation also affects risk perception. Covey (2007) conducted a meta-analysis on the comparison between presenting treatment benefit information in the form of either relative risk reduction, absolute risk reduction, or number needed to treat or screen. While this analysis showed a distinct effect such that the relative risk presentation was superior to the other two formats, Covey points out that the diverse methodology and the variety of mediating factors in the included studies made it impossible to identify a conclusive effect mechanism to account for this superiority. But if arguably subtle differences in the numerical presentation of risk led to noticeable changes in participants' performance, it appears plausible that more salient differences in the presentation (i.e., graph versus text versus numerical information) would also lead to significantly different participant performance.

People seem to be particularly susceptible to being influenced by anecdotal risk-related information, an impression that would also be supported by research by De Wit, Das and Vet (2008) who presented information aimed at persuading a group of high-risk males to acknowledge that they were at risk for infection with the hepatitis B virus. The material was either presented as (1) narrative evidence for the increased risk by presenting quotes from a fictitious male person with the same sociological background, who had contracted hepatitis B as a consequence of his high-risk behaviour; (2) statistical evidence, for example, increased infection risk; (3) mere assertion of risk with no further statistical or anecdotal evidence; or (4) no risk information at all. Narrative personal evidence appeared to be most effective in raising awareness of participants' health risks. De Wit et al. suggest that this superiority of narrative evidence in promoting risk acceptance may mainly be due to the narrative form conveying a more immediate sense of risk than statistical information, which increases the persuasive power of the health risk information.

Severtson and Henriques' (2009) study similarly compared the impact of graphical versus alphanumerical displays of information in the context of risk perception and intent of risk mitigation. While participants' fact-based recall was better and more accurate when the alphanumerical presentation format was used, it did not affect participants' risk perception or behavioural intent. However, the graphical presentation led to a noticeable impact on both risk perception and behavioural intent, and Severtson and Henriques concluded that the graphical information had been consolidated by participants into a general affect-related 'gist' of the message. This is consistent with Hawley et al.'s (2008) finding (described on page 7) that the graphical presentation improved participants' recall of gist knowledge, whereas numerical information was beneficial for recalling verbatim knowledge.

Lastly, in a recent study, Cheung et al. (2010) compared participants' willingness to participate in a hypothetical clinical trial (of pain relief medication) based on whether the information on potential side effects of the drug to be trialled was presented in a frequency-based, percentage-based, or verbal format. Participants were first presented with information in one of the three formats, and had to indicate their willingness to participate. They then were presented with all three formats giving the same information, now having to indicate their willingness to participate again. The authors argued that a significant change in the extent of willingness to participate from first to second presentation could then be attributed to the initial format as the decisive factor. While there was some change in the willingness to participate from the first time of asking to the second time, this change was not significant, and the authors concluded that the 'way of presenting information makes limited practical difference in willingness to participate in trials' (p. 9). However, the authors failed to acknowledge that the change in willingness is predominantly expressed in a change from not being willing to participate to being willing: 42 participants out of 240 changed their mind; of those 42, 6 changed from Yes to No, while 36 changed from No to Yes. This would indicate that the (non-significant) change of willingness to participate between the first and second time of asking could, at least partly, be due not to the presentation format but rather to the repetition of the question, perhaps even as an expression of a perceived social desirability to participate.

In summary, then, the choice of presentation format significantly affects the perception of risk such that intent to mitigate risk can be increased by presenting information (e.g., Greene & Brinn, 2003; Stone et al., 1997) suggesting that the choice of presentation format is an important factor whenever information about risk is communicated.

1.4 Perception

The previous sections have examined how presenting information in different formats has impacted on participant behaviour as an objective measure; the following sections examine how and whether this corresponds with participants' perception. Section 1.4.1 examines a number of studies where presentation formats have been evaluated for their (perceived) benefits, while Section 1.4.2 gives an overview of previous research on eliciting preferences on presentation formats.

1.4.1 Evaluations

When comparing the effects of using statistical evidence against narrative evidence, Kopfman, Smith, Yun and Hodges (1998) state: 'Both of these evidence types are used widely in the public health domain, yet few empirical investigations of cognitive and affective reactions to these types of evidence have been undertaken' (p. 280). Kopfman et al. argue that statistics may be perceived as the superior information source as they constitute a summary of cases and thus a larger database, whereas for narrative evidence they would expect participants to be more effective at creating a causal narrative. However, while finding that statistical information led participants to generate more related thoughts and was also rated as more appropriate, effective, reliable, knowledgeable, credible and thorough, participants did not experience a higher sense of causal relevance with the narrative format. Kopfman et al. conclude that 'Generally, statistical evidence messages produced greater results on all the cognitive dependent variables while narratives produced greater results on all of the affective variables, and level of prior thought and intent influenced both cognitive and affective reactions to the messages' (p. 294).

Kopfman et al.'s perspective of statistics as a summary of cases is echoed by Greene and Brinn (2003, p. 444):

> Statistical or informational messages summarize across a number of cases, often presenting summary statistics for a population such as number of deaths per year from some health threat. Because this type of evidence purports to represent a number of cases, there may be an implicit perceived objectivity not apparent with a single case (where representativeness can be questioned).

When participants in Greene and Brinn's study were asked to evaluate both the statistical and the narrative format, the latter was perceived to be more realistic, while the former was perceived to be more informative. The implicit objectivity would also be consistent with participants in Kopfman et al.'s study rating the statistical format as, among others, more appropriate, reliable, credible, etc. Greene and Brinn's implicit objectivity of the statistical format fits well with Burkell's (2004) observations. They suggest that when providing information, particularly within the medical context in the form of information for patients, verbal labels such as for example, 'quite certain', 'highly likely', communicate an inherent degree of uncertainty in comparison to numerical labels such as percentages and probabilities. At the same time, definitions of 'high' and 'low' can significantly depend on the context: a high risk of falling ill with flu might be put at 70% and above; for the risk of dying during surgery, a probability of 10% would still be considered high. In other words, a verbal label such as ‘high’ could refer to a range of risk types, depending on the context, whereas a numerical label such as ‘70’ has a fixed meaning, though of course it may still be weighted differently. Burkell concludes that it is this perceived variability and context dependence that makes verbal labels appear more uncertain than numerical labels. Yet studies have shown that the verbal format can increase participants’ comprehension (e.g. Vahabi, 2010), or accuracy (Sanfey & Hastie, 1998) in comparison to other presentation formats. These results are difficult to account for if verbal labels would inherently appear less certain and more context-dependent than other formats. However, it does link in with Greene and Brinn’s (2003) finding that the narrative format was rated more realistic than the statistical evidence – it may well be argued that it is precisely the context-dependence and perceived uncertainty of verbal information that convey a sense of realism. Furthermore, the absence of perceived uncertainty relates strongly to the concept of implicit objectivity suggested by Greene and Brinn. Brase (2002) examined what attributes were associated with different formats of frequency information and to what extent those attributes depended on the magnitude of the information conveyed. He used a 4 x 4 design (frequency type: simple, single-event, absolute, relative; by magnitude: 1%, 33%, 66% and 99%) and presented 16 different combinations to participants who then were to rate the formats in terms of impact, clarity and monetary pull (as expressed by an allocation of a donation out of a fictitious donation pool of $100). Participants rated simple and relative frequencies clearer than single-event and absolute frequencies. Even though no main effect of magnitude was found, there was an interaction between presentation format and magnitude: at lower magnitudes simple and absolute frequencies were rated more impressive than single event and relative frequencies; at the (two) intermediate magnitudes no difference was found at all and at the higher magnitude absolute frequencies were rated less impressive than simple or relative frequencies – in direct contrast to what was found at the lowest magnitude. In a follow-up experiment, participants also had to rate the same four frequency types on the ease of understanding them, and on the extent of sounding more or less serious. The simple frequency format was found to provide the best understanding whereas absolute frequencies made the issue sound most serious and made the single-event format sound least serious.

1.4.2 Preference

Erev and Cohen (1990) compared the use of verbal or numerical descriptors in the context of sports experts giving advice to lay-people by predicting the outcome of gaming events. The experts were giving advice whether to place bets on the games either in verbal or numerical format; and participants had to evaluate whether they considered the verbal or numerical format to be more helpful in making the right betting decisions. Erev and Cohen found that while participants preferred to receive information in numerical form, they preferred to pass on information in a verbal form. In other words, while they considered the numerical format to be more helpful in making their decisions, the verbal format was considered to be more conducive to expressing themselves. Erev and Cohen refer to this contrast as the *communication mode paradox* and suggest that the preference for expressing probabilities in a verbal format is due to the verbal format allowing the expression of more subtle evaluations and probabilities. Presumably, it is precisely this subtlety that is undesirable when *receiving* information, which is why numerical information is preferred at that point. This also implies that participants use different evaluation criteria when assessing a format's suitability for expressing information, and when assessing its suitability for receiving information through this format. These observations are consistent with both Burkell's (2004) context-dependence of the verbal format and Greene and Brinn's (2003) implied objectivity of the statistical format.

Waters, Weinstein, Colditz and Emmons (2006) aimed to find out to what extent presenting information in different formats affected participants' ability to correctly assess trade-offs in a decision-making scenario. They found that bar graphs led to a more accurate performance than the text material. Participants' preferred presentation format (text) did not match the format they performed most accurately in (bar chart), leading Waters et al. to conclude that participants were unable to accurately reflect on their own performance: 'The present finding is consistent with previous research suggesting that understanding risk information does not always depend on participants' communication preferences' (p. 178).

Hawley, Zikmund-Fisher, Ubel, Jancovis, Lucas and Fagerlin (2008, described in more detail on page 7) found that participants rated information presented in a table better, that is, more effective, scientific and trustworthy, than all other formats used in the same study. However, there was no explicit elicitation of preference, so it is unclear to what extent these superior ratings translated into an overall preference of tables over the other formats. Similarly, a study by Prangsma, van Boxtel, Kanselaar and Kirschner (2009, also previously described in more detail on page 13) observed that while the presentation format itself did not affect pupils' recall, participants considered the text format to be more difficult and associated with fewer learning gains, an evaluation that was not in line with participants' actual performance. Prangsma et al.'s observations are thus consistent with the findings by Waters et al. to the extent that participants were unable to correctly gauge the impact the presentation formats had on their performance. In contrast to this, presentation format did affect recall and risk assessment in Miron-Shatz, Hanoch, Graef and Sagi's (2009) study; however, participants' evaluation of the formats' clarity did not reflect the distinct difference in impact the presentation formats had, which led Miron-Shatz et al. to conclude that 'participants are not necessarily good judges of how well a format conveys information' (p. 448). This discrepancy is also consistent with Vahabi's (2010) study (described in more detail on page 7), in which participants displayed a strong preference for the information to be presented in a numerical format, even though the text format in itself substantially improved comprehension.

1.5 Determinants of Effects of Presentation Format

It appears that the factors that determine participants' perception and even preference concerning different presentation formats are not necessarily the same factors that determine to what extent those presentation formats impact on participants' performance (or do not, as the case may be.). Section 1.5 reviews the two main factors that have been examined as possible influences on the perception of presentation formats: Section 1.5.1 discusses the vividness factor, and Section 1.5.2 takes a closer look at how good we are at understanding numerical information as a particularly relevant factor for the comparison of graphical, numerical and textual information.

In this context it should be noted that the concept of 'graphical format' has been interpreted quite narrowly in recent research such that there seems to be a strong focus on bar, pie and line charts. The bar chart, for example, had been chosen as the seemingly prototypical representation of a graphical format by Parrott, Silk, Dorgan, Condit and Harris (2005) who compared text with bar charts; Severtson and Henriques (2009), who conceptualised graphical format as a vertical scale with labels and color coding of levels of risk; Waters, Weinstein, Colditz and Emmons (2006) who used simple bar graphs and stacked bar graphs; or Sanfey and Hastie (1998) who employed five different types of bar graphs. Carey and White (1991) are an exception by choosing to use line graphs in their study to assess the impact of presentation format on forecasting accuracy, though there is a good argument to be made for line graphs being a particularly salient choice for forecasting and extrapolation tasks. Studies comparing different types of graphical formats also often use the bar chart as one of the formats being compared, for example Hawley, Zikmund-

Fisher, Ubel, Jancovis, Lucas and Fagerlin (2008) compared bar graphs with modified and unmodified pictographs, and modified and unmodified pie charts and tables. More of these frequently chosen formats are combined in the study by Feldman-Stewart, Kocovski, McConnell, Brundage, and Mackillop (2000) who compared bar, line, and pie charts and tables; or Stone, Yates and Parker (1997) who compared bar graphs with stick figures and asterisks. To an extent, the choice of format partly hinges on the task in question. For example, Miron-Shatz, Hanoch, Graef and Sagi (2009) use a different format of displaying n-1 grey dots and one black dot to visualise a 1 in N type of risk, whereas Prangsma, van Boxtel, Kanselaar and Kirschner (2009) compared the effectiveness of text boxes and arrows with the drawings of related concepts when used to aid pupils' performance in a learning task.

1.5.1 Vividness

Pettus and Diener (1977) found that when participants were presented with varying descriptions of crimes, participants preferred concrete to abstract information, and person-specific information to statistics. Pettus and Diener attributed this preference to the increased level of detail in the concrete condition and the corresponding increased vividness and visualisation. However, based on a literature review, Taylor and Thompson (1982) state that 'the vividness effect is surprisingly weak' (p. 170) and give three main reasons for this conclusion: First, that there is no unified concept of vividness, particularly as research appears to be inconsistent about the difference between a vivid *message* and a vivid *presentation* of a message. Second, that there is no unified concept about the effect of vividness, particularly in relation to recipient characteristics. Third, that salience – that is, the extent to which something is prominent or conspicuous in contrast to other available information – has been consistently shown to be an effective factor, and that this could mean that vividness is mediated to a great extent by the salience of the information cues aiding the direction of attention. It would thus appear unlikely that vividness is an important determinant for the impact of presentation format.

In a powerful demonstration of how perception can vary depending on the way the same information is communicated, Johnson, Pierce, Baldwin and Harris (1996) presented information on counselling sessions in different formats (video, audio, transcript with or without photo) and found significantly different ratings of the counsellor as well as different expectations towards the counselling's outcome. Even though the video presentation provided the most direct, and vivid and detailed representation of the counselling session, it was rated lowest, and participants rated the counsellor's trustworthiness and expertise lower than, for example, in the written transcript with photo.

Johnson et al.'s results also suggest that vividness may not necessarily be more informative, or, broadly speaking, more beneficial in communicating a message. In fact, Frey and Eagly (1993) concluded that vividness may have a detrimental rather than beneficial effect by distracting from the meaning of the message and hence impairing its memorability and effectiveness. Whilst this was offset when participants were instructed to carefully attend to the message, vivid messages only elicited equivalent but not superior levels of memorability and effectiveness.

Slater and Rouner (1996) note somewhat counter-intuitively that statistics can be more vivid, clear, direct and non-technical than anecdotal evidence. Considering that statistics by definition constitute a statement on more than one single case or present the outcome of an analysis, it becomes apparent that well chosen and presented statistics can be clearer and more direct than a personal anecdote which may require the recipient to first identify and extract the relevant information. However, anecdotes can in turn serve as an example for a larger sample and subsequently carry more (informative) weight. This is a clear reminder that any study designed to test the effectiveness of different formats on their own merits (i.e., readability, ease of understanding, persuasiveness, etc.) has to ensure the formats are equivalent in terms of information contained. Slater and Rouner furthermore argue that the different types of information can serve different purposes dependent on how value-relevant the issue is for the recipient. They conclude that value-affirmative recipients tended to use more statistical evidence – and also perceived this type to be of higher quality – in the truest meaning of evidence, that is, as a means to support and bolster their belief, whereas value-protective recipients tended to prefer the anecdotal information, and in turn perceived the anecdotes to be of higher quality.

1.5.2 Understanding Numerical Information

The complexity of participants' preferences for different presentation formats (e.g. Erev & Cohen, 1990) and their documented inability to correctly identify the formats that improve their performance (e.g. Feldman-Stewart et al., 2000; Miron-Shatz et al., 2009; Waters et al., 2006) indicate that understanding and correctly interpreting numerical information may be subject to substantial limitations. The next section thus will give a brief overview on the perception and understanding of numerical information. Again, it is beyond the scope of this thesis to provide a comprehensive overview; rather this section's intent is to outline the difficulties we face when processing numerical information, and introduce them as a potential contributing factor to the perception of different presentation formats.

Tversky and Kahneman (1971) demonstrated – in a highly educated sample no less – that people adhere to a number of erroneous beliefs they termed *Law of Small Numbers*. Participants' answers to a questionnaire indicated, for example, the view that random samples were highly representative of the entire population; the expectation that even small samples would have strong explanatory power; an overestimation of the stability of patterns, the predictive power of trends, and significance of findings; and an unreasonable expectation of the replicability of results. These findings are all the more noteworthy as

Tversky and Kahneman's sample of participants consisted of psychologists, who could reasonably be expected to show a more educated understanding of sampling and probabilities due to their training in research methods. This implies that it is likely the same erroneous beliefs will persist to the same or greater degree in the general population.

Considering that these erroneous beliefs persist even in highly numerate samples, low numeracy levels should be of even more concern. Lipkus, Samsa and Rimer (2001) administered a short numeracy scale consisting of three questions (see the first three questions of the numeracy scale in Appendix H) to a highly educated sample (across three sub-samples the percentage of participants with only high school education or less varied between 6.4% and 15.6%). Throughout the trials, only between 15% and 21% per group answered all three questions correctly. No single question was answered correctly by all, and the highest percentage of correct answers per question was around 91%, demonstrating that overall levels of numeracy were quite poor, even in this population.

Furthermore, Kahnemann and Tversky have argued (e.g. Kahneman & Tversky, 1982, 1984; Tversky & Kahneman, 1988) that the exact framing of an issue, that is, the phrasing and wording, can have a tremendous impact on the decisions people subsequently make. As such, the concept of framing is of particular interest as it combines the issue of poor numeracy with the impact of displaying information in different formats. In one of their most widely known studies (Tversky & Kahneman, 1981) participants are presented either with a choice between option A and B, or C and D, see below. Both options describe the exact same mathematical parameters:

Framed in terms of **gain**: 'If Program A is adopted, 200 people will be saved. If Program B is adopted, there is a one-third probability that 600 people will be saved and a two-thirds probability that no people will be saved.'

Framed in terms of **loss**: 'If Program C is adopted, 400 people will die. If Program D is adopted, there is a one-third probability that nobody will die and a two-thirds probability that 600 people will die.'

Participants' decisions provide a striking example that the framing in terms of losses and gains creates a different context for each pair of options that leads to participants almost completely reversing their decisions. Even though program A and B are mathematically equivalent, when the scenario was presented in a frame of 'gain', 72% of the participants chose program A. However, when the scenario was framed in terms of 'loss', this preference was reversed and 78% of the participants chose program B.

Lastly, a study by Evans, Handley, Over, and Perham (2002) provides further support for the view that our understanding and perception of statistics is prone to error. In a first step, participants were asked to answer a few questions about the student population of a given university. Participants were first to indicate the probability of students from particular faculty belonging to a particular society; in a second task the instructions asked for the probability of students from a particular society belonging to a particular faculty. Even though the population for both tasks was identical (i.e., the university's total student population) participants' answers were not consistent – the size of the two populations was not identical and answers did not add up to 100% per population. The differences were of a magnitude that suggested this discrepancy was not due to rounding errors, but to participants failing to take into consideration that the two populations were identical and had to be of identical size.

Previous research has noticeably focussed on the impact and perception of presentation format in either a health-related context (e.g. Forrow et al., 1992; DeWit et al., 2008), in the context of making business decisions (e.g. Carey & White, 1991), or in the context of marketing and consumer information (e.g. Dickson, 1982; Stone et al., 1997). Arguably those are very specific contexts where the presentation of information often has a very specific value and connotation. For example, information in a medical context aims to enable the recipient to avoid or mitigate health risks based on the understanding of the presented data and the concept of probability. Being able to correctly understand information and to make appropriate decisions based on this information can literally be a life-saving skill. In this context clarity of information is paramount, particularly where the type of data such as conditional probabilities poses inherent challenges to the recipients (e.g. Gigerenzer & Hoffrage, 1995; Gigerenzer, 1996; Tversky & Kahneman, 1971). Information presented in a marketing and consumer context takes a distinctly different approach, albeit often under the pretence of mitigating risk and conveying health benefits. Here, information is usually provided to sway the consumer to purchase a particular product, or make use of a particular service, leading to – in the majority of cases – a financial gain for the provider of the information. Again the focus tends to be on the comparison of data and a cost-value analysis, although data presentation may be designed to accentuate or possibly obscure differences. In a business context, data presentation and analysis will more likely be related to the identification of trends and relationships between factors. And yet, in all of these cases the underlying aim is to influence, in some form, the recipient's attitude (with the overarching aim to then influence behaviour) and as such the information aims to not only appeal to the recipient's cognition, but also their affect, such that the recipient not only understands and accepts the information but also feels positive towards the information or the targeted behaviour. To understand the relationship between perceiving, understanding, and acting on information thus also requires to understand the mechanism of attitude and attitude change. The next section provides an introduction to the concept of attitudes and how the presentation of information relates to attitude and attitude change.

1.6 Attitude

Section 1.6.1 gives a short overview on the definition of the concept of 'attitude', which is followed by Section 1.6.2 focussing on the key concepts of attitude strength and attitude certainty. Section 1.6.3 examines the Elaboration Likelihood Model as one of the main frameworks for understanding attitude and attitude change in general, and in the context of processing information. Section 1.6.4 briefly describes how the perception of information can be influenced by the recipient's individual traits and experience to pave the way for Section 1.6.5 which concludes with an overview of the current understanding of how attitudes can be influenced by how information is presented.

1.6.1 Definition

Attitudes are, above everything, constructs; they are affective and evaluative responses to stimuli that may or may not lead to observable behaviour. As such, they are notoriously intangible, not immediately discernible and can often be measured only by their proxy 'behaviour'. A classical definition from Allport (1935) states that 'an attitude is a mental and neural state of readiness, organised through experience, exerting a directive or dynamic influence upon the individual's response to all objects and situations with which it is related' (p. 784). Perloff (1993) suggests that '(t)here is a consensus that an attitude is a learned, enduring, and affective evaluation of an object (a person, an entity, or idea) that exerts a directive impact on social behaviour' (p. 27).

According to Eagly and Chaiken (1993), '[an] attitude is a psychological tendency that is expressed by evaluating a particular entity with some degree of favour or disfavour' (where 'psychological tendency' is defined as 'a state that is internal to the person' and 'evaluating' is defined as referring 'to all classes of evaluative responding, whether overt or covert, cognitive, affective, or behavioural')' (p. 1). While Perloff makes an explicit reference to the impact of attitudes on social behaviour, Eagly and Chaiken do not impose this restriction. Similarly, while Doob (1947) describes them as an 'implicit, drive-inducing response considered socially significant in the individual's society' (p. 136), implying they are pertinent only to socially relevant evaluations, Judd (1991) states that 'attitudes can be seen as object evaluations stored in memory' (p. 193) without restricting the scope of their application any further. On a related note, Zimbardo and Leippe (1991) assign a 'badge value' to attitudes – an evaluation that we use, consciously or unconsciously, to make a statement about our values and beliefs. This would fit with the predominant view that attitudes are a construct pertaining to affective evaluation of stimuli and thus relating to persuasion and attempts to influence behaviour. Ultimately, the exact answer to that question is of only peripheral relevance for the current research, and for the sake of clarity, attitudes are considered to be located on a continuum of social relevance.

When presented with new information relevant to attitudes we presently hold, several reactions are possible. We can peruse the information very carefully, think through the presented arguments and evaluate to what extent the new information fits with our pre-existing knowledge; we can skim it only superficially – or process it with any degree of thoroughness between these two poles of the continuum. Subsequently, our tendency to change our attitudes depends to a large degree upon how carefully we pay attention to the information, and to what extent this new information confirms or provides arguments against our pre-existing attitudes. The amount to which our attitudes withstand the impact of new information is usually described by the concepts of *attitude strength* and *attitude certainty* while the Elaboration Likelihood Model (ELM) offers the most thorough description of the process determining how carefully we attend to the information. The next two sections, 1.6.2 and 1.6.3, discuss these concepts in more detail.

1.6.2 Attitude Strength and Attitude Certainty

Attitude certainty and attitude strength are generally understood to refer to the extent of confidence with which attitudes are held:

> Attitude certainty is a meta-cognitive attribute of people's attitudes (. . .) in that it is a secondary cognition (e.g., 'I am certain of my evaluation of X') attached to a primary cognition (e.g., the evaluation of X). (Petrocelli, Tormala, & Rucker, 2007, p. 30)

When defined in these terms, the concept of attitude certainty combines aspects of an attitude's past, present and future: past sources, which led to the initial formation of the attitude, determine the conviction with which it is presently held, which will subsequently influence to what extent the attitude will be susceptible to future change in any direction.

In a study by Haugtvedt, Schumann, Schneier and Warren (1994), for example, participants were repeatedly presented with print advertisements which had undergone either substantial changes (introducing new arguments in support of the advertised product) or cosmetic changes (variations in the layout or font, or different endorser). Both cosmetic and substantial change led to participants developing a positive attitudes towards the product. Yet, despite a superficial equivalence, changed attitudes resulting from the substantial change to the information were found to be stronger and more persistent. Repeated exposure led to increased persistence and increased confidence in participants' attitudes.

However, Petrocelli, Tormala and Rucker (2007) argue that the scope of what is usually referred to as attitude certainty would be better described by two separate factors, *correctness* and *clarity*, where correctness refers to a feeling of knowing to be (in the) right and clarity refers to knowing what one's true opinion is. This distinction was supported by the results showing that, for example, 'repeated attitude expression boosted attitude clarity but not attitude correctness' (p. 37), while 'consensus information boosted attitude correctness but not attitude clarity' (ibid). Results also showed that neither of the two concepts were equivalent with subjective ambivalence and that both increased participants' resistance to persuasion, leading Petrocelli et al. to conclude that clarity and correctness as distinct concepts performed better than a global attitude certainty measure.

Clarkson, Tormala and Rucker (2008) expand on these findings and argue that attitude certainty does not lead to a 'crystallisation' of an attitude but rather an 'amplification' such that highly ambivalent attitudes can be held with great certainty. While information consistency affected ambivalence, and ambivalence towards an object did affect attitude certainty, paradoxically, participants appeared to be more resistant to persuasion when they exhibited low attitude certainty. Clarkson et al. conclude that it is necessary to consider ambivalent attitudes separately when conducting research on attitude strength and certainty, as the amplification and the crystallisation model predict equivalent outcomes for univalent attitudes, but non-equivalent outcomes for ambivalent attitudes.

In addition, Eaton, Majka and Visser (2008) agree that attitude strength 'is not a unitary construct' (p. 175) and argue that factor analysis alone is not sufficient to determine the true nature and number of factors involved because the answer would depend on how the question was asked. Because importance (of an attitude) and knowledge (about the attitude target) are likely to stem from two different sources, they are likely to predict different outcomes. Similarly, attitude strength and attitude certainty 'set into motion at least some non-overlapping cognitive and behavioural consequences' (p. 172). Eaton et al. are concerned that the search for the a single set of factors may lead to a fractioning of research and thus a shifting of focus from potentially more important areas, for example attitudes acquired through social comparisons and social power as a heuristic to increasing attitude strength (i.e., 'Person A has power' implies 'A is intelligent' implies 'A is right' implies 'If I agree with A, I am right'). They conclude, 'a high-priority goal for attitude researchers, then, is to develop a fuller appreciation of the dynamic interplay between features of the social context and individual-level evaluative processes' (p. 194).

On a related note, Smith, Fabrigar, MacDougall and Wiesenthal (2008) suggest that perceived knowledge may be more strongly associated with attitude certainty than 'real' knowledge – via the confidence of being able to use knowledge against persuasive attempts. However, they nevertheless conclude that 'perhaps the most striking example of this gap in the literature is the research on what has been termed 'informational sources of certainty' (p. 281) – and it is those 'informational sources' that this thesis is going to examine in more detail.

1.6.3 Elaboration Likelihood Model

The most influential model detailing, among other aspects, the relationship between properties of the message and their impact upon attitude is the *Elaboration Likelihood Model* (ELM) (e.g. Petty & Cacioppo, 1986). According to the model, information processing proceeds in several stages with different decision points. On encountering a persuasive communication, the first deciding factor is the recipient's motivation to process the communication. Only if the communication is personally relevant to the recipient, appeals to their need for cognition or their sense of responsibility or otherwise engages their motivation, is the next deciding factor considered: the ability to process the information. This is influenced by possible distracting environmental factors, the amount of repetition, prior subject knowledge, the message's comprehensibility and similar factors. Once those conditions are successfully met, the nature of the cognitive processing is considered.

At this point the decision has been made for a deeper processing of the persuasive communication; the subsequent steps are relevant only to determine the exact nature and extent of a possible change in attitude. Dependent on the initial attitude, the argument quality and similar factors, only three outcomes are possible – a predominantly positive evaluation, a predominantly negative evaluation or a neutral evaluation. Of those, only a non-neutral evaluation will then potentially lead to an attitude change (or, in the terms of the Elaboration Likelihood Model, a cognitive structure change), but only if the following conditions are met: the new cognitions are adopted and stored in memory; and different responses are made more salient than previously (i.e. the differences are made obvious). If the conditions are met, either a central positive attitude change or a central negative attitude change takes place. The resulting (changed) attitude is relatively enduring, resistant and subsequently predictive of behaviour.

The motivation to process depends, for example, on whether the information is relevant to the recipient (e.g. Fabrigar, Petty, Smith, & Crites, 2006) or appeals to their need for cognition (e.g. Cacioppo & Morris, 1983; Kao, 2007). The ability to process the information, on the other hand, is influenced by factors such as, for example, distraction, and amount of repetition (e.g. McCullough & Ostrom, 1974) or prior subject knowledge (e.g. Biek, Wood, & Chaiken, 1996; Cacioppo, Tassinary, & Petty, 1992). If no peripheral cues are present, the initial attitude can thus be retained or regained; in the presence of peripheral cues, a temporary shift can occur. However, any attitudes so created will be relatively temporary, susceptible to additional information and overall less predictive of behaviour.

This model implies that a variety of factors have to be considered that could potentially influence the amount of processing, and would impact on participants' resulting attitude and attitude certainty. The most common distinction is made between properties of the message, properties of the source or communicator, the communication channel, and properties of the recipient. The next two sections will focus on the two areas most relevant for the current research question, which are the recipient and the message.

1.6.4 Recipient Variables Affecting Attitude Change

Research has identified a wide variety of factors influencing the extent to which an individual processes attitude-related information. While the scope of this thesis does not allow a comprehensive list, a selection is listed below: the recipient's motivation to process the information (e.g. MacKenzie & Spreng, 1992); initial attitude (e.g. Shaffer, 1975) as well as prior subject knowledge (e.g. Biek et al., 1996; Cacioppo et al., 1992). Another main category of influential factors relates to degree of involvement, for example, individual responsibility to act on the information received (e.g. Petty, Harkins, & Williams, 1980); degree of outcome involvement (e.g. Petty, Cacioppo, & Goldman, 1981); ego-involvement (e.g. Rhine & Polowniak, 1971) or issue involvement and personal relevance) (e.g. Petty & Cacioppo, 1979, 1984). Furthermore, individual differences such as Need for Cognition (e.g. Cacioppo & Petty, 1982; Cacioppo & Morris, 1983; Kao, 2007) or uncertainty orientation (e.g. Hodson & Sorrentino, 2003; Shuper & Sorrentino, 2004) have to be considered. On the other hand, situational factors relating to the recipients also play a role, such as mood (e.g. Bless, Mackie, & Schwarz, 1992; Finegan & Seligman, 1993) or whether or not they have been forewarned of a persuasion attempt (e.g. Petty & Cacioppo, 1977).

1.6.5 Information Presentation and Attitude

The previous section illustrated the variety of factors that can influence attitude strength and certainty. Of particular interest for the current research are variables relating to information which is presented to the recipient with the intent of influencing their attitude and possibly behaviour. Attitude-relevant information can be sought out actively, or merely encountered arbitrarily and unintentionally, though Holbrook, Berent, Krosnick, Visser and Boninger (2005) note that people possess more extensive and more accurate knowledge on issues they consider important. They argue that attitude importance plays a vital role in the acquisition of attitude-relevant information and demonstrated that attitude-relevant information was recalled and recognised better than non-relevant information. This was not limited to attitude-congruent information, in other words, there was no bias to attend to congruent or attitude-protective information; Holbrook et al. could show that the improvement in accuracy was due to attitude importance affecting selective exposure and elaboration of information.

Once the information is available to the recipient, there are a number of factors by which information material can potentially affect the formation or change of attitudes: For example, increasing the relevance of information increases the predictive power of the elicited attitude for the actual behaviour (e.g., Fabrigar, Petty, Smith & Crites, 2006). Additionally, argument quality itself has been identified by a number of researchers as an influential factor (e.g. Cacioppo & Morris, 1983; Park, Levine, Westerman, Orfgen, & Foregger, 2007; Petty et al., 1981; Petty & Cacioppo, 1984), as has the number of arguments (e.g. Petty & Cacioppo, 1984), and their order of presentation (e.g. Haugtvedt et al., 1994; McCullough & Ostrom, 1974). More intuitively appealing is the notion that the extent to which information is easy or difficult to understand also plays a role (e.g. Chaiken & Eagly, 1976; Eagly, 1974; Wood & Eagly, 1981) and that mode of communication has an effect (e.g. Unnava, Burnkrant, & Erevelles, 1994; Wall & Boyd, 1971).

To conclude, within the framework of the ELM, factors such as number of arguments or ease of understanding may easily serve as cues for peripheral processing, whereas argument quality or personal relevance appear to be more likely to induce elaborate processing. It can be argued that presentation format might also serve as a potential cue to induce either peripheral or elaborate processing. The model furthermore suggests that only attitudes that changed after elaborative processing are relatively enduring, stable and subsequently predictive of behaviour, where attitude certainty and strength are taken to indicate how enduring and stable the attitude is.

1.7 Conclusion

The literature review has established that the type of presentation format can affect processing speed (e.g. Viswanathan & Narayanan, 1994), mediate the amount and type of knowledge communicated (e.g. Hawley et al., 2008), can affect comprehension (e.g. Vahabi, 2010) or accuracy (e.g. Feldman-Stewart et al., 2000), and is capable of affecting risk perception (e.g. Covey, 2007) and behavioural intent (e.g. DeWit et al., 2008). In addition, studies have been able to elicit differences in perception regarding how helpful (e.g. Erev & Cohen, 1990), informative (e.g. Greene & Brinn, 2003), appropriate, effective, reliable, credible or thorough (e.g. Kopfman et al., 1998) different types of presentation formats are. However, when participants' preferences were elicited, they have tended not to match the performance observed in the same study (e.g. Prangsma et al., 2009). Research seeking to examine which features would distinguish different presentation formats from each other concluded that vividness most likely is not a determining factor (e.g. Frey & Eagly, 1993) whereas numeracy (e.g. Tversky & Kahneman, 1981) was identified as a possible contributing variable.

When considering the use of presentation formats as a means to influence others, the Elaboration Likelihood Model (ELM) presents a convincing framework within which presentation format may well be a factor determining whether information is processed in a peripheral or elaborate manner, thus affecting the depth of processing and the strength of a potential change in attitude.

In conclusion, there is a solid body of research on our limitations in processing and handling quantitative information and its representation in a variety of presentation formats. However, as extensive as the previous research is, it still presents no clear answer to how differences or similarities between different presentation formats are perceived, how these perceptions are formed and influenced, and how they might account for differences in performance. Thus it is the aim of this thesis to gain more insight into the perception of presentation formats: which factors mediate perception, how does perception relate to objective performance, and to what extent is perception itself a reliable measure.

Chapter 2

Impact of Presentation Format on Perceived vs. Actual Processing and Attitude Certainty

2.1 Abstract

The current study examined different levels of perceived and actual thought processing and subsequent differences in attitude strength and certainty. 103 participants were presented with information (adapted from Barden & Petty, 2008) in one of four different formats in a between-subjects design: text only, extended text, text with numerical information or text with graphical information. Perceived processing, attitude and attitude certainty were assessed through participants' self-reports. In addition, actual processing was assessed through a thought-listing task. No effect was found of presentation format on any of the self-reported measures or actual processing, and no consistent correlations between attitude certainty and processing.

2.2 Introduction

The literature review chapter concluded with the observation that while the impact of presentation formats on attitude in general appears to be undisputed (see Section 1.6.5), the factors identified to influence the link between information presentation and attitude appear to act in a less consistent manner and can lead to conflicting results (see Section 1.4, particularly Waters, Weinstein, Colditz & Emmons (2006), Prangsma, van Boxtel, Kanselaar & Kirschner (2009), or Vahabi (2010)). In the framework of the Elaboration Likelihood Model (ELM) depth of processing is considered to be one of the determining factors as to whether attitude change occurs and how strong the resulting attitude is. Considering that effects on accuracy and comprehension have been demonstrated which could arguably be subsumed under the term 'processing', this raises the question whether varying the format in which information is presented can affect depth of processing and, subsequently, the existence, direction or strength of attitude change.

In the literature, the extent of change is often expressed in terms of *attitude certainty* which was briefly introduced in Section 1.6.2 in the literature review. Recent findings suggest attitude certainty and attitude strength are not necessarily caused by elaborative processing alone. In fact, Barden and Petty (2008) argue that creating the perception of elaboration is sufficient to create an increased certainty in attitude. In their study, participants were given written information regarding the possible implementation of campus-wide Wifi. They were asked to complete a short quiz measuring how well they attended to (i.e., processed) the information; they were then informed of the quiz results. In the final task, participants' attitude and attitude certainty was elicited, as well as their own perception of how well they attended to the information. Additionally, a thought listing task measured participants' actual processing. However, only half of the students had received information relevant to the quiz, whereas the other half had not; this created a significant difference in participants' performance in the quiz and thus constituted a manipulation of the performance feedback they received. Results showed that the actual amount of processing as assessed by the thought listing task was identical for participants in both groups. Participants who received higher feedback scores – because they were given the relevant information and thus had more relevant knowledge than the other participants – reported higher levels of perceived processing. This increase in perceived processing was associated with an increase in attitude certainty. Barden and Petty suggest that this was due to participants activating the thoughtfulness heuristic, in other words, perceiving an increased amount of processing and interpreting that as having thought more carefully about the issue, which subsequently led to an increased certainty in the attitude. Against these findings it appears a reasonable question whether presenting information in different formats might prompt participants to perceive a difference in depth of processing. For example, it could be argued that a graph, by virtue of consisting of a number of elements, is perceived to be more complex and more elaborate. If that is the case, the ELM predicts that information presented in a graph would lead to attitudes being held with more certainty than attitudes based on information presented in other formats, that are potentially perceived to be less complex.

On the other hand, graphs and visual displays of information have been shown to facilitate comprehension (e.g. Carey & White, 1991; Kurz-Milcke, Gigerenzer & Martignon, 2008; but see also Sanfey & Hastie, 1998); these studies are described in more detail in the literature review. Therefore, an equally valid argument could be made that improvement in comprehension leads to less elaboration, and subsequent attitudes held with *less* certainty.

The current study aims to examine the issue of perception from two different perspectives: one, whether depth of processing as a potential factor influencing attitude change could be related to the perception of (different) presentation formats and two, to what extent participants' perception of their depth of processing corresponds to actual measured depth of processing.

Finally, the role of numeracy in understanding and appropriately interpreting information containing numerical information has been widely emphasised by a growing body of research (e.g. Gigerenzer, Gaissmaier, Kurz-Milcke, Schwartz, & Woloshin, 2007; Hoffrage et al., 2000, 2005) and the use of visual aids has been shown to improve task performance for participants low in numeracy (Garcia-Retamero & Galesic, 2010). Section 1.5.2 briefly laid out that overall numeracy skills are considered to be rather poor and prone to bias. It follows that numeracy may well be a factor impacting on the perception of, and subsequent response to presentation formats.

There are thus three main objectives of this study: First, to examine whether presenting information in different formats results in a significant difference in perceived or actual amount of processing. To achieve this, participants will be presented with information in four different formats, ranging from text only to text with graphical illustrations. Participants' actual and perceived amount of processing will be measured such that actual processing is measured by a thought listing task and perceived processing by participants' self-report on the amount of (cognitive) effort invested. Second, to find out if and how any perceived difference in processing would align with potential differences in attitude certainty. To this end, this study's design is largely based on Barden and Petty's (2008) study design but has been adapted to focus on the measurement of perceived and actual processing in relation to different types of presentation format as well as to control for numeracy as a potential confounding variable. The current study also makes use of the variable 'attitude extremity' which calculates the average distance of two separate attitude measures to the scale central point, thus measuring distance from the average irrespective of direction. Third, to establish whether and to what extent numeracy may be affecting participants' perception and response to the information presented to them.

- Hypothesis 1: Since participants' numeracy skill may influence ease of understanding and subsequently impact on the required amount of processing, a main effect of presentation format on perceived amount of processing was hypothesised, when controlling for numeracy as a potential covariate.
- Hypothesis 2: However, because all formats are designed to provide an equivalent amount of factual information, it was hypothesised that there will be no effect of presentation format on actual amount of processing. Again, this may require controlling for numeracy as a potential covariate.
- In line with Barden and Petty (2008) it was hypothesised that there would be an effect of perceived processing on attitude:

Hypothesis 3a: It was hypothesised that there would be an effect of perceived processing on attitude.

Hypothesis 3b: It was hypothesised that there would be an effect of perceived processing on attitude certainty.

Hypothesis 3c: It was hypothesised that there would be an effect of perceived processing on attitude extremity (as defined by average distance from the central scale point).

- Hypothesis 4: In line with Barden and Petty (2008), it was hypothesised that there would be a positive correlation between actual amount of processing and overall attitude certainty.

2.3 Method

2.3.1 Participants

Participants were undergraduate Psychology students from the University of Leicester who participated for course credit. In total, 103 participants took part in the study, of which 79 were female and 24 male. Participants had a mean age of 20.53 (SD = 5.78, mode = 19) years, ranging from 18 to 58.

2.3.2 Design

The study is a between-subjects design with one independent variable *Format of Presentation*, which consists of four levels: *Text Only*, *Text with Numbers*, *Text with Graphs*, *Extended Text*; the 'Extended Text' condition was included to allow analyses for a potential confounding effect of text length and duration of reading, should an effect of presentation format be found. The dependent variables are as follows:

- Perceived amount of processing as measured by participants' indication to what extent they thought about and attended to the questions (variables *Thought* and *Attend*).

- Actual amount of processing, measured by counting the number of distinct responses to a thought listing task (*ThoughtListing*).

- Attitude Certainty, measured by responses to three items enquiring how sure, certain, and confident participants were *(Sure*, *Certain*, *Confident*).

- Attitude as measured by responses to two semantic differential items (*Like*, *Good*).

- *Attitude Extremity* as a supporting measure will be calculated by computing the mean of the total absolute deviation from the two item scores to the scale centre point.

- A *Numeracy* score will be assessed as a covariate through a short numeracy questionnaire.

2.3.3 Materials

Material for the four different conditions was based on materials listing arguments for the introduction of senior comprehensive exams for American undergraduate degrees, which had first been used by Cacioppo and Petty almost 30 years ago, and since then has been re-used in subsequent studies, for example in a recent study by Barden and Petty (2008). The original material consisted of nine strong and nine weak arguments, where 'weak' arguments were designed to evoke negative attitudes towards the attitude object by referring to individual preference and anecdotal evidence. However, the current study research question required no such manipulation and therefore only the nine strong arguments have been used. The material was furthermore adapted to current requirements: For the Text Only condition, all numerical information from the original material was replaced by verbal quantifiers, for example, ‘many’ or ‘several’. For the Text Numerical condition, most verbal quantifiers, such as ‘many’ or ‘several’ have been replaced by fictitious numerical data. For the Text Graphical condition, the information given in the numerical form was put into a graphical format without adding additional factual information beyond that contained in the accompanying text. In line with the use of formats found most frequently in research of graphical presentation formats (as discussed in the literature review on page 27, the graphs consisted predominantly of bar charts and pie charts with the addition of a graph using symbols and a line chart. For the Extended Text version, filler text was inserted to create a longer text version with no additional factual information. This was done by taking the highest word count of the other three versions for every argument, and then extending the word count by approximately 15%.

For an example of how the four versions were adapted based on the original material, see below (full materials in Appendix A):

- Original material:

  > An interesting and important feature of the comprehensive exam requirement is that it has led to significant improvement in the quality of undergraduate teaching in the schools where it has been tried. Data from the Educational Testing Service confirm that teachers and courses at the schools with comprehensive exams were rated more positively by students after the exams than before. The improvement in teaching effectiveness appears to be due to departments placing more emphasis on high quality and stimulating teaching because departments look bad when their majors do poorly on the exam. For example, at the University of Florida, student ratings of courses increased significantly after comprehensive exams were instituted.

- Text Only condition: For this argument, the original material (see above) has been retained completely. However, where the original material contained numerical information, this has been replaced with a verbal description in the Text Only and Extended Text versions:

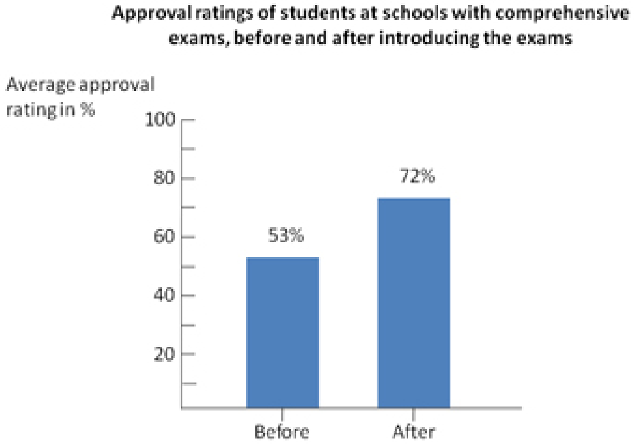
- Text with Numerical Information condition [Changes to original text are here shown in italics, but were not shown in italics to the participants.]:

  > An interesting and important feature of the comprehensive exam requirement is that it has led to significant improvement in the quality of undergraduate teaching in the schools where it has been tried. Data from the Educational Testing Service confirm that *with an average approval rating of 72%*, teachers and courses at the schools with comprehensive exams were rated more positively by students after the exams than before, *where an average approval rating of 53% was recorded.* The improvement in teaching effectiveness appears to be due to departments placing more emphasis on high quality and stimulating teaching because departments look bad when their majors do poorly on the exam. For example, at the University of Florida, student ratings of courses increased significantly after comprehensive exams were instituted.

- Text with Graphical information:

  > An interesting and important feature of the comprehensive exam requirement is that it has led to significant improvement in the quality of undergraduate teaching in the schools where it has been tried. [The following text from the original material was removed and the information instead displayed in graphical form: *Data from the Educational Testing Service confirm that teachers and courses at the schools with compre-*

hensive exams were rated more positively by students after the exams than before.]



The improvement in teaching effectiveness appears to be due to departments placing more emphasis on high quality and stimulating teaching because departments look bad when their majors do poorly on the exam. For example, at the University of Florida, student ratings of courses increased significantly after comprehensive exams were instituted.

- Extended text [Changes to original text are here shown in italics, but were not shown in italics to the participants.]:

  A *particularly* interesting and important feature of the comprehensive exam requirement is that it has led to *noticeable*, significant improvement in the quality of undergraduate teaching in the schools where it has been tried. Data from the Educational Testing Service confirm that teachers *as well as* courses at the schools with comprehensive exams were rated more positively by students after the exams than before. The improvement in teaching effectiveness appears to be due to departments placing more emphasis on high quality and stimulating teaching. *Universities seem to be strongly motivated to*

> *improve their teaching after comprehensive exams have been implemented* because departments *are concerned about their reputation* when their majors do poorly on the exam. For example, at the University of Florida, student ratings of courses increased significantly after comprehensive exams were instituted.

A short numeracy questionnaire was administered, taken from Lipkus, Samsa, and Rimer (2001), which in turn was based on a previous questionnaire from Schwartz, Woloshin, Black, and Welch (1997, as cited in Lipkus, Samsa, & Rimer, 2001), consisting of ten questions in total, of which three measured general numeracy and seven measured extended numeracy. This is an example of an extended numeracy item: 'Which of the following numbers represents the biggest risk of getting a disease? A: 1%, B: 10%, C: 5%.' One question was adapted for use in the UK by replacing the currency symbol '$' with '£' (see Appendix A for the complete questionnaire). In Lipkus, Samsa, and Rimer's version of the questionnaire, question 5 has two alternate forms. In this study, both were included, giving eleven questions in total. A pilot test with 18 participants confirmed that overall numeracy level (M = 9.5, SD = 1.33 for number of correct responses out of 11) matched, but did not surpass, Lipkus, Samsa and Reimer's highly educated sample.

2.3.4 Procedure

Participants signed up for one of several group testing sessions. These sessions took place in a departmental computing lab. Participants were informed of their rights and signed a consent form (see Appendix A). They were randomly allocated to one of the four conditions and then instructed to log on to the on-line testing environment SONA. Out of 103 participants in total, 25 each were allocated to conditions *Text Only* and *Text with Numbers*, 26 to condition *Text with Graphs* and 27 participants to the *Extended Text* condition.

After logging in, participants recorded their age in years and their gender. A testing routine started with the numeracy questionnaire, consisting of a practice question, and then eleven questions presented in a random order. This was followed by the presentation of nine arguments about introducing senior comprehensive exams. After reading all nine arguments, participants had to complete two 9-point semantic differentials, indicating their evaluation with a cross on a dotted line between 'good' and 'bad' and 'like' and 'dislike' (after Barden & Petty, 2008), see below:

> To what extent do you think introducing senior comprehensive exams is a good or bad idea?
> Good – – – – – – – – – Bad
>
> To what extent do you like or dislike the idea of introducing senior comprehensive exams?
> Like – – – – – – – – – Dislike

After the numeracy test, all items measuring attitude certainty and perceived amount of processing were presented in a single section in randomised order. This section included three questions eliciting attitude certainty. Responses were measured on a 9-point scale (after Barden & Petty, 2008), ranging from 1 = *Not at all* to 9 = *Very*.

- How certain are you of your opinion about senior comprehensive exams?
- How confident are you of your opinion about senior comprehensive exams?
- How sure are you of your opinion about senior comprehensive exams?

Perceived amount of processing was elicited by asking the following questions about the information on senior comprehensive exams (after Barden & Petty); for both questions answers were on a seven point scale ranging from 1 = *Definitely* to 7 = *Not at all*:

- 'To what extent did you think a lot about the information about senior comprehensive exams?'

- ‘To what extent did you pay attention to the information about senior comprehensive exams?’

When all participants in a testing session had finished the on-line questionnaire, they were asked to turn over a sheet of paper listing the instructions for the thought listing task (Petty & Cacioppo, 1977, as cited in Barden & Petty, 2008); for the detailed instruction sheet see Appendix A. They were given three minutes to complete this task after which they were instructed to stop writing.

2.3.5 Data Analysis

Numeracy scores (as measured in number of correct answers) ranged from 4 to 11, $M = 8.74$, $SD = 1.64$. Out of 103 participants, 13 answered all questions correctly, 71 gave between 1 and 3 incorrect answers, and 19 participants answered 4 or more questions incorrectly.

Attitude measures: Responses to the semantic differential ‘good–bad’ were scored by assigning numerical values from 1 = *Good* to 9 = *Bad* to the nine points; these numerical values were used only for data analysis and were not visible to the participants. Similarly, responses to the semantic differential ‘like–dislike’ were scored by assigning numerical values from 1 = *Like* to 9 = *Dislike*. Again, these numerical values were only used for analyses and were not visible to participants. Responses were at a mean of 2.59 ($SD = 1.26$) for ‘Good’, $M = 3.80$ ($SD = 2.02$) for ‘Like’. Post-hoc paired t-tests confirmed that *Good* and *Like* in fact differed significantly, with $t(102) = -7.418$, $p < .001$, although they displayed a moderate correlation at $r = .581$, $p < .001$. The two measures were thus retained as individual measures.

Attitude Extremity was derived as an indicator of attitude strength for every participant. This was done by calculating the absolute difference between the responses for both the ‘Like’ and ‘Good’ semantic differential to the corresponding scale center point of 5 and then averaging the two values.

Measures of perceived processing: Responses to *Thought* ranged from 1 to 7, with a mean of 3.67 ($SD = 1.47$), whereas responses to *Attend* ranged from 1 to 6, with a mean of 3.30 ($SD = 1.35$). Post-hoc paired -tests confirmed that the difference between the means was significant, with $t(102) = 2.729$, $p = .007$. *Thought* and *Attend* were also only moderately correlated with $r = .527$, $p < .001$. The two measures were thus also retained as individual measures.

Measures of attitude certainty: Answers to the questions 'How confident / sure / certain are you of your opinion about comprehensive exams?' were reverse coded, resulting in answers ranging from 1 = *Very* to 9 = *Not at All*. The means and standard deviations are shown in Table 2.1.

Table 2.1: *Means (SDs) for Measures of Attitude.*

Measure	M	*SD*
Sure	4.63	1.82
Certain	4.59	1.88
Confident	4.63	1.81

A series of paired t-tests confirmed that the very small differences between the three measures were not significant, at $p > .72$ or higher, see Appendix B. All three measures were strongly correlated: *Certain* and *Confident* with $r = .808$, $p < .001$; *Certain* and *Sure* with $r = .820$, $p < .001$; *Confident* and *Sure* with $r = .807$, $p < .001$. The three measures were subsequently averaged to create a single index of *Attitude Certainty*.

A correlational analysis observed a weak negative correlation of $r = -.208$, $p < .05$ between *Numeracy* and *Attend*, identifying *Attend* as a potential co-variate for *Numeracy*.

2.4 Results

2.4.1 Effect of Presentation Format on Perceived Amount of Processing

The means and standard deviations for all four conditions are given in Table 2.2 below. A multivariate analysis of variance with numeracy as a covariate was conducted, showing that presentation format had no significant effect on either the extent to which participants thought about the information, $F(3, 98) = 0.436$, $p > .05$, or the extent to which they paid attention to the information, $F(3, 98) = 1.472$, $p > .05$.

Table 2.2: *Means (SDs) for Perceived Processing.*

	Condition			
	Text Only	Text & Numbers	Text & Graphs	Ext. Text
Thought	3.96 (1.74)	3.56 (1.56)	3.58 (1.33)	3.59 (1.25)
Attend	3.60 (1.35)	3.36 (1.41)	2.85 (1.38)	3.41 (1.22)

2.4.2 Effect of Presentation Format on Actual Amount of Processing

The mean number of thought listing responses for the presentation format Text Only was 5.32 (SD = 2.50), for Text Numerical 6.16 (SD = 3.36), for Text Graphical 5.38 (SD = 1.98), and for Extended Text 5.30 (SD = 2.03). A multivariate ANOVA confirmed that there was no significant effect of presentation format on performance in the thought listing task, $F(3, 99) = 0.687$, $p > .05$.

2.4.3 Effect of Perceived Amount of Processing on Attitude, Attitude Certainty and Attitude Extremity

For a detailed account of how the attitude measures have been derived, see Section 2.3.5. The mean and standard deviation of all four attitude measures are presented in Table 2.3 below:

Table 2.3: *Means (SDs) for Attitude Measures.*

Measure	*M*	*SD*
Attitude: Like	3.80	2.02
Attitude: Good	2.59	1.26
Attitude Certainty	4.61	1.72
Attitude Extremity	2.24	1.00

The effects of the two measures of perceived processing, *Thought* and *Attend* on all four measures of attitude were examined using a multivariate ANOVA; results are listed in Table 2.4 below. A multivariate analysis of variance with numeracy as a covariate reveals no significant effect of *Thought* on any attitude measure, whereas there was a significant effect of *Attend* on *Attitude Certainty* and *Like* such that as amount of perceived processing increased, so did certainty and liking.

Table 2.4: *Effects of Perceived Processing on Attitude Measures*

	Perceived processing	
Measure	Attend[1]	Thought[2]
Attitude: Like	2.437, $p < .05$*	1.210, $p > .05$
Attitude: Good	1.004, $p > .05$	2.128, $p > .05$
Attitude Extremity	1.482, $p > .05$	1.192, $p > .05$
Attitude Certainty	4.868 $p < .05$**	1.283, $p > .05$

[1] = F(5, 74).
[2] = F(6, 74).
Note: * = significant at $p < .05$, $\eta^2 = .141$, power = .740; ** = significant at $p < .001$, $\eta^2 = .248$, power = .973.

2.4.4 Correlation between Actual Amount of Processing and Overall Attitude Certainty

When examining the correlation between actual amount of processing as measured by the *ThoughtListing* variable and overall attitude certainty (as measured by the composite index of average certainty, a weak negative correlation of $r = .-.082$ was observed, however, this was not significant with $p > .05$.

2.5 Discussion

No effect of presentation format was observed on perceived processing, when using numeracy as a covariate, thus offering no support for the first hypothesis. However, no effect of presentation format on actual processing was observed either – as measured by the number of responses in the thought listing task – thus supporting the second hypothesis.

The third hypothesis of perceived processing affecting attitude measures received only very limited support, as only one measure of perceived processing, *Attend*, significantly affected *Attitude Certainty* and *Like*. There was no significant effect of *Thought* on any attitude measures. Neither measure of perceived processing was found to have an effect on *Attitude Extremity*.

The fourth hypothesis was not supported as there was no significant correlation between average attitude certainty and actual amount of processing.

To conclude, the current study did not not observe any effect of presentation format on actual or perceived processing, but was able to demonstrate a moderate correlation between perceived processing and attitude certainty. With these findings, the study is unable to provide support for previous studies which were successful in identifying main effects of presentation formats (e.g. Carey & White, 1991; Kurz-Milcke et al., 2008; Sanfey & Hastie, 1998). It has to be noted though that those studies have focussed on other dependent measures such as accuracy of forecasting (Carey & White), risk communication (Kurz-Milcke, Gigerenzer & Martignon), or judgement (Sanfey & Hastie), rather than on more subjective measures such as perceived processing or attitudes, which may partially account for the different finding in the current study.

These results also offer only limited support to Barden and Petty (2008) who were successful in inducing an effect on attitude after manipulating perceived processing. While the current study was unable to observe an effect of presentation formats on perceived processing, the main result could be replicated to the extent that the amount of perceived processing did correlate with attitude certainty, despite the fact that actual processing was not influenced. This conclusion is also in line with the ELM, which postulates that the amount of processing influences the degree of certainty with which attitudes are held.

It is worth mentioning that preliminary analyses identified numeracy as a potential covariate for only a single attitude measure, *Attend*. This was surprising as previous findings (e.g. Gigerenzer et al., 2007; Hoffrage et al., 2000, 2005) had emphasised the relevance of numeracy in assessing new information. In the context of the current study, numeracy only affected perceived processing, and only to a small extent; it did not appear to affect actual processing. However, it could be argued that the thought-listing task simply did not require a high level of numeracy such that participants' overall numeracy levels were more than sufficient and would not bear any influence on the task result.

It should also be noted that in the current study, the two questions 'To what extent did you think a lot about the information about senior comprehensive exams?' and 'To what extent did you pay attention to the information about senior comprehensive exams?' elicited two significantly different types of responses. This is further supported by the observation that the two measures correlated with different measures of attitude. Participants may have perceived a different focus with these questions, such that 'attending to the information' referred to a careful reading of the information, with recall in mind, whereas 'thinking about' may have been taken to refer to any processing of information after reading, such as challenging the information's accuracy or veracity. This may also be a cultural difference as Barden and Petty's participants were American undergraduate students while the sample in the current study consisted of British undergraduates and suggests that a possible avenue for future research could be the development of a more localised, i.e. culturally specific, set of testing materials. In further contrast to Barden and Petty's study, a number of individual measures did not exhibit the same cohesiveness as in Barden and Petty's study. For example, responses to the two semantic differential items *Like* and *Good* in this study demonstrated a reliability of Cronbach's α = .685. Barden and Petty, however, reported a reliability of α = .91, concluding that they could be averaged into a single variable. While the difference is substantial, the existence of the moderate correlation seems to suggest that the consolidation into one variable is plausible and the use of the index justified.

It should also be noted that this study looked at attitudes as an end point of a process. The comparison was made only between formats and only after participants had been presented with the information. This examines attitude at a single point in time, but neglects attitude change as a process, and risks to overlook differences in the *extent* to which information changes attitudes over time.

It has to be concluded that in terms of perception, this study allows no conclusive statement on either participants' perception of the presentation formats used in this study nor on their perception of their own processing. While being in the focus of interests, attitude measurements here were included only as a secondary measure of interest (based on the assumption that depth of processing would serve as mediating variable). This suggests that a closer look at attitudes as a primary measure may be more appropriate and useful.

Chapter 3

Impact of Presentation Format on Perceived and Actual Attitude Change

3.1 Abstract

This experiment was designed to examine how accurately participants can recall previous attitudes and assess to what extent attitude change may have occurred. The experiment was conducted in a 4 x 2 x 3 mixed-factorial design with the independent between-subject variable *Presentation Format* (Text Only, Text Numerical, Text Graphical, and a No Presentation control condition); a between-subject variable *Processing Motivation* (High, Low); and the within-subject independent variable *Attitude Perspective* (Pre-testing, Current, Retrospective). Dependent measures were *Attitude*, *Attitude Positivity*, and five measures of *Attitude Certainty*. 82 psychology undergraduates participated in a two-part study where attitudes were elicited before and after information was presented. There was no no significant effect of presentation format on participants' current attitude and no interaction between attitude perspective and presentation format. There was no significant effect of processing motivation, as measured by its proxy, perceived importance, or interaction of perceived importance and presentation format on current attitude. No effect of presentation format was found on participants' retrospective attitude. Participants' current attitude was rated most positive, and retrospective attitude more positive than the actual pre-test attitude. Participants in the control condition did not perform significantly differently than participants in the experimental conditions which suggests that any attitude changes are due to the pre-/post-testing design rather than the presented material.

3.2 Introduction

Results of the previous study – as described in Chapter 2 – were seen as inconclusive. While amount of processing and attitude certainty appeared to be related, a causal link as demonstrated by Barden and Petty (2008) could not be shown. Neither could a link between presentation format and processing, or presentation format and attitude be established. The absence of an observable effect of presentation format allowed no conclusions regarding the reliability of participants' perception although previous research, particularly the studies discussed in Section 1.4, strongly suggest that this perception is unreliable, at least in terms of assessing which formats were helpful in completing the respective experimental tasks. Yet, the link between the presented information and attitude is evidenced by the positive correlation between actual processing and attitude certainty merits an investigation into the ability to reliably perceive and report attitude change. This implies a need to examine whether and to what extent participants are able to correctly recollect initial attitudes by eliciting pre- and post-test attitude measurements and comparing participants' recollections of their original attitudes with their current attitude. In addition, the current study was designed to gain more insight into the relationship between format used and perception of current and past attitude. To this end a methodology was adapted that was previously used by Douglas and Sutton (2004) to empirically test the third person effect concerning resistance to persuasion by eliciting current and retrospective attitude, that is, past attitude as recalled by participant at the time of testing. By using a between-subjects design and eliciting pre- and post-test attitude as well as retrospective attitude, this study design allows comparison of perceived and actual attitude change in relation to the use of different presentation formats. This allows the measurement and identification of the existence and extent of potential bias in participants' perception of their pre-testing attitude. In Douglas and Sutton's study participants correctly estimated other peoples' attitude change, but underestimated their own change such that what they perceived to be their original attitude actually more closely matched their attitude at the second time of testing – which happened to be at the same level as the other participants' attitude.

In addition, the framework of the ELM (for a more detailed discussion see Section 1.6.3, starting on page 38) suggests that levels of personal involvement affect the extent to which information is processed via a peripheral or elaborate processing route, and subsequently affects attitude. For example, Chaiken and Maheswaran (1994) found that participants were susceptible to a manipulation of credibility cues, but only when conditions of low involvement had been created; under conditions of high involvement, they attended carefully to the message. Sengupta, Goodstein and Boninger (1997) similarly observed participants to respond to cues of source credibility under conditions of low involvement, but respond to argument quality under conditions of high involvement. When the possibility of an effect of presentation format on attitude strength and certainty was investigated in the study described in Chapter 2, participants' involvement was not manipulated and could thus arguably be assumed to be uniformly low but nevertheless did not appear to respond to presentation format as a cue.

To clarify the role of involvement, the current study also included a manipulation of participant involvement by providing two levels of motivation to participants. Lastly, in order to clarify to what extent participants perceived the formats as equivalent or differing in a number of properties, they were asked to evaluate the formats along a number of criteria such as, for example, being informative or easy to understand.

- In line with the previous study's findings (as described in Chapter 2) it was predicted that there would be no main effect of presentation format on the current attitude.

- In line with findings from previous studies such as Chaiken and Maheswaran (1994) and Sengupta, Goodstein and Boninger (1997), it was predicted that there would be a main effect of processing motivation on the current attitude.

- Additionally, it was predicted that there would be an interaction of presentation format and processing motivation such that an effect of presentation format on current attitude would be revealed only under conditions of low processing motivation when, according to the ELM, participants would be more likely to base their attitude on a peripheral, cue-based processing route.

- It was predicted that there would be an effect of presentation format on the extent to which participants would perceive a change of attitude (i.e., a difference in the retrospective and current attitude).

- However, in line with the previous study's finding, it was predicted that there would be no effect of presentation format on actual attitude change.

- It was predicted that there would be significant differences in how participants would evaluate the formats in terms of being informative, easy to understand, and pleasant to read.

3.3 Method

3.3.1 Participants

Eighty-two psychology undergraduate students from the University of Leicester participated in return for course credits. Of those, 66 were female and 16 male, with a mean age of 20.77 (SD = 3.57) years.

3.3.2 Design

This study was conducted in a 4 x 2 x 3 mixed-factorial design. The first between-subject independent variable *Presentation Format* consisted of four conditions: three experimental conditions (*Text Only*, *Text Numerical*, *Text Graphical*) and one control condition with no presentation. The other between-subject variable was *Processing Motivation*, which was induced to be either

High or *Low* by varying the importance of participants' individual responses through the task instructions. The third, within-subject independent variable *Attitude Perspective* had three levels: *Pre-testing*, *Current*, and *Retrospective*.

The following dependent variables were measured: Two composite indices of attitude, namely *Attitude Agreement*, calculated from three responses and *Attitude Positivity*, calculated from three responses; and one composite index of *Attitude Certainty*, calculated from five individual responses. These methods of measuring attitude have previously successfully been used in studies like Clarkson, Tormala and Rucker (2008) or in Tormala, DeSensi, Clarkson and Rucker (2009) and their composite indices have consequently been adapted to this study. All twelve responses were measured three times: Once pre-test, once post-test, and a third set of responses was collected from every participant of their recall of their initial pre-testing responses as retrospective attitude.

To allow a manipulation check, participants were asked to indicate perceived importance of their individual answer. Participants in the experimental conditions were also asked how thoroughly they processed the information and what they thought about the material presented to them.

3.3.3 Materials

The study consisted of a pre-test and a main test. In the pre-test all participants were presented with a series of questions regarding their attitude towards making MMR (Measles, Mumps, Rubella) vaccinations mandatory. Questions were presented in an on-line survey environment, and the same set of questions was used again as part of the main test (for the complete set of material see Appendix L). These questions measured Attitude Agreement, Attitude Positivity and Attitude Certainty:

Responses for the *Attitude Agreement* index were measured by asking participants the following questions, see Figure 3.1:

Attitude Positivity was measured by asking participants to indicate their

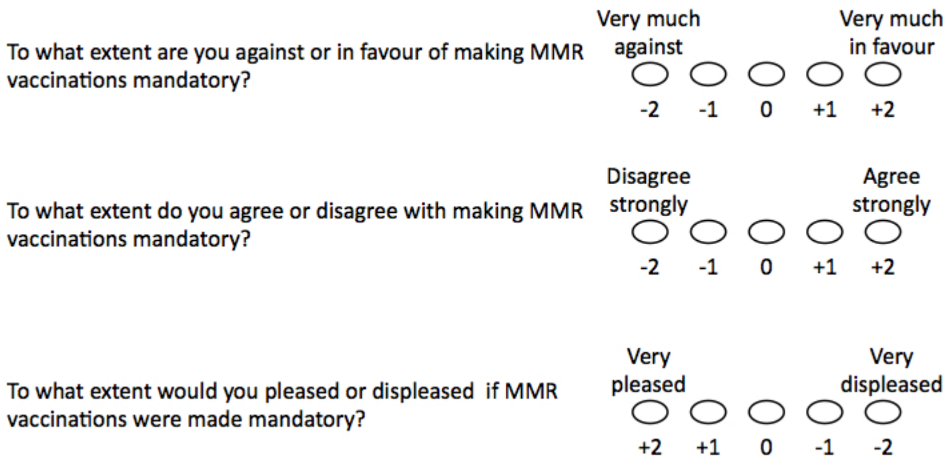


Figure 3.1: Items eliciting attitude agreement.

opinion about making MMR vaccinations mandatory on a semantic differential containing three items: *Unfavourable – Favourable*, *Bad – Good*, *Negative – Positive*, all three with responses ranging from 1 to 9, with higher responses indicating more positive evaluations.

Attitude Certainty was derived by calculating a composite index from five separate items; Figure 3.2 shows how the items were presented to participants.

The materials consisted of four A4 pages of content arguing the merits of vaccination, each page arguing one specific point such as vaccines being affordable and cost-effective; epidemics being preventable, etc.; these materials were adapted from material available on the WHO website[1]. The materials for this task had been selected after conducting a pilot study to determine a topic yielding a sufficient range in attitude responses to reduce the likelihood of floor or ceiling effects in the attitude responses. Participants received this information material as either text only, text with additional numerical information or text with additional graphical information (see Appendix L). Again, the graphical format was conceptualised as either pie charts or bar charts and modified bar charts, which provided more consistency between the individual studies.

[1]Materials have been permanently archived through Web citation service, see WHO (n.d.).

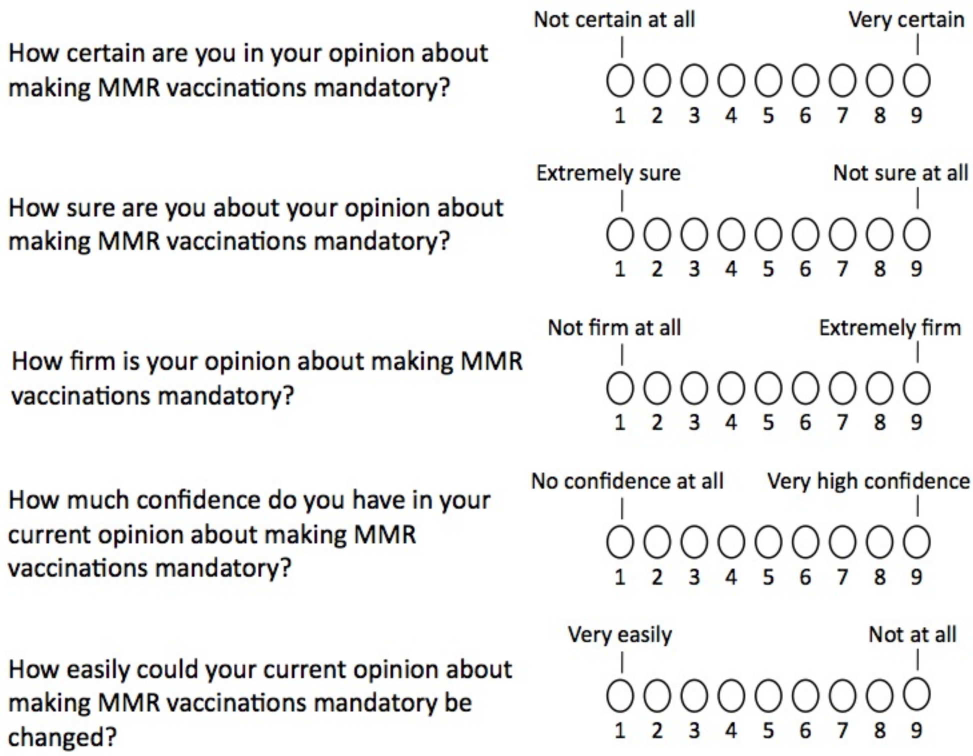


Figure 3.2: Items eliciting attitude certainty.

Instructions to manipulate perceived importance were adapted from previous studies successfully introducing high and low issue involvement and subsequent different levels of cognitive processing (e.g. Chaiken & Maheswaran, 1994; Maheswaran & Chaiken, 1991; Petty & Cacioppo, 1979; Sengupta et al., 1997). Participants were either instructed that they were part of a small pool of participants, with the individual's answer being read and evaluated by the experimenter, or that they were part of a large pool of participants, with their individual answers being aggregated and summarised with the entire participant pool's data; for instruction sheets see Appendix L.

In the main testing session, all participants were asked to complete the same questions initially presented in the pre-test, but with two different perspectives: once regarding the attitude they were holding at the moment of participating in the main study (*Current Attitude*), and once for the attitude they remembered holding when participating in the pre-test (*Retrospective Attitude*), see Appendix L.

To allow a manipulation check of the high-low involvement manipulation, all participants were presented with the question: 'How important do you consider your individual answer?', with responses ranging from 9 = 'Very important' to 1 = 'Not at all important'. In addition, participants in the experimental conditions were asked a series of questions relating to the material they were presented with, see Figure 3.3:

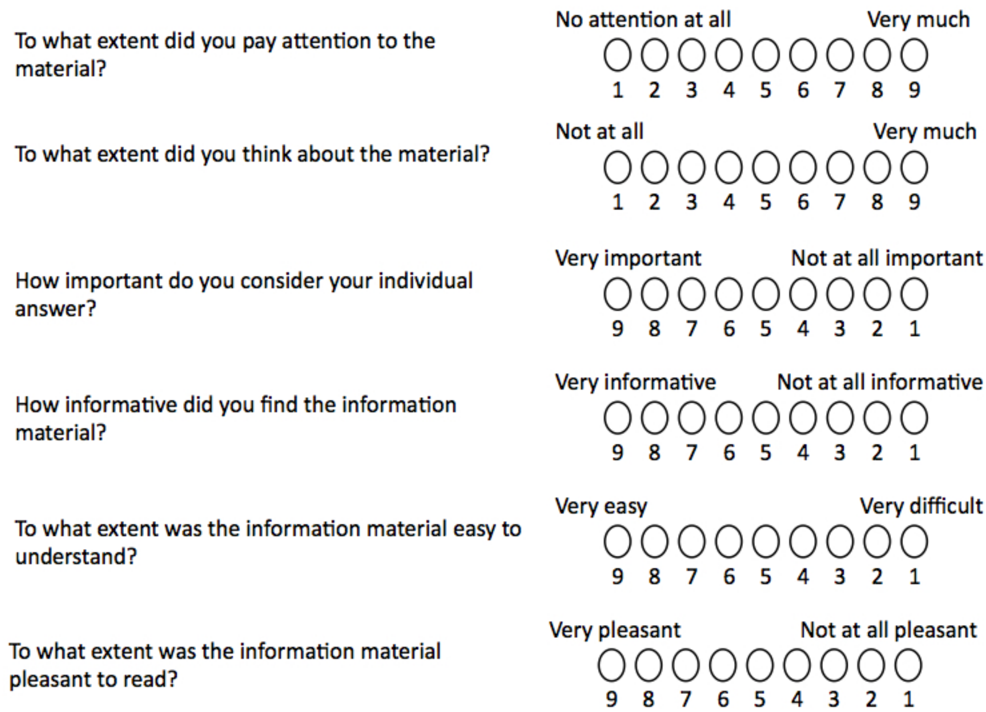


Figure 3.3: Questions for participants in experimental conditions.

3.3.4 Procedure

At the start of testing, participants were randomly allocated to either one of the three experimental groups or the control group. Members of all four groups were given a link to an on-line questionnaire to complete the initial attitude test (pre-testing attitude). A week after completing the pre-test, participants attended the main testing session in person. Participants in the control group completed the attitude questions again (current attitude), and were also asked to complete the set of attitude questions as closely to their original attitudes as possible (retrospective attitude). For half of the participants from the control group the order of completing these tasks in this testing session was reversed. Participants in the experimental groups first read through the materials handed out to them. They then completed the current attitude questionnaire, and the retrospective attitude questionnaire. For half of the participants, the sequence of sections asking for current and retrospective attitude was reversed. All participants completed the manipulation check questions, while participants in the experimental conditions additionally completed questions regarding how thoroughly they processed the material and how they evaluated the information material. Participants were then debriefed and thanked for their participation.

3.3.5 Data Analysis

Where necessary, items from semantic differentials and attitude sections were re-coded such that higher scores denoted higher a higher attitude certainty and a more positive attitude.

To derive the values of actual attitude change, the absolute difference between the current and pre-test attitude was calculated per item, and then summed up across all items to compute (*Total Attitude Change*).

Correlations were computed between items for the three planned attitude composite indices for pre-test, current and retrospective attitudes; detailed correlation data can be found in Appendix M. Within each set of data, *Attitude Agreement* items showed large significant correlations, so they were averaged into a single *Attitude Agreement* index per attitude perspective. *Attitude Positivity* items similarly showed large significant correlations and thus were averaged into an *Attitude Positivity* index for each attitude perspective. However, while *Attitude Certainty* items displayed strong, significant correlations for both the current and the retrospective attitude, inter-correlations for the pre-testing attitude were fairly low and for the sake of comparability, scores were thus retained as individual variables for each attitude perspective.

Results are reported for two-tailed hypotheses and with p at an α-level of .05, unless indicated otherwise.

3.4 Results

3.4.1 Effect of Presentation Format on Current Attitude

Means and standard deviations of the current attitude items are displayed for the three different formats and the control group in Table 3.1. A one-way ANOVA found no significant effect of Format on either Attitude Agreement, Attitude Positivity or any of the Attitude Certainty items.

Table 3.1: *Means (SDs) of Current Attitude Items Per Format.*

Attitude	M (SD) per format				$F(3, 77)$, $p > .05$
	Text Only	Text Numerical	Text Graphical	Control	
Positivity	6.52 (1.74)	7.11(1.74)	7.33 (1.39)	6.70 (1.88)	0.950
Agreement	1.08 (0.83)	1.05 (1.02)	1.26 (0.71)	0.89 (0.91)	0.610
Certain	6.75 (2.05)	6.86 (2.17)	7.00 (1.80)	6.38 (1.99)	0.353
Sure	6.15 (2.37)	7.19 (1.69)	6.79 (2.10)	6.33 (2.11)	1.047
Firm	6.55 (1.93)	7.10 (1.79)	6.84 (1.98)	6.52 (2.06)	0.401
Confidence	6.50 (1.67)	6.86 (1.85)	7.05 (1.87)	6.19 (1.94)	0.875
Change	6.40 (1.57)	5.81 (2.48)	6.05 (2.39)	5.10 (2.28)	1.280

3.4.2 Effect of Processing Motivation on Current Attitude

When asked how important they rated their individual answers, participants in the High Importance condition had a mean of 6.00 ($SD = 2.04$) and participants in the Low Importance condition were at 6.05 ($SD = 1.83$). A one-way ANOVA showed no significant effect of the manipulation on perceived importance, $F(1, 79) = 0.015$, $p > .05$. A further manipulation check compared participants' responses in answer to the question how much they thought about the material, which was at 7.06 ($SD = 1.27$) for participants in the High Importance condition, and 7.07 ($SD = 1.33$) for participants in the Low Importance condition. Again, a one-way ANOVA found no significant effect of manipulation on the extent of thinking about the material, $F(1, 58) = 0.001$, $p > .05$, that is, in all experimental conditions participants indicated that they thought a lot about the material presented to them.

Since the manipulation of processing motivation was not successful, self-reported perceived importance (participants' response to the question 'How important do you consider your individual answer?' as described above), was used as a proxy. Across all formats, responses ranged from 1 to 9 with $M = 6.025$ ($SD = 1.93$). However, there was no effect of perceived importance on any of the measures of current attitude (see Appendix M). The order in which retrospective and current attitude were elicited did not affect the extent to which participants considered their responses important, F (1, 79) = 1.608, $p > .05$.

3.4.3 Presentation Format and Processing Motivation on Current Attitude

Because the previous analysis indicates that manipulating processing motivation was not successful, processing motivation is here measured by participants' self-reported perceived importance. A multivariate analysis found no interaction of presentation format and perceived importance on any of the measures of current attitude; for detailed results, see Appendix M.

3.4.4 Presentation Format on Retrospective Attitude

The means and standard deviations of retrospective attitude are displayed in Table 3.2. In contrast to the hypothesis, there was no effect of presentation format on any of the dependent measures. In other words, regardless of what format participants had been presented with, it did not affect the way they recalled their pre-testing attitude.

Table 3.2: *Means (SDs) of Retrospective Attitude Across Formats.*

		Format			
Attitude	Text Only	Text Numerical	Text Graphical	Control	F*
Positivity	6.12 (1.70)	6.59 (1.97)	6.77 (1.39)	6.77 (1.89)	0.611
Agreement	0.62 (0.94)	0.86 (1.10)	0.98 (0.60)	0.90 (0.86)	0.622
Certain	6.35 (1.90)	6.40 (1.82)	6.55 (1.93)	6.24 (2.07)	0.091
Sure	5.80 (2.09)	5.86 (2.33)	5.75 (2.40)	5.86 (2.29)	0.010
Firm	6.30 (1.63)	6.33 (1.98)	6.45 (2.33)	6.29 (2.00)	0.028
Confidence	6.40 (1.64)	6.76 (1.73)	6.30 (2.23)	6.33 (2.01)	0.258
Change	6.30 (1.84)	6.33 (1.93)	5.80 (2.14)	5.14 (2.08)	1.611

* $F(3, 78)$ for all variables except *Certain* ($F(3, 77)$); $p > .05$ for all.

3.4.5 Effect of Presentation Format on Total Attitude Change

A first analysis examined whether any significant attitude change had occurred between the pre-test and main attitude elicitation, regardless of format. When comparing participants' attitude at pre-testing with the attitude after presenting the information material, they reported a significantly more positive attitude now than earlier on, while attitude certainty did not change significantly; see Table 3.3.

The variable *Attitude Change* was then computed for every participant by totalling the absolute differences between their current and pre-testing attitude. For participants in the Text Only condition, attitude changed on average by 17.70 (SD = 5.20) points, for Text Numerical the mean was 15.81 (SD = 7.86), for Text Graphical 18.05 (SD = 6.26), while in the control condition attitudes changed on average by 15.00 (SD = 8.54). A one-way ANOVA showed the differences between the different format conditions to be non-significant, $F(3, 77) = 0.861$, $p > .05$.

Table 3.3: *Comparison of Pre-Test and Current Attitude*

	M(*SD*		T-test	
Attitude item	Pre-Test	Current	t	p
Positivity	4.59 (1.65)	6.91 (1.70)	−15.619	$p < .001$
Sure	6.51 (2.01)	6.62 (2.08)	−0.422	$p > .05$
Certain	6.58 (2.05)	6.74 (1.99)	−0.832	$p > .05$
Firm	6.34 (2.01)	6.73 (1.92)	−1.914	$p > .05$
Confidence	6.49 (1.96)	6.64 (1.84)	−0.796	$p > .05$
Change	5.78 (2.02)	5.83 (2.22)	−0.235	$p > .05$

3.4.6 Evaluation of Presentation Formats

Means and standard deviations of participants' evaluations for the three presentation formats are given in Table 3.4. There was no significant effect of the presentation format on how *informative* the format was perceived, F(2,

57) = 2.043, $p > .05$; how *understandable* participants found the format, $F(2, 57) = 1.941$, $p > .05$; or how *pleasant* it was, $F(2, 57) = 0.902$, $p > .05$ (see Appendix M).

Table 3.4: *Means (SDs) of Format Evaluation.*

Evaluation item	Text	Text Numerical	Text Graphical
Informative	7.00 (1.17)	7.71 (1.10)	7.47 (1.17)
Understandable	7.25 (1.48)	8.00 (1.18)	7.90 (1.24)
Pleasant to read	5.35 (1.60)	5.71 (2.43)	6.16 (1.39)

3.5 Discussion

No significant effect of presentation format was found on any of the expressions of participants' current attitude: to what extent they agreed with the proposal, how positive they regarded it, and how strongly they held their attitude.

Because the manipulation of processing motivation (by inducing a sense of high / low importance of the participant's individual answer) was not successful, the analysis focused on examining the impact of perceived importance. Again, no effect of perceived importance on current attitude was observed, neither as an individual factor nor in any interaction with presentation format, thus offering no support for the second and third hypotheses. However, a secondary analysis found a moderate correlation between participants' perception of their own answer's importance and the extent to which they thought about the material, $r = .397$, $p < .001$ which suggests that perceived importance did affect the extent to which participants paid attention to the material.

No effect of presentation format on any of the measures of retrospective attitude was observed, offering no support to the initial hypothesis. Similarly, presentation format did not appear to affect the extent of attitude change as measured by the absolute difference between pre-testing and current attitude, again offering no support for the hypothesis. Finally, there was no difference in how participants evaluated the formats, and thus no support for the hypothesis.

In conclusion, this study was unable to observe an effect of presentation format on how much participants thought about the information or what they thought about the topic, and contrary to expectations, the use of different formats did not lead to any noticeable changes in attitude or attitude certainty. In addition, varying the presentation format, at least to the extent to which it was done in this study, did not appear to affect participants' perception of their initial attitude. This is consistent with the observation that participants' evaluations of the three formats did not differ significantly. To all intents and purposes, in this study the different formats appeared to have been perceived in an almost identical fashion across all conditions. While the results offer no support to the initial hypotheses, it is nevertheless internally consistent inasmuch as there was no difference between the experimental and control conditions, suggesting that the information presented made little or no impact at all, regardless of format. It can only be assumed that the mere act of eliciting an attitude led to an increase, with participants expecting that their overall positive attitude would consolidate over time and adjusting their evaluations accordingly. A similar effect has been observed by, for example, Haugtvedt, Schumann, Schneier and Warren (1994) who found that attitudes were more persistent after repeated exposure to advertising material.

Considering that there was no difference in attitude between participants who merely answered the same questions twice and participants who had been given additional information, it is hardly surprising that no differences were observed between participants in the three experimental conditions. It raises the question why presenting pro-vaccination material did not lead to any additional increase in positive attitude, and whether this may be indicative of a ceiling effect. Although the pre-testing attitude scores did not suggest a ceiling effect and made a potential change in attitude appear likely, a look at Table 3.3 shows pre-testing means above 6 (on a scale from 1 to 9) for four out of six items, and all post-testing means at 5.81 or higher, with standard deviations of approximately 2.00. This would certainly allow for the existence of a ceiling effect. Other possibilities include participants approaching the topic with a relatively high attitude certainty resistant to manipulation, regardless of the direction, or participants' desire to conform to what may have been perceived as socially desirable behaviour.

Second, as described above, the manipulation of importance and subsequent processing motivation was not successful. This may be due to the sample consisting of university students who may have been suspicious of the instructions. The failure to manipulate processing motivation may also have contributed to the lack of any observable effect of presentation format. Participants may have perceived the topic of MMR vaccinations as inherently irrelevant or of little importance, which could potentially explain the lack of thorough processing, the absence of any format effects in this study, and the failure to manipulate perceived importance. Possible changes to the study design could include offering monetary incentives; or implementing a study design where participants in the high importance condition have to defend their positions publicly, thus requiring a deeper level of processing motivation and preparation. Alternatively, a sample with a higher inherent motivation to engage with the topic, such as prospective or current parents, may yield different results, as may using topics more relevant to student life or their course content. At the present time, the unsuccessful manipulation of involvement does not allow any conclusion or comparison regarding Chaiken and Maheswaran's (1994) and Sengupta et al.'s (1997) findings.

The use of attitude composite indices was not as successful as in Clarkson, Tormala and Rucker's (2008) or Tormala, DeSensi, Clarkson and Rucker's (2009) studies. In the current study individual items displayed comparably lower correlations which did not allow for consolidation into composite indices. Participants appeared to have perceived the questions as separate entities rather than different perspectives or aspects of the same concept. While the data offers no clear answer as to why that was the case, it appears at least plausible that this related to the overall poor motivation of participants.

In summary, while this study tentatively establishes importance as a relevant antecedent to the perception of presentation formats such that it affects the extent to which participants across all conditions paid attention to the information presented, it allows no conclusive observations on the nature of potential consequences. This suggests that it may be more appropriate to use a more objectively measurable variable to examine the scope of participants' perception.

Chapter 4

Impact of Presentation Format on Attitudes and Estimates of Recall

4.1 Abstract

A 3 x 3 between-subjects design was used, with the independent variables *Presentation Format* (Text Only, Text Numerical, Text Graphical), time delay as expressed by the variable *Recall Period* (2, 12 or 20 days) and the dependent measures *Attitude*, *Attitude Certainty*, *Correct Recall* and *Incorrect Recall*, and *Estimates* of the cohort's recall, all measured immediately after presentation, and at the second point of testing after the recall period had elapsed. 293 participants took part in an on-line questionnaire. There was no significant effect of presentation format on attitude, a small significant effect on attitude certainty at the first time of testing, no effect on correct recall or incorrect recall and no significant effect on any of the dependent measures at the second time of testing. Length of recall period only affected correct recall, but no attitude measures.

4.2 Introduction

The two previous studies have looked at participants assessing their own attitude and perceived and actual processing in relation to being presented with information. Study 1 was unable to demonstrate an effect of processing format on perceived or actual processing. Study 2 observed a correlation between the extent to which participants perceived their answer to be important, and the degree to which they thought about their answer; however, there was no significant difference in attitude measures between participants who received the experimental treatments and participants in the control condition with no information presentation between the two instances of eliciting attitude. While this did not offer any support to the original hypotheses, it was nevertheless in line with the observation that participants showed no significant differences in their evaluation of the individual formats, and as such the findings were internally consistent.

Together, the two previous studies have focussed on assessing the nature and reliability of the individual participant and their perception of their own response. It appears equally important to examine the extent to which participants can reliably assess other people's perception and response to the presentation of information in different formats. Findings like Erev and Cohen's (1990) communication mode paradox (described in Section 1.4.2 on page 25) suggest that participants' perception of preferences and impact of presentation format where other people are concerned may be different – though not necessarily correct – from their individual perceptions. The case for examining perception of other participants' perception and response is further strengthened by noting that previous research suggests that we are generally incapable of accurately assessing our own performance, an argument that had previously been outlined in Section 1.4 in Chapter 1. Prangsma, van Boxtel, Kanselaar and Kirschner (2009) for example, found no effect of presentation format on recall in a learning task, but participants expected the text format to result in fewer learning gains than the other formats used in the study. Similarly, Waters, Weinstein, Colditz and Emmons (2006) found that of the formats used, the bar graph format led to a more accurate performance, but participants preferred the text format. Against the background of these findings it appears all the more plausible that we would be even less capable of assessing other people's perception and response than assessing our own perception and response.

Previous research has yielded inconclusive results concerning the relationship between presentation format and rate of recall. While Viswanathan and

Childers (1996) and Childers and Viswanathan (2000) could demonstrate an impact of presentation format on recall, Prangsma et al (2009) was unable to demonstrate such an effect. However, participants associated markedly different recall expectations with the different formats used in Prangsma et al.'s study, showing an interesting discrepancy between experienced and actual performance. This discrepancy makes recall an interesting measure to use as it allows the examination of the accuracy of participants' estimates of recall as well as an examination of actual recall. To gain more comprehensive insight into the effect of time delay on recall and attitude, this study varied the time delay after which attitude, recall estimates and actuall recall were elicited between subjects. Lastly, this study continues the line of exploration from Studies 1 and 2 concerning the potential link between information presentation and attitude by examining attitude and attitude certainty in addition to recall.

In summary, the current study was thus designed to examine whether presentation format affects as attitude and attitude certainty as well as perception of recall in terms of the extent to which participants are able to accurately estimate rates of recall, both their own and those of others. To test this, participants are presented with one of three different presentation formats and tested for both short-term and long-term recall (further differentiated by length of recall period of either 2, 12, or 20 days) as well as a number of simplified (in contrast to the measures used in previous studies) attitudinal measures.

There is also a distinct possibility that any one presentation format may be more likely to selectively aid recall of the gist of information or an over-arching theme (or schema) instead of detailed information, which in turn may increase recall at the cost of accuracy. A similar mechanism had been previously proposed by Severtson and Henriques (2009, described in more detail on page 21), suggesting that the graphical format (as opposed to the alphanumerical format) would lead participants to remember the 'gist' of the message rather than the details. To address this, the current study did not only measure the number of correctly recalled arguments but also measured to what extent participants would erroneously recall arguments or factual information that had not been included in the original material, allowing for the testing of the formats' potential effect on both correct and incorrect recall.

In order to access a large sample for this study an online methodology was pursued. Gosling, Vazire, Srivastava and John (2004) reviewed a total of 510 online studies (N = 361,703) and conclude that

> the samples gathered using Internet methods are at least as diverse as many of the samples already used in psychological research and are not unusually maladjusted. Internet samples are certainly not representative or even random samples of the general population, but neither are traditional samples in psychology. Moreover, the large sample sizes afforded by the Internet mean that even small proportions of participants (e.g., Latinos) are represented by large absolute numbers (Gosling et al., 2004, p. 102).

The American Psychological Association's Board of Scientific Affairs' Advisory Group (2004) review of the use of online research similarly concludes that recruiting participants online and conducting online studies is entirely feasible and could contribute usefully to psychological research, as long as a number of confidentiality and safety requirements are met. The current study's recruiting procedure (including the use of an incentive) as well as measures to ensure informed consent, debriefing and data safety were outlined to the University of Leicester's Psychology department ethics review board and have been fully approved.

- It was hypothesised that there would be no effect of presentation format on attitude, attitude certainty, correct recall or incorrect recall at the first time of testing.

- However, it was hypothesised that there would be an effect of presentation format on attitude, attitude certainty, recall and incorrect recall, at the second time of testing (i.e., after 2, 12, or 20 days).
- It was predicted that participants would estimate significantly different recall rates for the different formats.
- It was hypothesised that participants' recall would be affected by the length of the recall period.

4.3 Method

4.3.1 Participants

Participants were recruited from two main sources, via a participant panel and the internet. Members of the University of Leicester School of Psychology's participant panel, who had previously agreed to be approached for participation in research, were sent an email informing them about the current study and what their participation would involve, and including a link to the on-line questionnaire. At the same time, the on-line questionnaire was advertised by announcing the study via numerous on-line sources, such as the social networking site *Facebook*, the microblogging service *Twitter*, the University of Leicester's weekly *eBulletin*, weblogs (blogs), and emails. As an incentive, participants could enter a draw for a £50 (or an equivalent $75) voucher for the on-line book store Amazon. 369 participants completed the first first part of the study, and of those, 319 completed the second part which resulted in a very high completion rate of 86%. 26 data sets were excluded for being either identified as outliers (time taken to complete first part > 3 hours, or time taken to complete follow up part > 1 hour) or with participants having indicated that they found the survey 'quite difficult' or 'very difficult' to understand. Of the remaining 293 participants, 35 were male, 255 female, and 3 preferred not to disclose their gender. Participants' age ranged from 18 to

72 years, with a mean age of 34.11 (SD = 11.92). Overall, 253 participants indicated that English was their first language. Of the remaining 40, the three main languages given were German, French and Dutch with 6, 6 and 5 responses respectively. 23 more individual languages were named by two or less participants. The three countries of residence most frequently given were the United States (126), United Kingdom (113) and Canada (19).

4.3.2 Design

This study employed a 3 x 3 between-subjects design with the first variable, *Presentation Format* consisting of three levels: *Text Only*, *Text Numerical* (Text with numerical information), and *Text Graphical* (Text with graphical information). The second between-subjects variable, *Recall Period*, described the amount of time between the first recall and attitude task immediately after testing, and a second time either 2, 12 or 20 days later. Table 4.1 shows the distribution of participants across the nine conditions:

Table 4.1: *Participants per Condition.*

	Recall Period			
Format	2 days	12 days	20 days	Total
Text Graphical	37	40	22	99
Text Numerical	37	34	36	107
Text Only	26	25	36	87
Total	100	99	94	293

To measure the effect of presentation format on recall and attitude change, the following measurements were taken at both times of testing: *Correct Recall* (number of correctly recalled arguments), *Incorrect Recall* (number of incorrectly recalled arguments), *Attitude Certainty*, and *Estimated Recall.* A composite index of attitude, *Attitude Agreement*, was calculated from individual responses to two semantic differentials regarding participants' like/dislike of the proposal, and to what extent they thought it was a good or bad idea (see Procedure section below).

To check whether the three presentation formats were equivalent in terms of effort involved, and to ensure that data analyses only included participants who showed a sufficient understanding of the material, participants were also asked to rate the difficulty of reading the material. In addition, time taken to complete the questionnaire was measured.

4.3.3 Materials

The consent form presented in the on-line questionnaire can be found in Appendix E. The materials consisted of nine arguments supporting the implementation of comprehensive senior exams. These arguments were based on Barden and Petty's (2008) and were adapted to the requirements of this study; the same materials were used in a previous study (see Chapter 2) and the full materials for all three conditions can be found in Appendix A.

4.3.4 Procedure

The experiment was conducted by setting up an on-line questionnaire using the *SurveyGizmo* web survey tool. Participants were presented with an electronic version of a consent form explaining the purpose of the research as well as emphasising the confidential nature of the research and their right to withdraw at any time for any reason (see Appendix E). Following this they were asked several demographic questions on age, gender, country of residence, and first language.

The on-line survey tool then allocated participants randomly to one of the three presentation format conditions, *Text Only*, *Text Numerical* or *Text Graphical*. After having read the information material at their own pace, participants continued to complete two brief question sections. The recall section required them to briefly list all arguments they remembered from the material just read. Subsequently, in the attitude section participants were asked to indicate to what extent they liked or disliked the proposal on a nine point semantic differential ranging from *Like* to *Dislike*; and to what extent they thought this would be a good idea, ranging from *Good* to *Bad*:

> To what extent do you like or dislike the idea of introducing senior comprehensive exams?
> Like – – – – – – – – – Dislike

> To what extent do you think introducing senior comprehensive exams is a good or bad idea?
> Good – – – – – – – – – Bad

Additionally, they were asked to indicate on a nine-point scale how certain they were of their opinion, with answers ranging from 1 = *Not at all* to 9 = *Very*. Lastly, in the estimated recall section they were shown samples of all three types of presentation format and were asked to estimate how many different arguments participants in all three conditions might be able to recall at that point of testing.

After completion of the questionnaire, the on-line tool randomly allocated participants to one of the three recall period conditions. Depending on their allocation, an email was sent to participants either one day, eleven days or nineteen days after they completed the original questionnaire, to remind them to complete the follow-up questionnaire the following day. At the second testing point participants had to complete both the recall and attitude sections again.

4.3.5 Data Analysis

To derive the dependent variables *Correct Recall* and *Incorrect Recall*, two judges scored participants' answers according to whether they related to information contained in the original material or not. Both observers independently recorded the number of correct and incorrect responses given. There was extremely high inter-rater agreement on the number of correctly recalled arguments, r = .917 for the first recall, r = .924 for the second recall; but moderate agreement on the number of incorrect responses r = .428 for the first recall and $r = .304$ at the second recall, all correlations at $p < .001$. However, it has to be noted that the absolute number of incorrect responses was very low. All differences in scoring were resolved by discussion.

Participants responses on the 9-point semantic differential were scored from 1 to 9, with the endpoint of 1 allocated to 'Good', and 9 to 'Bad'. Similarly, responses on the 9-point semantic differential for *Like – Dislike* ranged from 1 = 'Like' to 9 = 'Dislike'. For responses concerning attitude certainty, scores were allocated such that the range was from 1 = 'Not at all' to 9 = 'Very'.

Preliminary analyses confirmed that the formats appeared to be equivalent in terms of task difficulty and effort involved. On average it took participants 22m 13s (SD = 17m 21s) to read the material in the Text condition, 19m 45s (SD = 14m 31s) in the Numerical condition, and 20m 44s minutes in the Graphical condition (SD = 16m 39s). There was no significant effect of presentation format on time to complete the questionnaire, $F(2, 288) = 0.565$, $p > .05$.

Average perceived difficulty for the Text format was $M = 2.63$ ($SD = 0.95$), for the Numerical format $M = 2.42$ ($SD = 0.99$), and for the Graphical format $M = 2.59$ ($SD = 0.89$). Again, there was no effect of presentation format on perceived difficulty, $F(2, 290) = 1.378$, $p > .05$.

4.4 Results

4.4.1 Effects of Presentation Format During First Recall

Participants did not follow the reminders for the follow up task completely accurately, and on average participants in the two-day condition completed the follow-up questionnaire 3.21 ($SD = 2.40$) days after the first part, participants in the twelve-day condition 13.17 ($SD = 1.97$) days later, and participants in the twenty-day condition 20.77 ($SD = 3.29$) days after the initial questionnaire;

independent sample t-tests confirmed that the differences in length of time between the three groups were highly significant, see Appendix F.

For the first point of testing, it was hypothesised that presentation format would not affect either attitude nor recall. When looking at attitude at the first point of recall, participants' responses to the questions 'To what extent do you think introducing senior comprehensive exams is a good or bad idea?' and 'To what extend do you like or dislike the idea of introducing senior comprehensive exams?' showed a large positive correlation at $r = .897$ ($p < .001$) and were consequently merged to a single attitude index. For this index, the means were at 3.26 (SD = 1.85) for the Text Graphical condition, 3.65 (SD = 1.89) for Text Numerical and 3.63 (SD = 2.04) for Text Only; a one-way ANOVA found no significant effect of presentation format on attitude, $F(2, 289) = 1.285$, $p > .05$.

Participants' attitude certainty scores ranged from 3.13 (SD = 1.80) in the Text Graphical condition, to 3.50 (SD = 1.85) in Text Only and 3.80 (SD = 2.01) in Text Numerical. In contrast to the hypothesis, a univariate analysis of variance revealed a significant effect of presentation format on attitude certainty with $F(2, 289) = 3.247$, $p < .05$, partial eta squared = .022, power = .616. Post-hoc tests indicated a significant difference between the certainty scores for the Text Graphical and the Text Numerical condition only; $t(204) = -2.525$, $p = .012$, such that Attitude Certainty was higher in the Text Numerical condition than in the Text Graphical condition.

At the first testing, on average participants recalled 5.57 (SD = 2.10) arguments in the Text Graphical condition, 5.73 (SD = 2.11) in the Text Numerical, and 5.80 (SD = 1.76) in the Text Only condition. The assumption of homogeneity of variance was violated and thus the Welch F-ratio will be reported: In support of the hypothesis, a one-way ANOVA found no significant effect of format on number of correctly recalled arguments, $F(2, 192.762) = 0.350$, $p > .05$.

The means for incorrectly recalled number of arguments were 0.38 for both the Text Graphical and Text Numerical conditions (SD = 0.67 and 0.64, respectively), and 0.36 (SD = 0.57) for the Text Only condition. A subsequent one-way ANOVA similarly showed no significant effect at $F(2, 290) = 0.057$, $p > .05$; while the F-value appears very small, the Levene-test indicated that the assumption of homogeneity of variance was not violated.

4.4.2 Effects of Presentation Format During Second Recall

It was hypothesised that presentation format would affect attitude and recall at the second point of testing. Participants' responses to the questions 'To what extent do you think introducing senior comprehensive exams is a good or bad idea?' and 'To what extend do you like or dislike the idea of introducing senior comprehensive exams?' showed a very high correlation of $r = .914$, $p < .001$. These scores were thus merged into a single attitude index. This attitude index showed an average of 3.51 (SD = 1.86) for Text Graphical, 3.92 (SD = 1.89) for Text Numerical, and 3.70 (SD = 1.85) for the Text Only condition. In contrast to the initial hypothesis, a one-way ANOVA showed no significant effect of presentation format on this attitude index, $F(2, 289) = 1.296$, $p > .05$.

Participants' attitude certainty ranged from 3.31 (SD = 1.69) in the Text Graphical condition, to 3.54 (SD = 1.93) in Text Only and 3.90 (SD = 2.05) in the Text Numerical condition. However, a one-way ANOVA similarly found no significant effect of presentation format on attitude certainty, $F(2, 290) = 2.484$, $p > .05$.

On average participants in the Text Graphical condition remembered 3.68 (SD = 2.01) arguments correctly, whereas participants in the Text Numerical condition remembered an average of 3.71 (SD = 2.08) and participants in the Text Only condition 3.79 (SD = 2.09) arguments, however, a one-way ANOVA showed no significant effect of presentation format on number of correctly recalled arguments, $F(2,\ 290) = 0.077$, $p > .05$.

For incorrectly recalled arguments the mean was 0.30 ($SD = 0.68$) for the Text Graphical condition, 0.30 ($SD = 0.55$) for Text Numerical and 0.34 ($SD = 0.61$) for the Text Only condition. Again, a one-way ANOVA showed no significant effect of presentation format on the number of incorrectly recalled arguments, $F(2,\ 290) = 0.158$, $p > .05$. While the F-value of this and the preceding analysis appears very small, the Levene-test indicated that the assumptions of homogeneity of variance were not violated.

4.4.3 Participants' Estimates of Recall

At both points of testing, participants were asked to estimate how many arguments other participants (i.e., the same 'cohort') would have recalled at the same time.

First Point of Testing When participants were asked to estimate other participants' recall for the first time, that is, immediately after reading the material during the first part of the study, their estimates put average recall at 4.27 ($SD = 1.58$) arguments in the Text Only condition, 5.21 ($SD = 1.53$) for the Text Numerical condition and 6.61 ($SD = 1.46$) for the Text Graphical condition. Participants expected participants in the Text Graphical condition to remember most, and participants in the Text Only condition to remember least. A repeated measures analysis of variance observed an effect of presentation format on estimate, F(2, 584) = 266.009, $p < .001$, $\eta^2 = .477$, power = 1.0. A series of paired samples t-tests showed all differences to be significant at $p < .001$ (see Appendix F). Participants' estimates of other participants' recall at the first point of testing are shown in Figure 4.1, split by which condition they were allocated to. A secondary analysis was conducted to see whether the format participants had been presented with themselves had an effect on the estimates of recall.

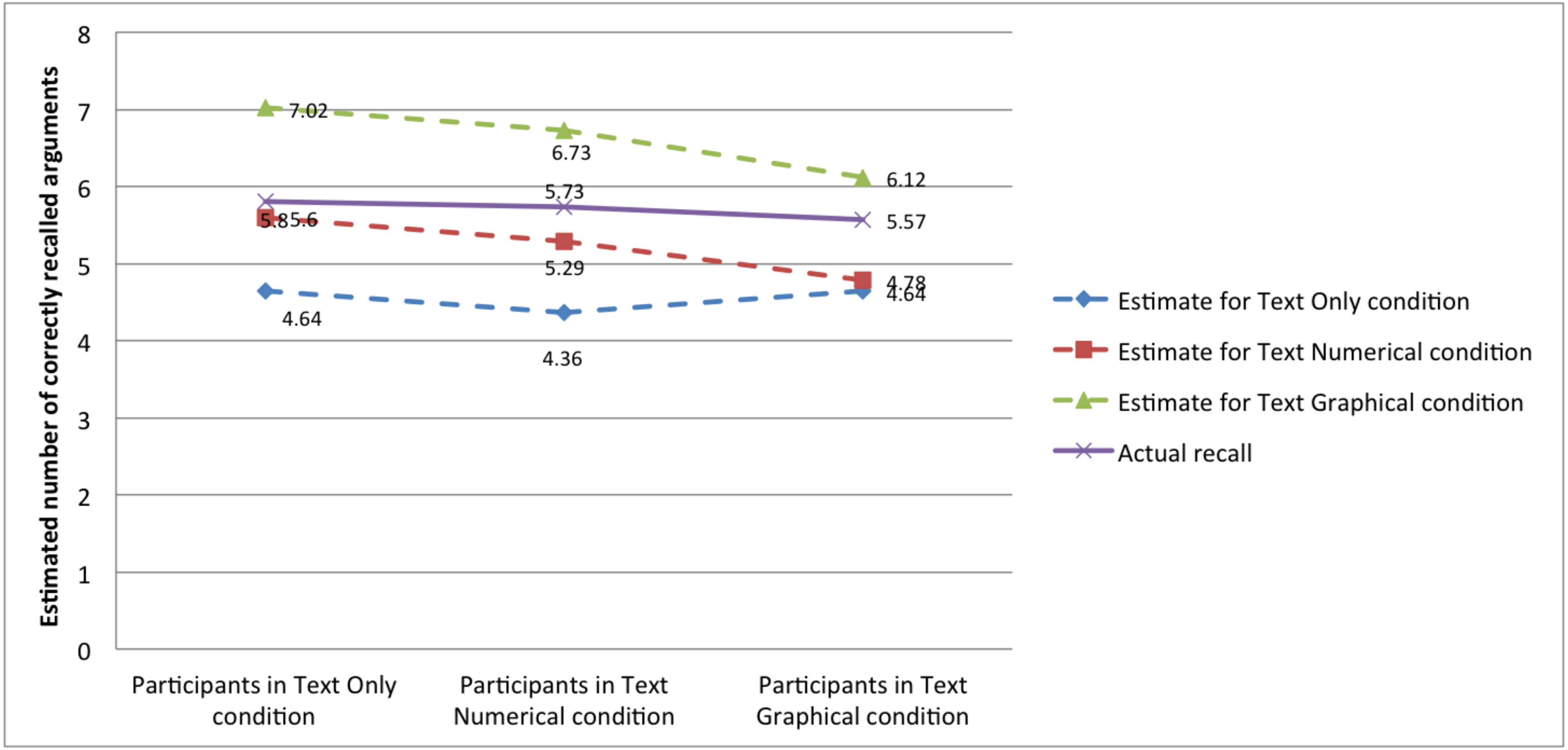


Figure 4.1: Participants' estimates of other participants' recall at first time of recall.

A multivariate analysis of variance revealed a strong significant effect of the participants' assigned format condition on their estimates of how much would be recalled in the Text Only condition, $F(2, 290) = 6.552$, $p = .002$, partial $\eta^2 = .043$, power = .907; in the Text Numerical condition, $F(2, 290) = 7.216$, $p = .001$, partial $\eta^2 = .047$, power = .933; and in the Text Graphical condition $F(2, 290) = 10.008$, $p < .001$, partial $\eta^2 = .065$, power = .984. In other words, participants' estimates of other participants' recall was influenced by the format they themselves were allocated to.

A closer look at estimates across formats with a series of independent t-tests (for details see Appendix F) revealed that participants allocated to the Text Graphical condition would make significantly different estimates for all three formats, when compared to participants from either the Text Only or the Text Numerical condition. However, when comparing participants from Text Only with participants from Text Numerical, estimates did not differ significantly for any of the three formats.

Second point of testing For the second recall, participants' estimated average of what other participants would have recalled was 3.56 (SD = 1.50) arguments for the Text Only condition, 4.51 (SD = 1.55) for the Text Numerical condition and 5.87 (SD = 1.62) for the Text Graphical condition. A repeated measures analysis of variance showed an effect of format on estimated recall, F(2, 584) = 322.886, $p < .001$, $\eta^2 = .525$, power = 1.0 . Again, paired samples t-tests showed all differences to be significant at $p < .05$. Participants' estimates of other participants' recall at the second point of testing are shown in Figure 4.2:

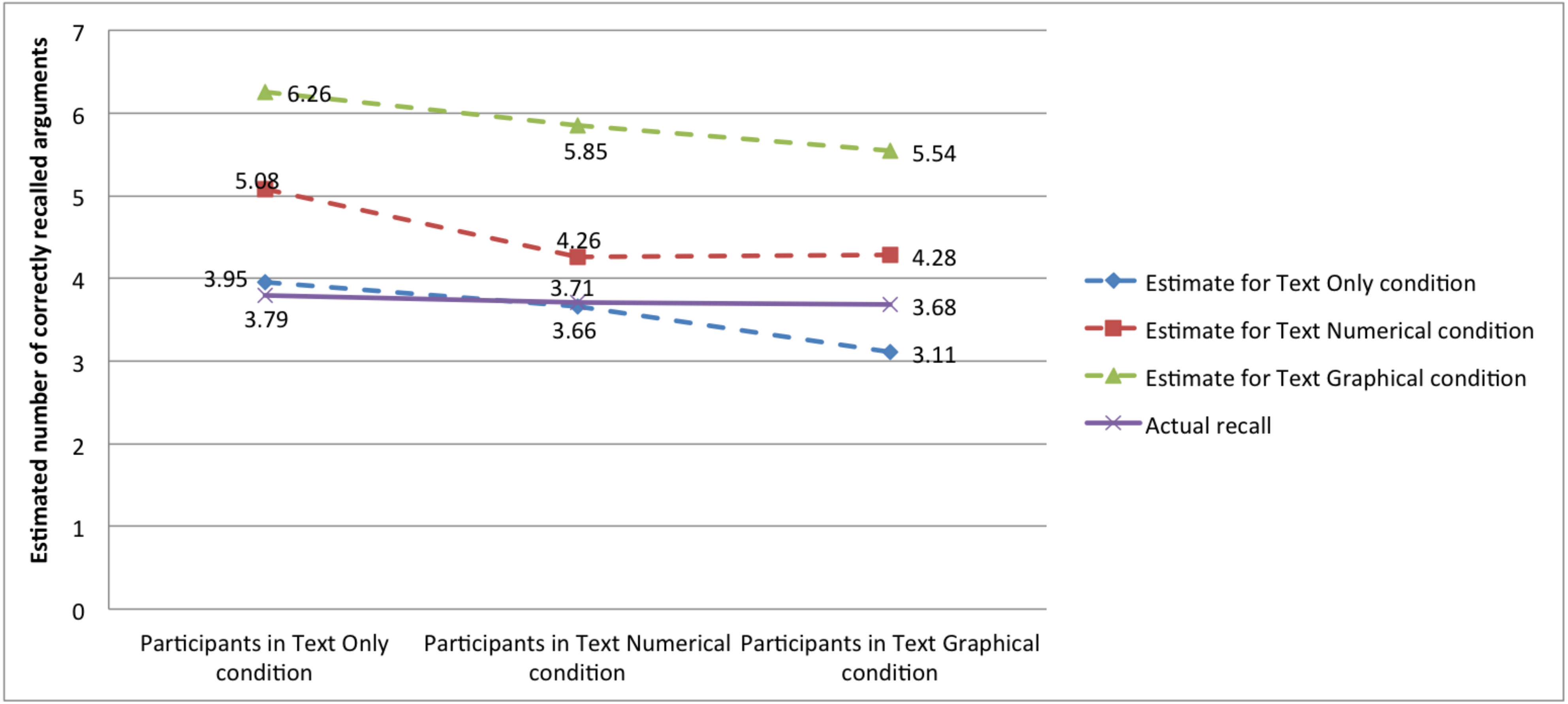


Figure 4.2: Participants' estimates of other participants' recall at second time of recall.

A multivariate analysis of variance revealed strong significant effects of participants' assigned format condition on their estimates of how much would be recalled in the Text Only condition, $F(2, 290) = 8.099$, $p < .001$, partial $\eta^2 = .053$, power = .957); in the Text Numerical condition, $F(2, 290) = 8.829$, $p < .001$, partial $\eta^2 = .057$, power = .971; and in the Text Graphical condition $F(2, 290) = 4.824$, $p = .009$, partial $\eta^2 = .032$, power = .796.

Similar to the findings at the first time of testing, participants from the Text Only and Text Graphical condition developed significantly different estimates for all conditions (for details see Appendix F). When comparing participants from the Text Only and Text Numerical condition, their estimates differed for the Text Numerical format, but not for Text Graphical or Text Only. Participants from the Text Numerical and Text Graphical condition likewise arrived at equivalent (i.e., not significantly different) estimates for the Text Numerical and Text Graphical condition; the only significant difference is found in their different estimates for the Text Only condition; participants from the Text Numerical condition estimate recall to be higher than participants from the Text Graphical condition do.

4.4.4 Effect of Recall Period on Recall of Arguments

The means and standard deviations for numbers of correctly and incorrectly recalled arguments across the three different recall periods are shown in Table 4.2. The number of correctly recalled arguments appears to decrease as the length of time between first and second recall increases. However, the number of incorrectly recalled arguments remains at an equivalent level throughout.

Table 4.2: *Effect of Recall Period on Argument Recall.*

	Recall period				
Recall	2 days	12 days	20 days	$F(2, 284)$	p
Correct	4.11 (1.85)$_a$	3.78 (1.94)$_{a,b}$	3.72 (2.05)$_b$	4.349	.014
Incorrect	0.35 (0.72)$_a$	0.22 (0.49)$_a$	0.37 (0.61)$_a$	1.726	.180

Note: Means sharing a subscript are not significantly different.

A multivariate analysis of variance revealed a significant effect of recall period on the number of correctly recalled arguments, (see Table 4.2, partial $\eta^2 = .029$, power = .751), but no significant effect on the number of incorrectly recalled arguments. Post-hoc t-tests (see Appendix F) show that recall rates at 2 days are significantly higher than recall rates after 20 days.

4.5 Discussion

In line with the initial hypothesis, only a small effect on attitude certainty was found at the first time of testing such that attitude certainty in the Text Graphical format was higher than for the Text Numerical format. No significant effect of presentation format was observed on correct recall, incorrect recall or attitude. Whilst the absence of any effect of presentation format was expected at the first testing, the absence of any effect at the second time of testing was not in line with the initial hypothesis. Presentation format was not observed to significantly affect attitude or attitude certainty nor did it affect correct or incorrect recall.

Participants estimated an average recall of 4.3 arguments in the Text Only condition, 5.2 in the Text Numerical condition and 6.6 in the Text Graphical condition. A similar pattern was observed at the second time of testing, with equally pronounced (and significant) differences in the estimates: on average 3.6 arguments in the Text Only condition, 4.5 in the Text Numerical and 5.9 in the Text Graphical condition. The difference between the three estimates are substantial, and amount to an average two arguments' difference between the highest and the lowest estimate. This pattern offers support for the initial hypothesis.

Length of recall period affected the number of correctly recalled arguments such that participants asked at 2 days after initial testing remembered more arguments than participants asked at 20 days after testing; however, no effect on incorrect recall was observed, offering no support for the hypothesis.

Regarding the lack of effect of presentation format on recall (both correct and incorrect), the results are not consistent with Viswanathan and Childers (1996), and Childers and Viswanathan (2000) who did observe an effect of presentation format on recall. The results also offer no support for Severtson and Henriques (2009) as neither correct nor incorrect recall was affected, thus not allowing any conclusions towards either of the formats aiding gist recall better than any other format.

Results are consistent with Greene and Brinn (2003) and Prangsma (2009) in presenting a similarly inconclusive picture where participants' homogeneous performance (here, recall) is not matched by their marked estimation pattern. Further analyses showed that both at first and second time of recall, the format participants themselves were allocated to also had a significant effect on their estimates: This difference was particularly strong between participants in the Text Graphical and Text Only format at the time of the first and second recall. At the first point of recall, average recall across all conditions was 5.7 (SD = 2.00). Participants' estimates missed the mark by a large margin and put the lowest recall estimate at 4.27 for the Text Only format, while the estimates for the Text Graphical format averaged at 6.6. This would suggest that participants underestimated the extent of recall the Text Only format would allow. At the second point of testing, participants recalled on average 3.7 (SD = 2.05) arguments. Here, participants' estimates for the Text Only format are strikingly close with an average 3.56, while the estimated recall for the Text Numerical (4.5) is slightly optimistic, and the estimate for the Text Graphical format (5.9) exceeds actual average recall by 2.2 – more than one standard deviation. This difference is certainly interesting as the pattern suggests participants substantially underestimating the Text Only format's contribution to recall while at the same time substantially overestimating the Text Graphical format's contribution to recall and highlights that participants perceived a difference between the three formats. The current study gives little indication what this perception of differences is based on.

It could be argued that the design could be improved by imposing a time limit on the presentation in an attempt to introduce a condition of high cognitive load, and to reduce the risk of distraction, particularly in the context of an on-line study taking place not in a controlled environment. Preliminary analyses suggested that reading times were equivalent across the four different formats, though, so it is doubtful that time to read or cognitive effort needed were relevant factors in the processing of the information.

Finally, anecdotal evidence in the form of participant comments suggests that some people considered the arguments to be one-sided and overwhelmingly supportive of the described proposal to introduce comprehensive exams. The comprehensive exam material was adapted from material used in previous studies conducted by Petty and Cacioppo (1984) where arguments were classified as either 'strong' or 'weak'. However, the 'weak' arguments were designed not to argue against comprehensive exams, but to be rhetorically weak, in the fashion of, 'My cousin studied at University X and he liked the comprehensive exams, so they should be implemented everywhere'. In the context of those studies they were designed to lead to negative attitudes towards the subject of comprehensive exams. They were not included in the current study because instead of leading to a negative attitude towards the subject matter they could possibly have led to a negative attitude towards the entire questionnaire. It was also felt that a focus on positive arguments was justifiable, because intentional persuasive attempts would similarly focus on the strong, positive arguments. Doing so may have created a strong, perceptible bias towards the proposal which suggest to either conduct a pilot study when using this material in future studies, or to use a different set of material.

To conclude, the current study observed a substantial difference in participants' perception of the impact presentation formats exert on recall, expressed in their systematically different estimates for different format conditions' recall rates. This perception seemed to be influenced by the presentation format the individual participant was presented with, but did not correspond to actual recall which was at the same level across all conditions. Attitude and attitude certainty similarly appeared unaffected which in the context of the study is consistent with the absence of a difference in recall rates.

Two main questions seem to arise from these results: To what extent does the difference in estimates reflect participants' perception that the three formats are qualitatively different? And is there a fundamental difference in how participants perceive presentation formats to affect themselves and others?

Chapter 5

Biased Perception of the Effectiveness of Using Statistics in Persuasion

5.1 Abstract

This study explored the hypothesis that participants would rate statistical information as more effective when they considered others as the persuasion target than when they considered themselves as the target. 60 participants were presented with 16 scenarios in a within-subjects design. They were asked to indicate perceived effectiveness of statistics for either themselves or others as the persuasion target, and to rate the importance of making the right decision for each scenario. Overall, participants rated statistics more effective for persuasion when considering others as a target, which is consistent with the better-than-average effect. Participants also rated statistics as more effective for issues they considered more important, which contradicts previous findings of a preference for verbal and anecdotal evidence. Need for cognition did not act as a confound for any measure.

5.2 Introduction

Study 3 examined recall and estimates of recall of participants presented with information in different formats; while participants' recall was equivalent across all formats they nevertheless estimated different rates of recall for the three different formats. Their estimates suggested a strong overestimation of the benefits of the graphical format to recall, while – compared to the average – the text format appeared to have been perceived as almost detrimental to recall. Recall estimates also significantly differed dependent on which format participants themselves had been presented with. The study concluded with the observation that more research was needed into whether participants perceived a fundamental difference in how presentation formats affected them and others, and whether the different estimates reflected on a more pervasive perception of differences between presentation formats. The current study aims to address the first of these two questions.

Perhaps participants tended to perceive a greater effect of statistical and numerical information than actually exists, for example considering the potential effect of this type of information on others rather on themselves, by way of a social comparison. The notion of a bias in our perceptions whenever we compare ourselves to others is well researched in social psychology and equally well supported. Two of the most prominent phenomena relating to this type of bias are the *self-serving bias* (e.g. Larson, 1977) and the *better-than-average effect* or *above-average effect* (e.g. Hoorens, 1993). The self-serving bias describes our tendency to attribute blame to external circumstances to explain our failures, and to cite internal factors (i.e., skills and competences) to explain our successes, and do the opposite for the failures and successes of our peers. It has been argued that the greatest motivator for this bias is the protection and maintenance of a positive self-image and this was strongly supported by a meta-analysis based on over 70 studies (Campbell & Sedikides, 1999). Not only did Campbell and Sedikides conclude that the self-serving bias is a psychological reality, they also consolidated fourteen strong mediators of the self-serving bias, for example task importance, self esteem, or task type, into one common theoretical construct 'self-threat'.

Yet, our efforts to put ourselves into a more favourable light are not limited to attributions of success and failure. They also extend to everyday evaluations of ourselves and others. Whenever the context implies a social comparison, we tend to think of ourselves as better than average. In fact, this tendency to think better of ourselves is so pervasive that it has prompted some researchers to claim that it is a standard coping mechanism for our daily functioning:

Taylor and Brown (1988) state that our '*unrealistically positive views of the self*, *exaggerated perceptions of personal control*, and *unrealistic optimism*' (p. 194, emphasis in the original) are a necessary prerequisite for our mental health (ibid.). In contrast, Kruger (1999) maintains that the scope of the better-than-average effect is overestimated and instead only applies to domains people perceive they have high absolute skills in, that is, skills a large number of people can acquire to a high level of proficiency, like driving a car. However, in domains where absolute skills are believed to be low, like playing the piano, people would tend to display a lower-than-average effect, and would be more likely to consider their skills to be below average. Nevertheless, overall the better-than-average effect has reliably been shown to exist (for a comprehensive review, see Alicke & Govorun, 2005).

Another influential factor is how salient the comparison target is against which the individual makes the comparison. Alicke, Klotz, Breitenbecher, Yurak and Vredenburg (1995) demonstrated conclusively that with increasing personal contact the better-than-average effect decreases. Conversely, the effect size increases, the more de-individuated the comparison target becomes. When considering whether and how a possible bias in perception of the effectiveness of statistics might be at work, it appears plausible that displaying or admitting to a susceptibility to persuasion by statistics may be essentially perceived as negative and as such would be relevant to the protection of our self-image.

The current study aims to explore whether there is a systematic bias in the perception of effectiveness of statistical information by assessing participants' perception of their own and others' susceptibility to persuasion. This was done by asking participants to rate the perceived effectiveness of statistics when used by the individual participant to persuade someone else, and when used by someone else to persuade the individual participant.

Furthermore, previous research has hinted at the role of attitude importance; for example, it was one of the 14 factors subsumed to the construct of 'self-threat' by Campbell and Sedikides (1999), and has also been identified in the guise of 'self-involvement' to play a role in inducing attitude change (e.g., Eisenstadt & Leippe, 2005; Petty et al., 1981). In Study 2, importance – more precisely, participants' perception of their own answer's importance – was found to moderately correlate with the extent to which they thought about the material presented to them. To find out to what extent the importance of the particular behaviour itself would mediate the perceived effectiveness of statistics, participants were asked to rate the importance of making the right decision (or exhibiting the right behaviour).

Lastly, differences in susceptibility to persuasion and attitude change have successfully been attributed to individual differences in personality traits, such as uncertainty orientation (e.g., Hodson & Sorrentino, 2003; Shuper & Sorrentino, 2004) or need for cognition (e.g., Cacioppo & Petty, 1982; Cacioppo & Morris, 1983; Kao, 2007). Need for Cognition seems particularly relevant to the understanding and perception of numerical information as it could interact with the degree of preference for numerical information, the tendency to thoroughly evaluate numerical information, or the competence in handling numerical information. It appears plausible that individuals high in need for cognition would react significantly differently, both when persuading others or when being the persuasion target. For these reasons, the current study included the Need for Cognition (NfC) scale (Cacioppo, Petty, & Kao, 1984) to assess the impact of participants' need for cognition as a potential covariate.

- Hypothesis 1: Based on the assumption that participants would display a better-than-average effect, and that this would induce participants to believe themselves more resistant to being persuaded by statistics, it was expected that participants rate statistics as more effective when asked to consider others as a persuasion target, as opposed to considering themselves as a persuasion target.

- Hypothesis 2: Because the importance of the targeted behaviour should influence the extent to which participants attend to the information carefully, a correlation between importance and estimated effectiveness, both for persuading others and for being persuaded, was hypothesised.

- Because participants' Need for Cognition was assumed to be related both to their affinity towards and proficiency in handling statistics, it was hypothesised that there would be an association between participants' Need for Cognition and their perception of statistics such that:

  Hypothesis 3a: It was hypothesised that there would be a correlation between participants' Need for Cognition and how effective they perceive statistics when used to persuade others.

  Hypothesis 3b: It was hypothesised that there would be a correlation between participants' Need for Cognition and how effective they perceive statistics when used by others to persuade the individual participant.

5.3 Method

5.3.1 Participants

Fifty-nine undergraduate psychology students from the University of Leicester, 21 male and 38 female, participated in return for course credit. Their age ranged from 18 to 27, with a mean of 19.07 ($SD = 1.62$) years.

5.3.2 Design

The experiment was conducted as a within-subjects on-line experiment. The independent variable *Persuasion Target* consisted of two levels that related to the two possible targets of a persuasion attempt that are considered in the task; specifically, either the individual participant (when being persuaded by someone else) or other people (when persuading someone else). The same set of sixteen scenarios was presented twice, once listing the participants as the persuasion target, and once listing other people as the persuasion target. Both times, the scenarios were presented in random order. Participants' *Need for Cognition* was also assessed.

Dependent measures were participants' ratings of *Perceived Importance* of making the right decision in every scenario, and how *effective* they considered the use of statistics to be.

5.3.3 Materials

The on-line study consisted of four sections. In the first section participants had to complete the short version of the Need for Cognition (NfC) scale; this scale has been reported as having very good internal consistency (Cacioppo & Petty, 1982; Cacioppo et al., 1984). It consists of 18 statements for which participants have to indicate how characteristic the behaviour is for themselves on a five-point scale ranging from 1 = *Extremely Uncharacteristic* to 5 = *Extremely Characteristic.* Sample statements include 'I prefer my life to be filled with puzzles that I must solve' or 'The notion of thinking abstractly is appealing to me'. Of the 18 questions, 9 were reverse coded. For the complete list of questions see Appendix G. The second section asked participants to consider how effective the use of statistics would be for others to persuade the individual participant to behave in a specific way for sixteen scenarios (see Appendix G). Sample scenarios include 'To eat more healthily' or 'To buy a particular brand of cough drops'. Answers were given on a six-point scale ranging from 1 = *Very ineffective* to 6 = *Very effective.* The third section asked the same questions, now relating to how effective the use of statistics would be in persuading other people (see Appendix G). The same scale was used, ranging from 1 = *Very ineffective* to 6 = *Very effective.* In order to improve chances of eliciting an effect, the stronger term 'statistics' was used (as opposed to numerical information) in the materials. The fourth section asked participants to indicate how important they felt it was to make the right decision for each of the sixteen scenarios previously used, the scale ranging from 1 = *Not at all* to 6 = *Very important*. For a detailed list of questions see Appendix G. Within each section, questions were presented in random order.

5.3.4 Procedure

The study was conducted in an on-line testing environment where participants could participate at a time of their convenience. At the beginning of the testing session, participants were informed of their right to withdraw at any time and for any reason. To indicate their consent, they had to tick a box to proceed further with the survey upon which they were asked for gender and age. Participants first had to complete the Need for Cognition (NfC) scale where questions were presented in a random order. Then participants moved on to the second part of the study, consisting of sections two, three and four. The order of sections two and three was reversed for half of the participants to control for order effects. Within each section, items were presented in random order. For all participants, the section asking for ratings of importance was presented last.

5.3.5 Data Analyses

Results are reported with two-tailed levels of significance and p at .05, unless stated otherwise. Participants' judgements of perceived effectiveness were averaged over all 16 scenarios, such that two measures, one for each persuasion target, were derived for each participant.

5.4 Results

A one-way ANOVA showed there was no effect of the order of presentation of sections 2 and 3 on the ratings of effectiveness, $F(1, 57) = 0.029$, $p > .05$.

Two average scores were computed for every participant. The first calculated average perceived effectiveness of statistics with others as the persuasion target. Across all participants, this score ranged from 2.44 to 6.00 with the mean at 3.96 ($SD = 0.59$). In contrast to that, overall perceived effectiveness of statistics when used by others to persuade the participant was lower and ranged from 1.56 to 4.94 with the mean at 3.77 ($SD = 0.61$) which is close to the mid-point of the scale (3.5). A one-tailed paired t-test showed that this difference was significant, $t(58) = 3.357$, $p < .001$.

Table 5.1 breaks down effectiveness and importance ratings for the individual scenarios.

Table 5.1: *Rated Effectiveness and Perceived Importance.*

	Target				
	Other	Self			Importance
Scenario	M (*SD*)	M (*SD*)	Δ[1]	One-tailed *t*-test	M(*SD*)
Buy a skin moisturiser	4.17 (1.34)	3.54 (1.37)	0.63	3.829, $p < .001$	3.12 (1.19)
Vote in a mayoral election	3.81 (1.06)	3.27 (1.17)	0.54	3.533, $p < .001$	4.07 (1.13)
Buy a hair dryer	3.58 (1.19)	3.14 (1.25)	0.44	3.428, $p < .001$	2.76 (1.15)
Buy a car	3.86 (1.18)	3.54 (1.16)	0.32	2.812, $p = .004$	3.83 (1.18)
Sign a petition	3.73 (1.03)	3.42 (1.16)	0.31	1.919, $p = .030$	3.90 (1.06)
Buy a TV	3.42 (1.24)	3.17 (1.19)	0.25	2.039, $p = .023$	3.15 (1.08)
Get a flu jab	4.20 (1.13)	3.95 (1.35)	0.25	1.788, $p = .040$	4.29 (1.04)
Chose therapy for back pain	4.59 (1.10)	4.39 (1.15)	0.20	2.054, $p = .023$	5.00 (0.77)
Participate in EU referendum	3.46 (1.15)	3.31 (1.21)	0.15	1.219, $p = .114$	4.19 (1.15)
Buy cough drops	3.75 (1.14)	3.64 (1.20)	0.11	0.799, $p = .214$	3.08 (1.34)
Volunteer as a magistrate	2.92 (0.95)	2.81 (1.06)	0.11	0.759, $p = .226$	3.42 (1.05)
Support speed limit	4.29 (1.00)	4.39 (1.07)	0.10	0.736, $p = .233$	4.69 (0.93)
Observe speed limit	4.42 (0.93)	4.51 (1.06)	0.09	0.659, $p = .256$	5.15 (0.81)
Eat more healthily	4.36 (1.00)	4.32 (1.24)	0.04	0.207, $p = .419$	4.83 (0.93)
Recycle more household waste	4.37 (0.87)	4.39 (1.02)	0.02	0.155, $p = .439$	4.63 (0.93)
Drive more safely	4.47 (1.10)	4.46 (1.07)	0.01	0.148, $p = .442$	5.20 (0.87)

[1] Δ denotes absolute difference; sorted in descending order.

Table 5.1 displays the individual importance ratings regarding the individual scenarios. Average importance scores across all participants ranged from 3.00 to 5.06, $M = 4.08$, $SD = 0.51$. High positive correlations were observed between rated importance and perceived effectiveness with self and others as target, with $r = .581$ and $r = .526$ respectively, both at $p < .001$, showing that as importance increased, perceived effectiveness also increased.

Overall, NfC scores ranged from 28 to 83, $M = 58.49$, $SD = 12.52$. Average perceived effectiveness of statistics with others as the persuasion target showed a very weak negative correlation with participants' NfC score, $r = -.111$, however, this was not significant, $p > .05$. Similarly, average perceived effectiveness of statistics with self as the persuasion target showed a very weak negative correlation with NfC, $r = -.149$, again, this was not significant, $p > .05$. Finally, looking at the correlation between the absolute difference between perceived effectiveness for self and others, and NfC provided further evidence that NfC did relate to the perception of effectiveness as only a non-significant correlation of $r= .071$, $p > .05$, was observed.

It is worth noting that of the 16 items, half (eight) display a significant difference between perceived effectiveness for self and others. Combined with the observation of lack of a significant correlation between importance and difference between self and other (denoted Δ) in Table 5.1 with $r = -.053$, $p > .05$, this raises the question whether the difference of scenarios with and without a significant difference in effectiveness is arbitrary or systematic. To have a closer look at the effectiveness rating data and examine to what extent this represents an actual underlying pattern, a series of factor analyses was conducted.

5.4.1 Factor Analyses

Importance Rating

A factor analysis with a direct oblimin rotation examined participants' responses to the 16 items measuring importance of making the right decision regarding the presented scenario. An examination of the Kaiser-Meyer-Olkin measure of sampling adequacy indicated that the sample was factorable (KMO = .679); Bartlett's test of sphericity was significant. A first factor analysis yielded four factors with an Eigenvalue greater than 1.0. Since these factors overlapped, all subsequent analyses were designed to identify three non-overlapping factors. Table 5.2 shows the results of the oblimin rotation with only high loading ($\geq$ .06). The resulting three non-overlapping factors with an eigenvalue of larger than 1.0 explain a cumulative variance of 59.12 %.

Table 5.2: *Rescaled Structure Matrix Importance Ratings*

	Component		
	1	2	3
Drive more safely	.840		
Observe speed limit	.753		
Support speed limit	.746		
Eat more healthily	.714		
Recycle more household waste	.711		
Buy a TV		.888	
Buy a skin moisturiser		.858	
Buy a hair dryer		.804	
Buy a car		.706	
Buy cough drops		.746	
Sign a petition			.857
Vote in a mayoral election			.816
Participate in EU referendum			.745
Volunteer as a magistrate			.709
Get a flu jab	–	–	–
Chose therapy for back pain	–	–	–

Perceived Effectiveness for Self

Similarly, a factor analysis with a direct oblimin rotation was conducted on participants' responses to the 16 items measuring perceived effectiveness of statistics when used by others to persuade the individual participant. An examination of the Kaiser-Meyer-Olkin measure of sampling adequacy indicated that the sample was factorable (KMO = .716), Bartlett's test of sphericity was significant. Table 5.3 shows the results of the oblimin rotation restricted to high loading ($\geq .06$) factors. The resulting three factors with an eigenvalue of larger than 1.0 explain a cumulative variance of 58.65 %.

Table 5.3: *Rescaled Structure Matrix Perceived Effectiveness for Self*

	Component		
	1	2	3
Buy a hair dryer	.861		
Buy a TV	.796		
Buy a car	.780		
Buy a skin moisturiser	.776		
Buy cough drops	.730		
Observe speed limit		.810	
Drive more safely		.789	
Eat more healthily		.828	
Recycle more household waste		.702	
Sign a petition			.837
Volunteer as a magistrate			.725
Participate in EU referendum			.694
Vote in a mayoral election			.651
Get a flu jab			.636
Chose therapy for back pain	–	–	–
Support speed limit	–	–	–

Perceived Effectiveness for Other

Lastly, a factor analysis with a direct oblimin rotation was conducted on participants' perceived effectiveness of statistics when used by the individual participant to persuade others. An examination of the Kaiser-Meyer-Olkin measure of sampling adequacy indicated that the sample was factorable (KMO = .652), Bartlett's test of sphericity was significant. Table 5.4 shows the results of the oblimin rotation with factors of loadings smaller than .60 excluded. The resulting three factors with an eigenvalue of larger than 1.0 explain a cumulative variance of 60.50 %.

Table 5.4: *Rescaled Structure Matrix Perceived Effectiveness for Other*

	Component		
	1	2	3
Observe speed limit	.766		
Drive more safely	.796		
Recycle more household waste	.721		
Support speed limit	.640		
Eat more healthily	.633		
Get a flu jab	.700		
Buy a hair dryer		.885	
Buy a TV		.780	
Buy a skin moisturiser		.802	
Buy a car		.774	
Buy cough drops		.734	
Vote in a mayoral election			−.859
Participate in EU referendum			−.853
Volunteer as a magistrate			−.799
Sign a petition			−.778
Chose therapy for back pain	–	–	–

Table 5.5 gives an overview of identified factors. The items *observe speed limit*, *recycle more*, *eat more healthily*, *drive more safely* all load on factor 1 for Importance and Other, and on factor 2 for Self; the closely related *support speed limit* loads on factor 1 for Importance. *Get a flu jab* loads on Factor 1 for Other (but on Factor 3 for Self). These items have in common socially desirable behaviour and may be termed *good citizen.* Items *buy skin moisturiser*, *buy a TV*, *buy a car*, *buy cough drops*, *buy a hair dryer* all load highly on factor 2 for Importance and Other, and on factor 1 for Self. These items seem to share a theme of consumer decisions; in fact the full wording of the items 'To buy a particular brand of . . . ' puts them explicitly in the context of *consumer decision-making.* Lastly, the items *vote in mayoral election*, *volunteer as magistrate*, *participate in referendum*, *sign a petition* load highly on factor 3 for Importance and Self, but negatively on factor 3 for Other. These items seem to share a theme of *political involvement.* Factor loadings for Importance and

Other are nearly identical for the first two factors, whereas for Self the order of factors 1 and 2 is reversed. It is also quite striking that factor 3 for Other sees the same four items loading on it, but all negatively.

Table 5.5: *Factor overview*

	Factor		
	1	2	3
Importance	Observe speed limit	Buy a hair dryer	Vote in mayoral election
	Drive more safely	Buy a TV	Participate in referendum
	Support speed limit	Buy a car	Volunteer as magistrate
	Recycle more	Buy skin moisturiser	Sign a petition
	Eat more healthily	Buy cough drops	
Perceived Effectiveness for Self	Buy a hair dryer	Drive more safely	Vote in mayoral election
	Buy a TV	Observe speed limit	Participate in referendum
	Buy a car	Recycle more	Volunteer as magistrate
	Buy skin moisturiser	Eat more healthily	Sign a petition
	Buy cough drops		Get a flu jab
Perceived Effectiveness for Other	Observe speed limit	Buy a hair dryer	*Vote in mayoral election
	Drive more safely	Buy a TV	*Participate in referendum
	Support speed limit	Buy a car	*Volunteer as magistrate
	Recycle more	Buy skin moisturiser	*Sign a petition
	Eat more healthily	Buy cough drops	
	Get a flu jab		

Note: * indicates negative loading.

5.5 Discussion

Participants overall rated statistical information to be significantly more persuasive when asked to consider others as a persuasion target than when asked to consider themselves the target of persuasion. This was in line with the first hypothesis.

Rated importance was highly correlated with perceived effectiveness, both when participants or others were considered as persuasion targets, such that effectiveness was rated higher for issues rated more important. Participants appeared to consider statistical data to be more persuasive when the outcome of the decision or behaviour was perceived to be more important. This supported the second hypothesis.

Lastly, no significant correlation was found between participants' NfC score and perceived effectiveness of statistical information when used to persuade others. Similarly, no correlation was found between participants' NfC score and perceived effectiveness of statistical information when being the persuasion target. This provided no evidence for an effect of NfC on perceptions of effectiveness, and offered no support for the last two hypotheses.

Participants' Need for Cognition did not correlate significantly with their perception of the effectiveness of statistical information. The lack of any effect in the current study does not, however, diminish the importance of the trait itself, nor its impact on attitude formation and attitude change. But the results imply that this trait does not moderate the perception of statistics as more or less persuasive.

When examining the individual scenarios in more detail, the absolute differences in effectiveness for self and others were particularly large for the three items 'buying skin moisturiser' ($\Delta = 0.63$ on a scale from 1 to 6) , 'voting in a mayoral election' ($\Delta = 0.54$) and 'buying a hair-dryer' ($\Delta = 0.44$). These three items include the items scored lowest and third lowest on importance. Although this small number is insufficient to draw any conclusions as to whether the low importance is linked to the large difference in perceived effectiveness, it is worthwhile pointing out that the items with a significant difference in perceived effectiveness could be categorised as scenarios involving the expression of a personal choice or preference. In contrast to this, the items with no significant difference in perceived effectiveness could be categorised as scenarios involving socially desirable activities (e.g., safer driving, healthier eating). To examine this in more detail, a factor analysis was conducted which identified three main factors determining participants ratings of importance of making a decision, and their effectiveness rating of statistics when used to persuade others or the individual participants. A first factor seemed to describe what is usually considered responsible, law-abiding, socially desirable behaviour, such as observing the speed limit or getting a flu jab. A second factor was identified as relating to consumer decision-making, for example, buying a hair dryer or cough drops, and a third factor related to involvement in the political process, such as signing a petition or volunteering as a magistrate. In the context of using statistics to persuade others, the third factor was negatively related, in contrast to the other factors. This could suggest that participants felt that statistics may be effective for persuasion of others in terms of socially desirable behaviour, or for consumer behaviour, but not expressions of political attitudes or affiliations. Nevertheless, participants appeared to perceive statistics as an effective means of being persuaded themselves when making decisions in the context of political expressions or behaviour.

The current findings are consistent with a better-than-average effect as postulated by Campbell and Sedikides (1999) and reviewed by Alicke and Govorun (2005), to the extent that participants seem to have perceived themselves sometimes to be a less susceptible target of persuasion by statistical information; this of course assumes that being less susceptible to persuasion is considered desirable and potentially difficult to attain. Furthermore, importance was found to be an influential factor such that participants perceived statistical information to be more effective for persuasion for issues they rated more important. This lends further support to Campbell and Sedikides' notion of importance as one of the moderating factors and suggests that the concept of importance should be considered in future studies. Additionally, even though these results do not directly support the findings of Alicke and Govorun, they are at least consistent with the claim that the magnitude of the better-than-average effect decreases as the degree of individuation increases. In the current study, a measurable effect was found within a setting where participants effectively compared themselves to an unknown, anonymous group – in other words, a setting that according to Alicke should have been conducive to a better-than-average effect. It is also interesting to note that across almost all items – with the exception of 'to volunteer as a magistrate' – participants rated the perceived effectiveness of statistics at either close to or above the average of 3.5. In fact, the minimum individual score of perceived effectiveness given by any participant was 2.44, and the minimum average score was 2.81. Considering that these ratings were given on a scale from 1 to 6 this seems relatively high and could be seen as an indication for perceived high overall effectiveness of statistical information, and adds further emphasis to the need of a closer look at the perceived properties of presentation formats; a conclusion that had also been reached in the context of the discussion of Study 3's findings.

Chapter 6

Differential Evaluations of Presentation Formats

6.1 Abstract

In a quasi-experimental design 91 participants were grouped according to their degree subject (with or without substantial statistics education) and received a brief questionnaire to indicate their preferences and evaluations of three formats: *Text Only*, *Text Numerical* and *Graph Only*. There was no significant difference between the two groups' preferences and evaluations. Participants perceived the graphical format as superior to the other formats.

6.2 Introduction

The last study observed that effectiveness of statistics when used to persuade others was perceived to be higher than when used by others to persuade the individual participant. A more detailed examination showed that, while significantly different overall, this evaluation of effectiveness varied between scenarios. In an effort to examine whether this was due to chance or due to properties of the scenarios used, factor analyses were conducted and three main factors were identified to influence perception of effectiveness. However, identifying these factors failed to provide a systematic explanation for why the difference in effectiveness was significant for half of the scenarios.

Study 3 observed participants substantially overestimating the rate of recall based on the graphical format, while at the same time underestimating the rate of recall based on the text format; no differences in actual rates of recall were observed. This suggests that participants did perceive differences in the formats used, and that the formats may be associated with differences in the extent to which they aid or hinder processing. Yet, in Study 2 participants did not seem to perceive any differences, which was consistent with the overall lack of differences between participants in the experimental and control condition(s) but not consistent with the findings of Study 3. Study 3 furthermore raised the question to what extent participants' differences in recall estimates for different presentation formats may have been based on them perceiving the different presentation formats as fundamentally different.

Together, this suggests that the perception of presentation formats and their associated benefits should be examined in more detail. In the current study, participants are presented with examples of the three different formats used previously, and asked to indicate their perception and preference. Although in Study 1 numeracy was found not to be a factor influencing perceived or actual processing, this does not preclude the possibility that extent of numeracy skills and familiarity with statistics may affect perception and the extent to which different presentation formats may be associated with different properties. To examine the impact of background knowledge and experience in processing statistical information, this study thus recruited participants from different degree subject backgrounds: psychology students as participants with a basic education in the processing and application of statistical knowledge, and students at the English department.

It was predicted that the two groups would perceive the formats in a different way such that there would be significant differences in the two groups' ratings of the evaluation criteria.

It was predicted that the two groups would perceive the formats in a different way such that there would be significant differences in the two groups' format preferences.

It was predicted that participants would display significantly different evaluations for the three formats.

It was similarly predicted that there would be a significant preference of one format over the others.

6.3 Method

6.3.1 Participants

Participants from a previous, related study were recruited for the current study. Ninety-one undergraduate students from the University of Leicester participated, of which 68 were single subject Psychology students, 19 single subject students of English and 4 Combined Arts students. Overall, 70 participants were female, and 21 were male; their mean age was 19.26 (SD = 1.84) years.

6.3.2 Design

This quasi-experimental mixed-factorial study was conducted in the form of an on-line questionnaire, and had one grouping variable, *degree subject*, with participants classified as either *Psychology* (group P) or *Non-Psychology* (group NP).[1] The independent, within-subjects variable *Presentation Format* had three levels (Graph Only, Text Numerical, Text Only). All formats were evaluated by participants according to seven criteria, and participants also had to choose their preferred format for each criterion.

6.3.3 Materials

The questionnaire was presented using SONA, an on-line environment for experimental participation. Participants were asked to rate the three presenta-

[1]For ease of reference, this group will be referred to as *Non-Psychology* though in this study the sample comprises participants pursuing either an Honours degree in English or a Combined Arts degree which includes Psychology but excludes a major part of the statistics curriculum. The Non-Psychology group explicitly does not include students pursuing degrees such as Mathematics, Physics, etc. which would have suggested a higher overall level of numeracy.

tion formats used throughout Study 2. Materials included an example of every format used, listed as Format A, B and C (Graph Only, Text Numerical and Text Only, respectively). In line with previous representations of the graphical format, the Graph Only format was represented by a bar chart. They were given the following set of questions with responses from 1 = *Very much* to 3 = *Not at all* to answer for each format:

- How reliable did you find Format A?
- How easy to understand was Format A?
- How objective did you consider Format A?
- How helpful did you find Format A to make your decision?
- How confident were you making your decisions based on information given in Format A?
- To what extent did you trust the information presented in Format A?
- How difficult did you find Format A?

After completing this section, they had to indicate their format type preferences along the same criteria, and indicate one overall preference:

- Which format do you consider most reliable?
- Which format do you consider easiest to understand?
- Which format do you consider most objective?
- Which format do you consider most helpful to make a decision?
- Which format do you consider to give you the most confidence in making a decision?
- Which format do you trust most?
- Which format do you find most difficult to base your decision on?

- Which format do you prefer most?

6.3.4 Procedure

The survey was conducted in SONA, an on-line testing environment where participants could participate at a time of their convenience. Items were presented in a randomised order. Participants completed this short questionnaire after having previously completed Study 2 so that the entire testing session for Study 3 lasted approximately five minutes.

6.3.5 Data Analyses

Results are reported with two-tailed levels of p at .05 unless reported otherwise. Responses to the questions 'How difficult did you find format A / B / C?' were reverse scored to be in alignment with responses to the other questions, such that lower scores indicate more positive ratings.

6.4 Results

6.4.1 Non-Psychology and Psychology Participants' Evaluation of Formats

Table 6.1 lists both groups' evaluations of the presentation formats *Graph Only*, *Text Numerical* and *Text Only*. The data show that the two groups' format evaluations are very similar and independent t-tests revealed that there was indeed no significant difference between the two groups for any of the evaluated criteria.

Table 6.1: *Evaluations for Text Only, Text Numerical, and Graph Only for Both Participant Groups.*

		Group				
		Non-Psychology		Psychology		
Criterion	Format	Mean	SD	Mean	SD	t-test, all at $p > .05$
Reliable	Text Only	2.29	0.64	2.10	0.68	$t(86) = 1.082$
	Text Numerical	1.32	0.48	1.52	0.50	$t(87) =-1.672$
	Graph Only	1.45	0.51	1.36	0.51	$t(87) = 0.765$
Easy to understand	Text Only	1.64	0.73	1.82	0.76	$t(87) =-1.001$
	Text Numerical	1.86	0.56	1.82	0.55	$t(86) = 0.333$
	Graph Only	1.23	0.43	1.20	0.44	$t(86) = 0.283$
Objective	Text Only	2.45	0.61	2.23	0.61	$t(80) = 1.429$
	Text Numerical	1.50	0.69	1.56	0.56	$t(81) =-0.365$
	Graph Only	1.52	0.60	1.64	0.72	$t(85) =-0.651$
Helpful	Text Only	2.09	0.75	1.98	0.68	$t(84) = 0.618$
	Text Numerical	1.67	0.58	1.67	0.56	$t(86) =-0.035$
	Graph Only	1.50	0.60	1.37	0.57	$t(87) = 0.892$
Confident	Text Only	2.00	0.62	2.02	0.67	$t(85) =-0.095$
	Text Numerical	1.64	0.49	1.67	0.56	$t(86) =-0.225$
	Graph Only	1.64	0.66	1.44	0.61	$t(86) = 1.285$
Trust	Text Only	2.15	0.59	2.16	0.54	$t(82) =-0.044$
	Text Numerical	1.41	0.50	1.51	0.59	$t(87) =-0.705$
	Graph Only	1.64	0.49	1.47	0.56	$t(86) = 1.243$
Difficult	Text Only	2.09	0.75	2.17	0.73	$t(83) =-0.460$
	Text Numerical	2.41	0.59	2.25	0.60	$t(83) = 1.055$
	Graph Only	2.59	0.67	2.55	0.73	$t(84) = 0.249$

Table 6.2 shows how often every format was mentioned as preferred format across the two groups. There was only one significant difference between the two groups' format preferences: When asked which format was the most reliable, NP participants chose the Text Numerical, whereas P participants named the Graph Only format. It is noteworthy that the Text Only format received little to no mention for being reliable or trustworthy, while more than half of the participants in both groups said it was the format most difficult to understand.

Table 6.2: *Frequency of Mentions (in %) of Preferred Format by Psychology Students (P) and Non-Psychology Students (NP).*

	Format						
	Graph		Text Numerical		Text Only		
	NP	P	NP	P	NP	P	χ^2
Reliable	39.1	60.3	60.9	33.8	0	5.9	5.846
Easy	60.9	72.1	21.7	11.8	17.4	16.2	1.523
Objective	52.2	55.9	39.1	35.3	8.7	8.8	0.113
Helpful	69.6	61.8	26.1	26.5	4.3	11.8	1.121
Confidence	47.8	63.2	39.1	23.5	13.0	13.2	2.211
Trust	52.2	63.2	47.8	32.4	0	4.4	2.497
Difficult	8.7	17.6	26.1	25.0	65.2	57.4	1.082
Overall	56.5	72.1	26.1	11.8	17.4	16.2	2.916

Note: Table lists percentage of mentions of format per criterion, per group, i.e. NP mentions for Graph, Text Numerical and Text Only add up to 100% (rounding notwithstanding). χ^2-tests results non-significant at $p > .05$, df = 2, except for *reliable* with $p = .027$.

6.4.2 Overall Format Evaluation and Preferences

Table 6.3 displays the resulting average ratings for the three presentation formats. The Graph Only format was consistently rated significantly more positive than Text Only and, for three criteria, also more positive than the Text Numerical format. For five out of seven criteria, the Text Only format was rated significantly lower than the Text Numerical format; it was also rated as the least helpful of the three formats.

Table 6.3: *Participant Evaluation of Presentation Formats.*

	Presentation format		
	Graph only	Text numerical	Text only
Criterion	M (*SD*)	M (*SD*)	M (*SD*)
Reliable	1.38 (0.51)$_a$	1.47 (0.50)$_a$	2.15 (0.67)$_b$
Easy to understand	1.20 (0.43)$_a$	1.83 (0.55)$_b$	1.78 (0.75)$_b$
Objective	1.61 (0.69)$_a$	1.54 (0.59)$_a$	2.28 (0.61)$_b$
Helpful	1.40 (0.58)$_a$	1.67 (0.56)$_b$	2.01 (0.69)$_c$
Giving confidence	1.49 (0.63)$_a$	1.66 (0.54)$_a$	2.01 (0.66)$_b$
Trustworthy	1.51 (0.55)$_a$	1.48 (0.57)$_a$	2.15 (0.55)$_b$
Difficult	2.56 (0.71)$_a$	2.29 (0.59)$_b$	2.15 (0.73)$_b$

Note: Rated from 1 = *Very much*, 2 = *Somewhat*, 3 = *Not at all*, i.e. lower values are more positive. For example, *Text Only* was rated to be, on average, *somewhat helpful* at a mean of 2.01. Means sharing a subscript are not significantly different.

Table 6.4 shows the distribution of mentions in answer to questions about preferred formats. From a superficial analysis it appears that the Graph Only format was mentioned most often in all but one question, and was thus perceived as the most easy to understand, most trustworthy, most objective and so forth. The only notable difference was found with the criterion of *Difficult*; however this question asked for the most difficult format and here the Text Only format was mentioned most often. χ^2-tests (see Appendix J) revealed that the difference in frequencies of mentions was indeed significant for all criteria; they also showed that the Graph Only format was mentioned significantly more often than the Text Only format for every single criterion, and significantly more often than the Text Numerical format for all criteria except *reliable*, *objective* and *difficult*. In addition, the Text Numerical format was mentioned significantly more often than the Text Only format for the criteria *reliable*, *objective*, *helpful*, *confidence* and *trust*.

Table 6.4: *Frequencies of Mentions of Preferred Format Overall.*

	Format			
Criterion	Graph Only	Text Numerical	Text Only	χ^2
Reliable	50_a	37_a	4_b	37.077
Easy to Understand	63_a	13_b	15_b	52.835
Objective	50_a	33_a	8_b	29.429
Helpful	58_a	24_b	9_c	41.560
Confidence	54_a	25_b	12_c	30.484
Trust	55_a	33_b	3_c	44.923
Difficult	14_a	23_a	54_b	29.033
Overall	62_a	14_b	15_b	49.604

Note: All χ^2-tests were significant at $p < .05$, df = 2. Frequencies sharing the same subscript are not significantly different.

6.5 Discussion

There was a single significant difference in the evaluations of the individual formats between the two groups of participants: When asked for the most reliable format, participants with a Psychology background named the Graph Only format most often, whereas participants with a different background most often chose the Text Numerical format. No other significant differences in either evaluations or preferences were found, and overall the first and second hypotheses received no support. However, participants appeared to prefer the graphical format over the text format. This was the case when rating the three formats individually (see Table 6.3), where the graphical format received significantly higher and thus more positive ratings than the text format, partly supporting the third hypothesis; it was also the case when selecting the best format of the three for a number of criteria (see Table 6.4), where the graphical format was mentioned significantly more often than other formats, thus supporting the fourth hypothesis. It has to be noted that with N = 23, the

Non-Psychology group was quite small, and for conducting χ^2-tests a larger group would have been preferable.

In conclusion, the Graph Only format was perceived to be superior to Text Only, and was perceived as superior to the Text Numerical format in terms of being easy to understand, helpful, and giving confidence to make the right decision. Furthermore, the Text Numerical format was perceived to be superior to the Text Only format in terms of being objective, helpful, giving confidence, and being trustworthy.

The finding that there was no effect of participants' degree subject and corresponding statistics education on their evaluation could indicate that participants' statistics education did not differ to the extent it was initially assumed. For example, instead of the statistical knowledge gained while at university, it might have been the mathematical knowledge gained during their A-levels that could have been relevant in terms of overall numeracy and/or attitude towards the more numerical and graphical formats. Indeed, with the University of Leicester's entrance requirements being of a relatively high standard, participants' statistical abilities might have been more homogeneous than expected.

The current study's findings bear resemblance to the findings of Prangsma, van Boxtel, Kansellar and Kirschner's (2009) study (described in more detail in Chapter 1 on page 13). Prangsma et al. found a similar inconsistency between performance and perception when testing retention of teaching material for history lessons, leading them to remark on the importance of the affective property of the stimuli.

One possible way in which a stimuli could exert an influence on participants' perception could be what is in the literature referred to as an *affect heuristic*:

> Affect means the specific quality of goodness or badness (a) experienced as a feeling state (with or without consciousness) and (b) demarcating a positive or negative quality of a stimulus. (...)

> We argue that reliance on such feelings can be characterised as the 'affect heuristic', with the experienced feelings being used as information in the decision process. (Slovic, Peters, Finucane, & MacGregor, 2005, p. S35).

However, it is commonly assumed that heuristics are employed when faced with complex tasks or when cognitive resources are limited, for example, under stress or when distracted. While participants were not stressed, distraction cannot categorically be excluded, considering that participants consisted of undergraduate students participating for course credit; it would indeed be somewhat consistent with the failure to manipulate level of involvement in Study 2. On the other hand, if participants had in fact employed an affect heuristic, the findings would provide a basis to explain which factors may have determined the associated affect, i.e. a perception of a format being helpful, trustworthy or giving them confidence.

If further studies were indeed conducted on this topic, it might also be appropriate to reword some of the criteria employed so as to avoid any overlap of criteria like 'easy to understand' and 'difficult'. Furthermore, it could be argued that participants in this study were biased because they had previously participated in another study employing the same three presentation formats. A future study could either employ a control group that has no prior exposure to the materials to be evaluated, or vary the type of context and information involved.

Chapter 7

Investigating the Effect of Presentation Format on Confidence and Accuracy

7.1 Abstract

In the previously described study (Chapter 6) participants showed a marked preference for a graphical presentation format as opposed to text only or text with numerical information. This study examined whether these presentation formats would affect participants' perception as measured by their confidence, and to what extent performance (as measured by accuracy) might also be affected. The current study employed a unifactorial design with the factor presentation format (*Text Only*, *Text with Numbers*, *Graph Only*). Participants were asked to solve a series of tasks within three different scenarios, and were asked to indicate how difficult they perceived the tasks to be and how confident they were in their own solution. Perceived difficulty and criterion desirability were considered as potential confounding variables. No effect of presentation format was observed on any of the dependent measures.

7.2 Introduction

In the previously described study, participants were asked to rate each type of format regarding six criteria relating to its potential benefits and consistently rated the format types containing either numerical or graphical information as more positive and more beneficial. This clear difference in both evaluations and preferences stands in stark contrast to the previous studies' largely inconclusive findings. The current study was designed to examine whether and to what extent those differences in subjective perception would be reflected in participants' confidence and perceived task difficulty. In addition, the study examined objective performance, which mirrors previous studies' setup of observing both perceived and actual response, such as depth of processing, attitude change, and – to some extent – rate of recall. For the current study, objective performance was defined as accuracy in a problem-solving task. Based on observations from a pilot study, criterion desirability was further introduced to identify answers where participants did not base their solutions on mathematical parameters but on personal preferences. By introducing a separate section where participants are asked to rate the desirability of all 15 criteria on which the 45 decision making tasks are based on, it was hoped to gain an indication of which responses are based on personal preferences, and which responses are based on a desire to find the mathematically correct solution.

The current study's hypotheses broadly relate to two main questions:

1. To what extent does the perceived difficulty of the individual tasks affect participants' confidence and actual accuracy?

- Hypothesis 1a: Based on the assumption that participants would be aware of how difficult a task was, it was predicted that ratings of perceived task difficulty would correlate negatively with participants' confidence.
- Hypothesis 1b: Based on the assumption that difficulty directly relates to the accuracy in solving a task, it was predicted that ratings of perceived task difficulty would negatively correlate with participants' accuracy.

2. Is there an effect of presentation format once the bias of personal preferences has been removed? For these analyses a subset of data was formed by excluding responses, per participant, to questions where the mathematically correct answer was based on a criterion defined by the participant as undesirable.

- Hypothesis 2a: It was hypothesised that there would be an effect of presentation format on accuracy.
- Hypothesis 2b: It was hypothesised that there would be an effect of presentation format on confidence.
- Hypothesis 2c: It was hypothesised that there would be an effect of presentation format on perceived difficulty.

7.3 Method

7.3.1 Participants

Ninety-one undergraduate students from the University of Leicester participated as part of a course requirement. Of those 91 students, 70 were female and 21 male. Their mean age was 19.26 (SD = 1.84) years.

7.3.2 Design

The study was conducted in the form of an on-line questionnaire. It employed a unifactorial within-subject design with *Presentation Format* as within subject variable with three levels: *Text Only*, *Text Numerical*, *Graph Only*. Participants' *accuracy* and *confidence* were measured as dependent variables, with *(perceived) task difficulty* as a potential covariate. The study also elicited ratings on the desirability of the solution criteria employed, so answers associated with an undesirable criterion could be excluded from the main analysis.

7.3.3 Materials

The experimental materials were presented using SONA, an on-line environment for experimental participation. Participants had to choose the best option out of three choices presented, based on the information given in the task description, and indicate their confidence in their choice on an 11-point scale from 0 to 100, in intervals of 10. Three scenarios were created: the *Car* scenario (choosing the best car to buy out of three), the *TV* scenario (choosing one out of three TV sets to buy), and the *Law* scenario (voting for one out of three new pro-environmental laws to be implemented).

Within every individual scenario, three choices were framed using five different criteria. For example, within the Car scenario, questions were framed in terms of fuel consumption, safety, comfort rating, defect rate and resale value. With five criteria, fifteen questions were generated for each scenario. Each question was presented three times (with the accompanying description varying in the degree of numerical information contained in the information provided), totalling 45 items. In the Text Only condition the information was presented as a plain text, for example: 'Cars of brand D are found to more defective than brand F, and brand F is more often defective than brand E'. In the Text Numerical condition the identical text was presented with the addition of numerical qualification for all three choices, for example: 'Brand D has a defect rate of 22 defects per 10,000 hours of use. Cars of brand E are found to have a defect rate 9 defects per 10,000 hours and brand F presents with 15 defects over the same period of time.' In the Graph Only condition a single graph containing the same information as in the numerical condition was presented, as illustrated in Figure 7.1.

Forty-five questions were presented altogether; see Appendix K. To prevent confounding with real brand name associations, no names were used and all options were instead assigned letters from A to O. Furthermore, no letter was used in more than one question type per scenario to prevent transfer effects between questions.

To measure *Criterion Desirability* participants were also asked to rate the desirability of 15 criteria which referred to the underlying qualities on which the tasks' information was based. For example, participants had to indicate how desirable they rated low fuel consumption when choosing a car, or ease of implementation when voting for a law on recycling. Each subsection started

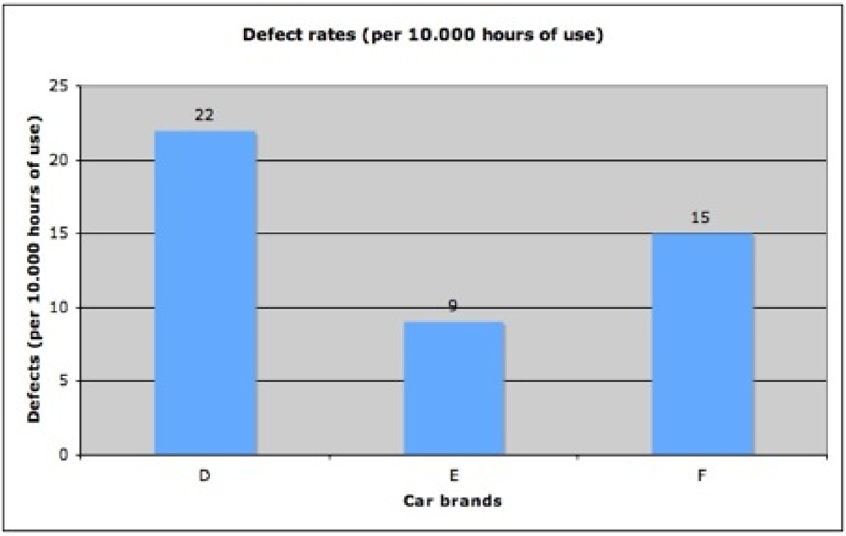


Figure 7.1: Example of Graphic presented in *Graph Only* condition.

with a short description about the scenario and was followed by a list of criteria to rate for desirability on a six-point scale, ranging from -3 =*very undesirable* to $+3$ = *very desirable*. For a complete list of criteria see Appendix K.

7.3.4 Procedure

The study was conducted in an on-line testing environment where participants could participate at a time of their convenience. At the beginning of the testing session, participants were informed of their right to withdraw at any time and for any reason. To indicate their consent, they had to tick a box to proceed further with the survey upon which they were asked for gender, age and a unique identifier. Participants first had to complete the problem-solving task by selecting their choice out of three options. After finishing this task, participants completed the desirability section. An entire testing session lasted approximately 20 minutes.

7.3.5 Data Analysis

For every participant, an average confidence score was calculated from their confidence scores across all 45 decision making tasks. Additionally, three mean confidence scores – one per presentation format condition: *Confidence Text*, *Confidence Numerical*, *Confidence Graph* – were calculated for all participants. Accuracy scores were calculated by assigning an accuracy score of 100% to the correct answer and 0% for the two remaining options. An average accuracy score was then calculated for every participant. Three mean accuracy scores – one per presentation format condition: *Accuracy Text*, *Accuracy Numerical*, *Accuracy Graph* – were calculated for all participants. Similarly, ratings of the perceived difficulty were averaged per condition as well as over all conditions, creating an overall score as well as three individual scores, one for each presentation format condition, all ranging from 1 to 6.

For every participant the desirability ratings of criteria were consolidated such that the response values *very undesirable*, *fairly undesirable* and *somewhat undesirable* were re-coded into the value *undesirable*, while response values *somewhat desirable*, *fairly desirable* and *very desirable* were re-coded into the value *desirable*. Across all participants and across all 45 questions, responses were then excluded from analysis whenever participants had rated the underlying criterion to be undesirable. For example, if participant A rated the criterion 'that the TV has the lowest price of all available choices' as *somewhat undesirable*, the response was recoded to *undesirable*. Because of this, participant A's accuracy, difficulty and confidence scores relating to the three questions using the TV price as a criterion were subsequently excluded.

Results are reported with two-tailed levels of $p = .05$, unless reported otherwise.

7.4 Results

Average perceived difficulty and average confidence displayed a strong negative correlation such that confidence was lower for items judged more difficult, at $r = -.844$, $p < .001$. Similarly, average perceived difficulty and accuracy displayed a moderate negative correlation such that accuracy was lower for items judged more difficult, at $r = -.429$, $p < .001$.

Table 7.1 shows the distribution of desirability ratings for every criterion used among the three scenarios.

Table 7.1: *Ratings of Desirability of Different Criteria.*

		UndesirableRatings	Desirable Ratings
	Scenario	%	%
Car			
	Comfort rating	3.3	96.7
	Safety	6.6	93.4
	Fuel consumption	7.7	92.3
	Resale value	8.8	91.2
	Defect rate	16.5	83.5
TV			
	Quality	2.2	97.8
	Customer satisfaction	4.4	95.6
	Life span	5.5	94.5
	Price	9.9	90.1
	Brand	14.3	85.7
Law			
	Recycle rate	4.4	95.6
	Cost	4.4	95.6
	Waste reduction	5.5	94.5
	NGO support	15.4	84.6
	Ease of implementation	17.6	82.4

All subsequent analyses were conducted with a subset of the original data (see Section 7.3.5 for a detailed description of how this subset was determined). The means and standard deviations for difficulty and accuracy and perceived difficulty across the three conditions are shown in Tables 7.2 and 7.3.

Table 7.2: *Means (SDs) of Difficulty*

	Text Only	Text Numerical	Graph Only
Perceived Difficulty	2.05 (0.83)	2.06 (0.84)	2.01 (0.81)

Table 7.3: *Means (SDs) of Accuracy (in %) and Confidence.*

	Text Only	Text Numerical	Graph Only
Accuracy	83.39 (18.96)	83.59 (17.55)	81.66 (16.67)
Confidence	80.19 (17.40)	80.13 (17.07)	79.91 (16.94)

There was no effect of presentation format on confidence, $F(2,\ 180) = 0.144$, $p > .05$; accuracy, $F(2,\ 180) = 1.014$, $p > .05$; or difficulty, $F(2,\ 180) = 1.004$, $p > .05$.

7.5 Discussion

There was a large significant negative correlation between difficulty and confidence, thus supporting hypothesis 1a. Difficulty and accuracy showed a moderate significant, negative correlation, which supported hypothesis 1b.

When looking at the data set limited to desirable answers, there was no significant effect of presentation format on confidence, accuracy or difficulty and no support for hypotheses 2a, 2b, and 2c.

The results are not consistent with Carey and White (1991), Sanfey and Hastie (1998), or Miron-Shatz et al.'s (2009) conclusion that presentation format affects accuracy. However, this may be due to the overall high levels of accuracy and the resulting low levels of overall difficulty as discussed above.

Regarding the absence of an observable effect of difficulty it could be argued that the difficulty levels of the questions were not heterogeneous enough to elicit heterogeneous performances. In fact, with the possible difficulty scores ranging from 1 = *Very Easy* to 6 = *Very Difficult*, a mean difficulty score of 2.04 ($SD = .81$) after excluding the undesirable options indicates there may have been a floor effect of difficulty; this would also be supported by a skewness value of 1.509 and kurtosis at 4.053, indicating the distribution was skewed. From these considerations, it emerges that for a future study the difficulty of questions used should be calibrated. This could be done by conducting a pretest with a larger sample of more varied questions and then selecting questions in such a way that a normal distribution of difficulty is approximated.

The current study's observation that presentation format did not appear to affect participants' confidence is inconsistent with how participants evaluated the individual formats in the previous study. In Study 5, the graphical format was rated as providing significantly more confidence than the text only format; it was also rated mentioned significantly more often as preferred format than either of the two other formats. Postulating a ceiling affect of accuracy would be further supporting the notion that the failure to observe an effect of presentation format was likely due to the experimental design rather than a genuine absence of effect.

Chapter 8

Discussion

This chapter starts with Section 8.1 summarising the current studies' findings. Section 8.2 gives an overview on participants' perception as observed in this thesis, while Sections 8.3 and 8.4 examines how the findings relate to antecedents and consequences of perception. Section 8.5 discusses the implications of the current findings for the Elaboration Likelihood Model, while Section 8.6 summarises the identified experimental limitations and suggests improvements to the experimental design. The chapter ends with Section 8.7 providing a brief conclusion and an outlook on future research.

8.1 Summary

The literature review in Chapter 1 established that varying the type of presentation format can affect, for example, processing speed, comprehension or accuracy, and there is plausible evidence to suggest it affects risk perception and behavioural intent, but inconclusive findings as to whether recall is affected. At the same time, presentation formats had previously been perceived to significantly differ in terms such as, for example, appearing realistic, being informative, appropriate, reliable, credible or impressive. In studies where participants' preferences had been elicited, these did not necessarily correspond to the presentation formats most beneficial to actual task performance. Lastly, the literature review established a plausible relationship between the presentation of information and and attitude in the framework of the Elaboration Likelihood Model (ELM), such that attitude or attitude certainty could be influenced by presenting attitude-relevant information. In addition, recent research (e.g. Barden & Petty, 2008) suggested that a perceived difference in processing is sufficient to influence attitude strength and certainty.

Study 1, as described in Chapter 2, was designed to examine whether the use of different presentation formats would be associated with different levels of perceived processing and in turn lead to differences in participants' attitudes or attitude certainty as the ELM would suggest. Because the literature review had revealed that participants' perceptions as expressed by their preferences tended to not accurately reflect their actual performance and as such self-perceived processing did not appear to be a reliable indicator, the study also measured actual processing. Lastly, in response to the weaknesses in understanding and handling numerical information as documented in the literature review the study assessed participants' numeracy as a gauge of their numerical abilities to examine its impact on the relationship between depth of processing and attitude.

Although depth of perceived processing correlated positively with attitude certainty, no effect was found of presentation format on actual or perceived processing. Numeracy was not observed to be associated with either actual or perceived processing. The discussion noted that in this study attitude was measured as a single, static measurement which suggested that a subsequent look at attitude over time may be more appropriate.

Study 2, as described in Chapter 3, aimed to test whether participants were (incorrectly) perceiving greater change in attitude or attitude strength when being presented with specific formats; a question the answer to which would potentially further contribute to putting the findings of Study 1 into context. Participants were presented with a pre-test attitude questionnaire towards mandatory MMR vaccinations and either received the same questionnaire a second time, or additional information arguing the merits of mandatory

MMR-vaccinations in one of three formats before attitude was elicited again. In addition they were asked to recall their initial pre-test attitude (retrospective attitude). It was expected that the comparison between participants' pre-testing attitude, their current attitude, and the pre-test attitude as recalled during the main testing session would allow identification of any distortions occurring during the process of recall and so allow a comparison between perceived and actual attitude change. Participants were also asked to evaluate the format they had been presented with. Participants' attitude was more positive at the second point of testing, but not influenced by the type of format they had been presented with. They recalled their original attitude as more positive than it had been, displaying a retrospective bias that was expected. However, this retrospective bias towards a more positive attitude was shared by all participants across all presentation formats, and by participants in the control group who had not received any information material at all. Thus it had to be assumed that it was the mere act of eliciting the attitude again which prompted the attitude improvement, presumably by exposing participants to the attitude object again. Such an effect of repetition has previously been demonstrated, for example, by Haugtvedt, Schumann, Schneier and Warren (1994). Lastly, when participants were asked to indicate how 'informative' each format was, there was no significant difference between the three formats' evaluation.

Studies 1 and 2 examined participants' perception of their own response, either in terms of perceived processing, or in terms of attitude and perceived attitude change. Study 3 as described in Chapter 4 expanded on the notion of comparing *perceived* versus *actual* processing (here defined in a broader sense). The study aimed to examine to what extent presentation format affected attitude and attitude certainty; additionally it was examined to what participants were able to assess their own and other participants' recall based on different presentation formats. Every participant was presented with information in only one format and recall was assessed immediately after the first presentation as well as 2, 12 or 20 days later for their own attitude, attitude certainty and recall, and an estimate of other participants' recall for each of the formats. No differences were found in recall rates across different presentation format conditions. Neither attitude nor attitude certainty were observed to be substantially affected but across all conditions participants tended to overestimate actual recall and expected the highest absolute recall from participants presented with the graphical format. Participants also estimated the text format to have the lowest recall. However, estimates were at least partially influenced by the format participants themselves were allocated to, which suggested that participants were overestimating the extent to which the graphical format would aid recall, and underestimating the impact to which the text only format would aid recall.

Results of Study 3 opened two avenues of further exploration: To what extent did the systematic differences in estimates reflect participants perceiving others to process the information substantially differently, and to what extent did it reflect participants themselves perceiving the formats to be substantially different.

Study 4, described in Chapter 5, aimed to provide insight to the first part of that question, exploring the possibility that participants' marked differences in the perception of different formats' impact on rates of recall might stem, at least partly, from a more general bias based on the concept of social comparison. The experiment was designed to compare participants' perception of the effectiveness of statistics when persuading someone else to when being persuaded themselves. Study 4 made use of a number of different scenarios presented to explore their impact on the perception of formats and assessed perceived importance of the individual scenario. The study also measured participants' Need for Cognition (NfC), because it appeared plausible that NfC as a personality trait would be relevant to participants' reception and perception of numerical information. Results suggested that statistical information was perceived to be more persuasive when the outcome of the decision was considered to be more important. Surprisingly, NfC did not affect any of the dependent measures. For half of the scenarios presented participants did consider themselves to be less easily persuaded than other people, which could be considered indicative of, or at least consistent with, a better-than-average effect, assuming that being easily persuaded is considered undesirable. However, the distribution of an equal number of significant and non-significant differences required to also consider the possibility that this result was due to chance. In an effort to determine whether this was due do a systematic factor or to error, a factor analysis was conducted and identified three consistent factors referring to scenarios involving socially desirable behaviour, consumer decision-making, and political involvement. These factors could not account for the split in scenarios where effectiveness was considered to be significantly different, and those where it was not.

Study 5, described in Chapter 6, addressed the second question raised in the discussion of Study 3, namely to what extent the difference in recall estimates was reflective of a fundamental difference in how presentation formats were perceived. To account for potential differences in educational background, the study recruited participants from different degrees and examined whether these groups would differ significantly in their evaluations. Although the two groups did not differ significantly in how they rated the different formats, the study was able to observe participants perceiving presentation formats to be significantly different from each other. These differences predominantly manifested themselves between the Graph Only and the Text Only format. Overall, participants preferred the Graphs Only format, which was also perceived to be superior to the Text Only format in terms of being objective, helpful, trustworthy, and giving confidence to make the right decision. No such consistent difference was found between the Text Numerical format and either of the two other formats.

Lastly, Study 6, described in Chapter 7, aimed to complement Study 5's findings on perception by examining whether employing the same formats that were perceived as significantly different would correspond to significant differences in participants' task confidence and task performance (here measured through accuracy). Participants were asked to complete a number of problem-solving tasks based on information presented in either text, text with numbers, or graphs only format. They were also asked to rate both the perceived difficulty of the tasks as well as the desirability of the criteria used in creating the scenarios so both could be controlled as potential covariates. Study 6 similarly compared students with and without a background in Psychology and the associated different levels of knowledge in research methods and statistics. In contrast to the initial hypothesis, participants' background did not affect any of the dependent measures.

Measurements of perceived difficulty further suggested that a ceiling effect of accuracy could have occurred, allowing for the possibility of difficulty potentially obscuring any effect of presentation format. This strongly suggests that assessing perceived difficulty and controlling it as a covariate was not sufficient and, at least in the context of the type of task used in Study 6, it would have been more appropriate to actively manipulate the degree of task difficulty, either by conducting pilot studies with a larger pool of tasks to determine levels of difficulty, or by introducing conditions of high cognitive load.

8.2 Exploring Perception of Presentation Formats

Table 8.1 below gives an overview to what extent the different formats were perceived to be different or equivalent regarding the evaluation criteria used (as a caveat it should be noted that evaluations – except for Study 2 – are based on a comparison where the graphical format did not contain extra text information which may have overemphasised the difference between the three formats.):

Table 8.1: *Overview of Evaluations and Preferences Across All Studies*

Criterion	Study	Formats		
'Reliable'	Study 5: Evaluation	G_a	N_a	T_b
	Study 5: Preferences	G_a	N_a	T_b
'Confidence'	Study 5: Evaluation	G_a	N_a	T_b
	Study 5: Preferences	G_a	N_b	T_c
'Helpful'	Study 5: Evaluation	G_a	N_b	T_c
	Study 5: Preferences	G_a	N_b	T_c
'Trustworthy'	Study 5: Evaluation	G_a	N_a	T_b
	Study 5: Preferences	G_a	N_b	T_c
'Objective'	Study 5: Evaluation	G_a	N_a	T_b
	Study 5: Preferences	G_a	N_a	T_b
'Understanding'	Study 2: Evaluation	G_a	N_a	T_a
	Study 5: Evaluation	G_a	N_b	T_b
	Study 5: Preferences	G_a	N_b	T_b
'Informative'	Study 2: Evaluation	G_a	N_a	T_a
'Pleasant to read'	Study 2: Evaluation	G_a	N_a	T_a
'Overall'	Study 5: Preferences	G_a	N_b	T_b

Notes: G = *Graph Only* format in Study 5, and *Text Graphical* format in Study 2; N = *Text Numerical*; T = *Text Only.* Letters sharing a subscript are not significantly different.

The data suggests that criteria such as *reliable* and *objective* seem to be particularly useful to differentiate the graphical and numerical format from the text format, that is, the text format is perceived to be substantially less reliable and objective than either the graphical or the numerical format. The graphical format is also perceived to be significantly *easier to understand* than both the numerical or text format in Study 5 although no significant difference was found in Study 2. Furthermore, all three formats are perceived to be significantly different in terms of being *helpful*. The same holds for 'trustworthy' and *giving confidence* though only in terms of preferences not mentions.

Interestingly, the criteria *informative* and *pleasant to read* do not seem to differentiate between the three formats as no difference has been observed; however, it should be noted that these evaluations were made in the context of Study 2 where no difference was observed for the *easy to understand* criterion either – a criterion that in Study 5 served to differentiate the text format from the other two formats. While the evaluation task in Study 5 referred to material employed in the context of problem-solving tasks, Study 2 only elicited attitude before and after presenting information to participants; hence, it may be the nature of the tasks that led to the different types of responses for those three criteria: In the context of a problem-solving task, the extent to which a particular format presents the information in an easily understandable way is arguably more important than in the context of participants being asked to give their opinion on a particular issue. This may also explain why the criteria 'informative' and 'pleasant to read' did not differentiate between the three formats used as these formats may not be (sufficiently) relevant in said context of attitude elicitation.

This suggests that the numbers and figures used in the numerical and graphical format convey a sense of reliability and objectivity. This increased sense of reliability and objectivity would also provide a plausible reason for those formats to be perceived as being more helpful and giving more confidence. On the other hand, these perceptions may be a different expression of the text format being perceived as less easy to understand. A format where information is comparably more difficult to understand and extract could conceivably be seen as a format more suitable for presenting information in a biased and subjective way. This interpretation is also consistent with the graphical format seen as presenting information in a clearer manner; and it would be true both for a purely graphical presentation where the content is immediately visible as a whole, or as text information supplemented with graphical information, where the graphical information provides an additional representation of the relevant information.

It is worth noting that in the current studies evaluations of preferences were predominantly elicited based on set criteria such as, for example, *reliability*, *objectiveness*, being *helpful* or being *trustworthy*. However, these criteria mostly refer to cognition-based criteria – although it may be argued that *helpful* and *trustworthy* could be considered affect-based to an extent, too – and as such could lead to mostly cognition-based preferences. When participants in Study 2 were asked similar questions concerning how informative the material was, or how easy to understand, there was only one conceivably affect-based question, asking to what extent the format was pleasant to read. While in the current research the answers consistently pointed towards the graphical format, the possibility should be considered that the preferences assessed here had been heavily biased towards cognition based preferences, and that if more or only affect-based questions had been presented, different preferences may have been expressed. Future research could address this, for example by replicating the studies described here but expanding on the elicitation of affect-based preferences, or by varying the task and content of the scenarios to be more relevant to affect.

8.3 Antecedents of Perception

Having explored the perception of formats in the preceding section, the current section discusses a series of factors which were examined as potential antecedents, beginning with individual differences in Section 8.3.1, moving to the importance of the presented information in Section 8.3.2 and concluding with a look at the use of different scenarios in Section 8.3.3.

8.3.1 Individual Differences

The factors relating to the individual participant that were examined in the present research – numeracy in the study described in Chapter 2, Need for Cognition in the study described in Chapter 5, background (degree subject) in the study described in Chapter 6 – could not be shown to influence the dependent measures or interact with the type of presentation format participants faced. However, it seems implausible that these individual factors are completely irrelevant to the processing of numerical information. Numeracy, for example, was identified by Reyna, Nelson, Han and Dieckmann (2009) as an influential factor in risk comprehension and decision-making, affecting the extent to which participants were susceptible to information presented as either percentages or frequencies; while Need for Cognition has been shown to affect message evaluation and recall (e.g. Cacioppo & Morris, 1983). It seems more likely that these individual differences may not have been relevant for the type of tasks employed in the studies, particularly against the background of a possible ceiling effect of difficulty in the study described in Chapter 2. On the other hand, Hoffrage, Lindsey, Hertwig and Gigerenzer (2000) did demonstrate that even trained participants (law professionals and law students) struggled with correctly interpreting statistical problems relating to a court case, and Lipkus, Samsa and Rimer (2001) observed low overall numeracy levels even with highly educated samples. This could mean that it is difficult to elicit strong enough levels of difference between any two participant samples, simply because overall levels of numeracy are low. It has been demonstrated (e.g. Holbrook et al., 2005) that people tend to selectively seek exposure to attitude-relevant information. It is worth considering that outside an experimental setting – that is, in a natural, non-laboratory environment – these individual variables contribute earlier on in the attitude formation process. For example, they could be influencing the extent to which information is sought out and attended to, rather than how the content is processed. However, it could also be argued that Need for Cognition and numeracy do play a role at the time of processing and understanding the information but that conditions of high cognitive load are required to observe an effect. According to Kruger (1999) a better-than-average effect usually implies that the relevant skills are perceived to be high domain skills, that is, a domain in which many people can achieve high proficiency. The study described in Chapter 5 concluded that the findings were consistent with participants having displayed a better-than-average effect such that they considered themselves to be less susceptible to persuasion than they considered others to be. This would indicate (or, at the least, is consistent with the idea) that resisting persuasive attempts is perceived to be a high domain skill. Yet when participants' numeracy skills were assessed in the study described in Chapter 2, participants' low overall numeracy scores confirmed previous findings (e.g. Lipkus et al., 2001) that absolute numeracy skills are low, even in highly educated samples. This is in line with the current understanding of our ability to understand and process numerical information as described in more detail in Section 1.5.2 in the literature review in Chapter 1. Following this line of reasoning, the understanding of numerical information arguably is a low-domain skill, whereas the existence of a better-than-average effect suggests it is perceived to be a high domain skill. However, our poor understanding of numerical information also extends to poor meta-knowledge such that we are unaware of the limits of our understanding, which may go some way in resolving this apparent contradiction (see also Ehrlinger, Johnson, Banner, Dunning, & Kruger, 2008).

8.3.2 Importance of Information

When examining participants' perception of the importance of their own answer, no correlation was found with either depth of processing or any of the dependent attitude measures. However, since the manipulation of importance was unsuccessful and failed to create conditions of high / low involvement, the study was unable to replicate the framework of Chaiken and Maheswaran's (1994) or Sengupta, Goodstein and Boninger's (1997) studies which found participants to be receptive to source cues (relatedness, and credibility and argument quality, respectively) when level of involvement was manipulated.

Yet in Study 4, effectiveness of statistics was perceived to be higher for issues considered more important which suggests that importance may well be a relevant antecedent for the perception of information, for example in attending to relevant material more readily or processing the information more thoroughly. Looking at the properties associated more strongly with the graphical and numerical format, such as 'reliable', 'trustworthy' and 'objective', it could be argued that participants' demonstrated expectation of increased effectiveness of statistics is based on a desire to create the impression that important decisions are made on more reliable, informative, objective information. As such, it is plausible that participants' answers displayed a social desirability bias rather than reflecting on their past behaviour.

8.3.3 Scenario

The factor analysis in Study 4 identified three factors that appeared to influence participants judgements of effectiveness of statistics in persuasion (both themselves and others) and their assessments of the scenarios' importance. These three factors described scenarios that related to socially desirable behaviour, consumer decision-making behaviour, and expressions of political affinity or activism. Although these factors were unable to account for the observed pattern of significant / non-significant differences, the high loadings and consistent clustering of scenarios nevertheless suggests that these three factors underlie participants' perceptions to some extent. As such, the question to what extent scenarios influence the perception of presentation formats, may be directly linked to the question of importance, which suggests a methodology where importance is manipulated independently of scenario.

8.4 Consequences of Perception of Presentation Formats

Several studies examined whether and to what extent participants' perception was associated with participants' task performance as measured in terms of recall, accuracy or attitudes. Sections 8.4.1, 8.4.2 and 8.4.3 discuss these aspects as potential consequences of perception.

8.4.1 Attitude

Although depth of perceived processing correlated positively with attitude certainty, no effect was found of presentation format on actual or perceived processing, which did not provide support to the findings of Viswanathan and Narayanan (1994), Viswanathan and Childers (1996), and Childers and Viswanathan (2000), who found that processing speed did vary depending on what presentation format was presented to participants. In addition, Shen and Hue (2007) demonstrated that numerical and verbal information were processed using different rules to consolidate new information. Eagly (1974) also emphasised that the extent to which information is easy or difficult to understand is a particularly important factor regarding its impact on attitude. When eliciting participants' assessments of the presentation forms regarding ease of understanding, Study 2 found no difference between the three formats, and Study 5 found a significant difference between the graphical format and the other two format. This somewhat inconclusive pattern is consistent with Eagly's observation – if participants did not perceive a substantial difference in the different formats' ease of understanding, a lack of difference in the resulting attitude is plausible.

8.4.2 (Perceived) Difficulty and Accuracy

At a first glance, the lack of effect on accuracy appears to be in contrast to previous research, where the choice of presentation format consistently affected participants' accuracy (e.g. Carey & White, 1991; Childers & Viswanathan, 2000; Feldman-Stewart et al., 2000; Sanfey & Hastie, 1998; Severtson & Henriques, 2009; Viswanathan & Childers, 1996); however, the direction of the effect of accuracy has been less than consistent, with accuracy higher in the graphical than the numerical format (Carey & White, 1991); higher in the numerical format than in the graphical format (Viswanathan & Childers, 1996); text format leading to higher accuracy than numerical or graphical format (Sanfey & Hastie, 1998); accuracy higher with bar graphs for choice tasks, but higher with numerical information for estimate tasks (Feldman-Stewart et al., 2000); or higher with text plus graphical than with text alone (Waters et al., 2006). The failure to observe an effect could also plausibly be due to experimental limitations; these are discussed in more detail in Section 8.6.

8.4.3 Recall

Previous research (e.g. Childers & Viswanathan, 2000; Viswanathan & Childers, 1996) has observed an effect of presentation format on recall such that numerical information led to higher recall than verbal information. Study 2 was unable to offer support to this, or to Hawley et al. (2008) who suggested that presenting information in a table would best support recall of verbatim knowledge, whereas pie charts would best recall gist knowledge (for more detail see the discussion of Hawley et al.'s study on page 7). It seems plausible that an association between format and type of knowledge conveyed through the format should have resulted in a noticeable difference in either correct or incorrect recall between the presentation formats used.

The findings of Study 3 are more consistent with Prangsma et al. (2009) who concluded that presentation format did not affect recall even though participants expected the text format to lead to lower recall than the graphical (i.e., *concrete vsiualised*, *abstract visualised*, or *combined*). Linking back to the processing and understanding of numerical information as it had been discussed in the literature review, this does not seem surprising, as other studies (e.g. Feldman-Stewart et al., 2000; Miron-Shatz et al., 2009; Vahabi, 2010; Waters et al., 2006) have similarly observed that participants were unable to identify which, if any, format did improve their performance, and that their preferences did not align with their performances. As such, this inability to accurately assess our own performance is not limited to the processing of numerical information – see Ehrlinger, Johnson, Banner, Dunning and Kruger (2008) for a particularly compelling account of our limitations to accurately identify the extent of our proficiencies for many skills. However, while the results of Study 3 seem to offer support for Prangsma et al. in that participants estimated different levels of recall but did not display different levels of recall, it is doubtful to what extent the findings of Study 3 can be considered to be in support of Waters et al. or Miron-Shatz et al. The latter were able to observe a significant difference in performance but not in perception, whereas the current research was able to observe a significant difference in perception but not performance; but just as Miron-Shatz's finding does not rule out an existing difference in perception, the current research cannot positively exclude a difference in performance.

8.5 Elaboration Likelihood Model

The literature review introduced the Elaboration Likelihood Model as a plausible framework for the examination of the perception of presentation formats and their antecedents and consequences. In the research described in this thesis, participants were observed to perceive the formats in significantly different ways but no difference in attitude or attitude certainty could be observed, which would suggest that the information was processed in a similar or equivalent way across the different formats, a conclusion that would be consistent with the findings of the study described in Chapter 2, which could not elicit significant differences in either perceived or actual processing. However, in the context of the ELM (e.g. Petty & Cacioppo, 1986, for a more extensive review see Section 1.6.3, starting on page 38) this would suggest that information was processed via the elaborate rather than the peripheral route, in other words, that participants attended more carefully to the information rather than the format. As the experimental tasks were designed to convey equivalent information across the different formats, elaborate processing in the form of attending to the information rather than the format would not yield any differences in participants' performances. This would be in line with participant responses in Study 2, which indicated that participants tended to think a lot about the presented information, and emphasises the need to repeat parts of the previous studies with a greater variation in and higher overall levels of difficulty, as this could conceivably increase the likelihood of the information being processed via different processing routes.

Within the ELM, one of the cues that could potentially influence whether information is processed via the peripheral or elaborate route, is the cue of *information source*. It is thus worth considering whether there may have been an overriding cue of information source that could have obscured any individual cues provided by the formats. Information source was not manipulated or varied between conditions, so if the information provided a distinct source cue this cue would have been consistent across all conditions. However, while the source was not varied within a study, the type of information provided was very different between studies – ranging from information from non-attributed health-related information in the study described in Chapter 3 to information from alleged academic sources in the studies described in Chapters 4 to non-attributed sources for neutral problem-solving tasks in the studies described in Chapter 7 – and it is unlikely that in each of the studies the same overriding source cue had been at work, leading to the same result.

8.6 Experimental Limitations

Each study was followed by a discussion of how the study design could had been improved, and wherever appropriate, these improvements have been implemented in subsequent studies. The following sections summarise and discuss possible design improvements, regarding experimental tasks (Section 8.6.1), sampling (Section 8.6.2), and material (Section 8.6.3) and then discuss the issues of self-report reliability (Section 8.6.4), and overall ecological validity (Section 8.6.5).

8.6.1 Experimental Tasks

As previously discussed, results in Study 6 suggested a ceiling effect of accuracy. Similarly, while different tasks were used in the study described in Chapter 4, the discussion raised the possibility that the lack of time restrictions may have led to a lack of differentiation in quantity and quality of recall across the three format conditions. This suggests that difficulty as an influential factor should not yet be ruled out. To effectively control for difficulty in experiments attempting to replicate Study 6, more pilot studies should be conducted to allow the development of new testing material specifically designed and graded for difficulty. In line with previous research, the current thesis has represented the graphical format by the most commonly used types such as bar charts, pie charts, etc. A more diverse selection of graphical representations, combined with a more accurate pre-testing measurement of time needed to perform adequately would allow the use of appropriate time limits to accentuate any possible interactions of presentation format and task difficulty for a wider range of formats.

The material used in the studies described in Studies 1 and 3 appeared to be only moderately effective as testing material. While the same set of material is still being used in current research (e.g. Barden & Petty, 2008), comments from participants indicated that it had been perceived as one-sided and not engaging. The lack of counter-arguments also may have obscured any effects on recall, as it made it easier for participants to recall the (pro-comprehensive exam) gist of the message and develop appropriate arguments from the gist rather than recalling individual arguments. Again, pilot studies would allow the creation of a set of more balanced arguments which may enhance possible differences in recall.

8.6.2 Samples

Although the majority of studies was admittedly conducted with Psychology undergraduates, the participant sample in the study described in Chapter 4 in particular was much more heterogeneous, yet did not provide markedly different results. Evidently the validity of the current findings could be further improved by recruiting a wider variety of participants in terms of age and educational background, and with a more balanced gender distribution. However, at this point it seems unlikely that this would provide substantially different findings from the previous studies, and there is no suggestion in the literature that age or gender may be a factor. If a more heterogeneous sample were used, it would also be useful to again measure numeracy or a similar factor to account for potential differences in the perception and understanding of numerical information.

8.6.3 Information Content: A Potential Confound?

As described in Chapter 1, it has been argued (e.g. Allen & Preiss, 1997; Slater & Rouner, 1996) that in day-to-day encounters with numerical and statistical information, different presentation formats often display an inherent difference in the amount of information contained such that anecdotes usually describe only a small number of individual cases, whereas statistics are usually understood as a summary of a considerably larger number of cases. Whilst an effort was made in preparing the testing materials that the information contained was equivalent, this observation could nevertheless at least partially account for the perception of numerical and, possibly by extension, graphical information as more beneficial than textual information alone. Although perceptive participants in Study 5 could have noticed that all formats contained the same information, it is unlikely that participants subjected the presented formats to that level of scrutiny. To examine whether participants relied on their personal experiences with the formats in general, or on the specific instances used in the experiments, future experiments could test this assumption by introducing amount of information as an additional variable. It would be worthwhile explicitly manipulating the information content to be reversed, that is, the text or anecdotal version to describe a larger number of cases than the numerical or graphical version, and to then elicit participants' assessments of the formats.

8.6.4 Self-Report Reliability

The current findings further confirm reservations expressed elsewhere (e.g. Prangsma et al., 2009; Waters et al., 2006) that participants appear to be incapable of accurately assessing their own performance, and the extent to which it is supported or impaired by specific presentation formats. This was particularly striking in Study 3, described in Chapter 4, where participants underestimated recall in the text version and overestimated recall in the graphical and numerical versions. While there was an effect of the format participants had been assigned to, the hierarchy of which format was estimated to lead to the highest and lowest recall was maintained across all conditions.

Participants' subjective judgements in terms of recall could indicate that there is little or no effective monitoring of participants' own performance, and could imply that attempts to elicit judgements result in participants activating heuristics such as the affect heuristic, and subsequently basing their response on which format is most pleasant to read. This emphasises the need to pair any subjective measure of preference or confidence with objective performance measures.

8.6.5 Ecological Validity

It may be the case that the academic context in which the studies were conducted has influenced the extent (or lack) of participants' involvement. With the exception of the study described in Chapter 4, participants were university students; of those, most were Psychology undergraduates and, as the study described in Chapter 3 would suggest, only moderately motivated to be involved and engaged in the study. Previous research (e.g. Freymuth & Ronan, 2004) describes a strong reliance on anecdotal evidence, particularly under conditions of uncertainty – as often found in the context of medical decision-making – and such a context may be more suitable to elicit differences in the use and handling of different presentation formats. This raises the question whether participants could have been motivated more strongly, for example, by using monetary incentives, creating increased personal involvement by referring to issues relevant to their interests, or extending the experimental task by participants having to publicly defend their decision in front of their peers.

8.7 Conclusion and Outlook

Results from this research are of potential relevance whenever numerical information is used, be it in the context of marketing, policy making or communicating health-related information. The findings suggest that participants perceive the graphical format to be more effective than formats containing only text, or text with additional numerical information although no concurrent effect on task performance, attitude or recall could be demonstrated as a consequence of this perception. Participants' perception appears to be influenced by the importance attached to the information and by the scenario within which an evaluation is required. There are plausible reasons to assume an element of 'feeling good' about the format the information is presented in, and it may well be an affect-based factor of this type rather than associated cognitive processes which determines the extent to which the information is considered to be persuasive.

The findings should also serve as an (unsurprising) reminder to not put too much trust in participants' self-reports when evaluating the effectiveness of information material. Findings suggest that subjective evaluations should always be supplemented by, and compared with, more objective performance measurements such as understanding, reading time, recall, or similar measures.

This thesis has focused on a quantitative approach to the research questions. However, individual perceptions could also be examined in greater detail by using an approach with more qualitative methods to supplement the current findings. This could take the form of eliciting individual perceptions and understandings of different presentation formats – i.e., individual 'definitions' – of concepts such as 'statistics', particularly in comparison to and relationship with terms such as 'numerical information', 'numbers', 'graphs' or even more broadly, 'information'. Participants could also be presented with more comprehensive tasks of evaluating presentation formats, with a stronger focus on eliciting affective reactions. This would provide more rounded and comprehensive insight into our experience of, and interaction with a wide range of presentation formats.

Appendix A: Chapter 2 Materials

Consent Form

Participant Consent Form

BACKGROUND INFORMATION

Title and researchers. The title of this research is *Perception of Arguments.* Our names are Daniela Rudloff and Dr Briony Pulford from the University of Leicester School of Psychology.

Reason for the research. We are studying participants' perception of arguments on the introduction of senior comprehensive exams for American undergraduate degrees, and we are collecting data from undergraduate students.

Details of participation. The research involves completing two questionnaires online, and a short exercise on paper. You will be first asked to complete a short questionnaire to assess general numeracy and then read some information about introducing senior comprehensive exams. You will then be asked to indicate your attitude about the exam topic. After having finished the online part, you will be asked to complete a short exercise on a sheet of paper. The session should take about 20 minutes. Please feel free to ask questions now if you have any.

CONSENT STATEMENT

I understand that my participation is voluntary and that I may withdraw from the research at any time, without giving any reason.

I am aware of what my participation will involve.

I understand that there are no risks involved in the participation of this study.

All questions that I have about the research have been satisfactorily answered.

I agree to participate.

Participant's signature: ___________________________________

Participant's name (please print): ___________________________________

Tick this box if you would like to receive a summary of the results by e-mail: [ ]

E-mail: _______________________________

Date: __________

Thought Listing Exercise

Thought listing exercise

Please write in your identifier here (this is purely so we can match your online data with your paper data, and not for any identification purposes): ____________________________

Below is the first of several boxes you can use to record your thoughts regarding the senior comprehensive exams issue. Simply write down the thoughts that come to mind without worrying about spelling or grammar. Please list all of the thoughts you have.

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Text Only **Condition**

The National Scholarship Achievement Board recently revealed the results of a five-year study conducted on the effectiveness of comprehensive exams at Duke University. The results of the study showed that since the comprehensive exam has been introduced at Duke, the grade point average of undergraduates has increased by a considerable amount. At comparable schools without the exams, grades increased only marginally over the same period. The prospect of a comprehensive exam clearly seems to be effective in challenging students to work harder and faculty to teach more effectively. It is likely that the benefits observed at Duke University could also be observed at other universities that adopt the exam policy.

Graduate schools and law and medical schools are beginning to show clear and significant preferences for students who received their undergraduate degrees from institutions with comprehensive exams. As the Dean of the Harvard Business School said: ‘Although Harvard has not and will not discriminate on the basis of race or sex, we do show a strong preference for applicants who have demonstrated their expertise in an area of study by passing a comprehensive exam at the undergraduate level.’ Admissions officers of law, medical, and graduate schools have also endorsed the comprehensive exam policy and indicated that students at schools without the exams would be at a significant disadvantage in the very near future. Thus, the institution of comprehensive exams will be an aid to those who seek admission to graduate and professional schools after graduation.

A member of the Board of Curators has stated publicly that alumni nationwide have refused to increase their contributions to the University because of what they feel are lax educational standards. In fact, the prestigious National Accrediting Board of Higher Education (NAB) has recently rejected the University’s application for membership citing lack of a comprehensive exam as a major reason. Accreditation by the NAB enhances a university’s reputation to graduate schools, employers, and demonstrates to alumni that the school is worth supporting. A recent survey of influential alumni in corporations and the state legislature has revealed that contributions would improve significantly if the exams were instituted. With increased alumni support, continued increases in tuition might be avoided.

A study conducted by the Educational Testing Service Princeton, New Jersey, revealed that most of the Ivy League schools and several of the Big 10 universities have senior comprehensive exams to maintain their academic excellence. Professors at those schools who were interviewed recently said that senior comprehensive exams assured that only high quality and knowledgeable students would be associated with the university. This, of course, increases the prestige of current students, alumni of the school, and the university as a whole. The exams should be instituted to increase the academic reputation of the university. A national educator's publication recently predicted that within the next 10 years, the top universities would have the exam policy, and the weaker ones would not.

An interesting and important feature of the comprehensive exam requirement is that it has led to significant improvement in the quality of undergraduate teaching in the schools where it has been tried. Data from the Educational Testing Service confirm that teachers and courses at the schools with comprehensive exams were rated more positively by students after the exams than before. The improvement in teaching effectiveness appears to be due to departments placing more emphasis on high quality and stimulating teaching because departments look bad when their majors do poorly on the exam. For example, at the University of Florida, student ratings of courses increased significantly after comprehensive exams were instituted.

One aspect of the comprehensive exam requirement that students at the schools where it has been tried seem to like is that all regular final examinations for seniors are typically eliminated. This elimination of final exams in all courses for seniors allows them to better integrate and think about the material in their major area just prior to graduation rather than 'wasting' a lot of time cramming to pass tests in courses in which they are really not interested. Students presently have to take too many courses in subjects that are irrelevant to their career plans. The comprehensive exam places somewhat greater emphasis on the student's major and allows greater concentration on the material that the student feels is most relevant.

Faculty members at universities with the comprehensive exams who were interviewed by researchers from the Carnegie Commission on Higher Education revealed that the comprehensive exams appeared to provide an incentive for students to study the material in their major area. A thorough study undertaken by the Department of Education at the University of Notre Dame showed that universities with comprehensive exams have resisted the national trend of declining scores on standardised achievement tests. Average scores on achievement tests for the universities with comprehensive exams have actually risen over the last five years.

Data from the University of Virginia, where comprehensive exams were recently instituted, indicate that the average starting salary of graduates increased significantly over the two-year period in which the exams were begun. At comparable universities without comprehensive exams, salaries increased marginally over the same period. As Saul Siegel, a vice-president of IBM put it in Business Week recently: 'We are much quicker to offer the large salaries and executive positions to these kids because by passing their area exam, they have proven to us that they have expertise in their area rather than being people who may or may not be dependable and reliable.' Another benefit is that universities with the exams attract larger and more well-known corporations to campus to recruit students for their open posi-tions. The end result is that students at schools with comprehensive exams have a 55% greater chance of landing a good job than students at schools without exams.

A study by the U.S. Department of Education revealed that universities with the comprehensive exam requirement average significantly more financial aid available to students than comparable universities without the exams. Richard Collings, Director of Financial Aid at the University of Southern California (USC) has written that since the comprehensive exam was instituted at USC five years ago, more individuals and corporations have been willing to donate money for student scholarships.

Text Numerical **Condition**

The National Scholarship Achievement Board recently revealed the results of a five-year study conducted on the effectiveness of comprehensive exams at Duke University. The results of the study showed that since the comprehensive exam has been introduced at Duke, the grade point average of undergraduates has increased by 31%. At comparable schools without the exams, grades increased by only 8% over the same period. The prospect of a comprehensive exam clearly seems to be effective in challenging students to work harder and faculty to teach more effectively. It is likely that the benefits observed at Duke University could also be observed at other universities that adopt the exam policy.

Graduate schools and law and medical schools are beginning to show clear and significant preferences for students who received their undergraduate degrees from institutions with comprehensive exams. As the Dean of the Harvard Business School said: "Although Harvard has not and will not discriminate on the basis of race or sex, we do show a strong prefer-ence for applicants who have demonstrated their expertise in an area of study by passing a comprehensive exam at the undergraduate level." Admissions officers of law, medical, and graduate schools have also endorsed the comprehensive exam policy, with 73% of admissions officers surveyed expressing a preference for students from institutions with comprehensive exams and indicating that students at schools without the exams would be at a significant disadvantage in the very near future. Thus, the institution of comprehensive exams will be an aid to those who seek admission to graduate and professional schools after graduation.

A member of the Board of Curators has stated publicly that alumni nationwide have refused to increase their contributions to the University because of what they feel are lax educational standards. In fact, the prestigious National Accrediting Board of Higher Education (NAB) has recently rejected the University's application for membership citing lack of a comprehensive exam as a major reason. Accreditation by the NAB enhances a university's reputation to graduate schools, employers, and demonstrates to alumni that the school is worth supporting. A recent survey of influential alumni in corporations and the state legislature has revealed that 60% of alumni expected contributions to improve significantly if the exams were instituted. With increased alumni support, continued increases in tuition might be avoided.

A study conducted by the Educational Testing Service Princeton, New Jersey, revealed that 90% of the Ivy League schools and seven out of the Big 10 universities have senior comprehensive exams to maintain their academic excellence. Professors at those schools who were interviewed recently said that senior comprehensive exams assured that only high quality and knowledgeable students would be associated with the university. This, of course, increases the prestige of current students, alumni of the school, and the university as a whole. The exams should be instituted to increase the academic reputation of the university. A national educator's publication recently predicted that within the next 10 years, the top universities would have the exam policy, and the weaker ones would not.

An interesting and important feature of the comprehensive exam requirement is that it has led to significant improvement in the quality of undergraduate teaching in the schools where it has been tried. Data from the Educational Testing Service confirm that with average approval ratings of 72%, teachers and courses at the schools with comprehensive exams were rated more positively by students after the exams than before, where average approval ratings of 53% were recorded. The improvement in teaching effectiveness appears to be due to departments placing more emphasis on high quality and stimulating teaching because departments look bad when their majors do poorly on the exam. For example, at the University of Florida, student ratings of courses increased significantly after comprehensive exams were instituted.

One aspect of the comprehensive exam requirement that students at the schools where it has been tried seem to like is that all regular final examinations for seniors are typically eliminated. This elimination of final exams in all courses for seniors allows them to better integrate and think about the material in their major area just prior to graduation rather than 'wasting' a lot of time cramming to pass tests in courses in which they are really not interested. Students presently have to take too many courses in subjects that are irrelevant to their career plans. Out of 3,500 students recently surveyed by the National Board of Education, the majority (78%) felt that the introduction of comprehensive allowed them to focus on their core subjects. The comprehensive exam places somewhat greater emphasis on the student's major and allows greater concentration on the material that the student feels is most relevant.

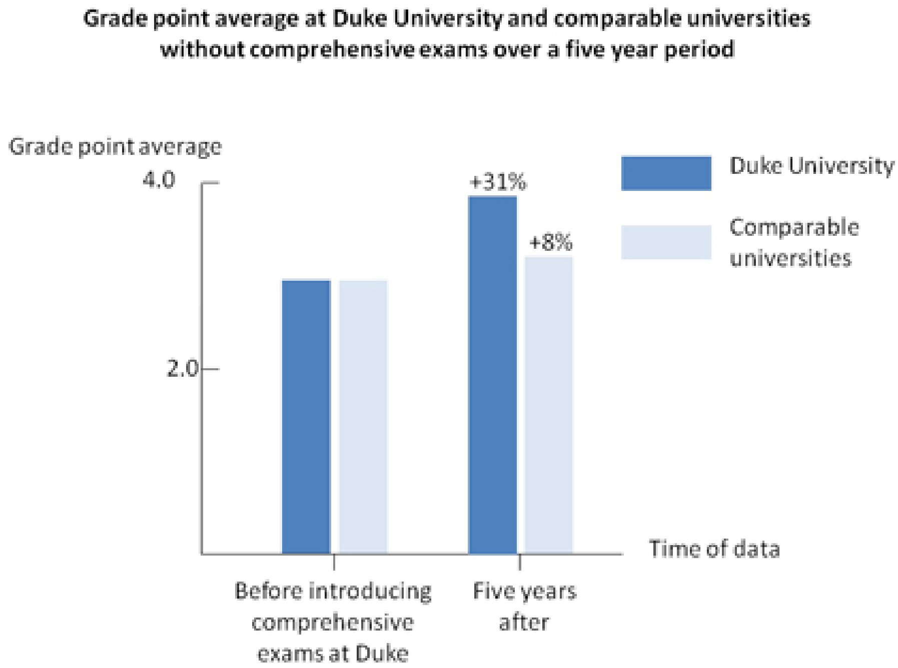
Faculty members at universities with the comprehensive exams who were interviewed by researchers from the Carnegie Commission on Higher Education revealed that the comprehensive exams appeared to provide an incentive for students to study the material in their major area. A thorough study undertaken by the Department of Education at the University of Notre Dame showed that universities with comprehensive exams have resisted the national trend of declining scores on standardised achievement tests. Average scores on achievement tests for the universities with comprehensive exams have actually risen by 7% over the last five years.

Data from the University of Virginia, where comprehensive exams were recently instituted, indicate that the average starting salary of graduates increased over $4,000 over the two-year period in which the exams were begun. At comparable universities without comprehensive exams, salaries increased only \$850 over the same period. As Saul Siegel, a vice-president of IBM put it in Business Week recently: “We are much quicker to offer the large salaries and executive positions to these kids because by passing their area exam, they have proven to us that they have expertise in their area rather than being people who may or may not be dependable and reliable.’ Another benefit is that universities with the exams attract larger and more well-known corporations to campus to recruit students for their open positions. The end result is that students at schools with comprehensive exams have a 55% greater chance of landing a good job than students at schools without exams.

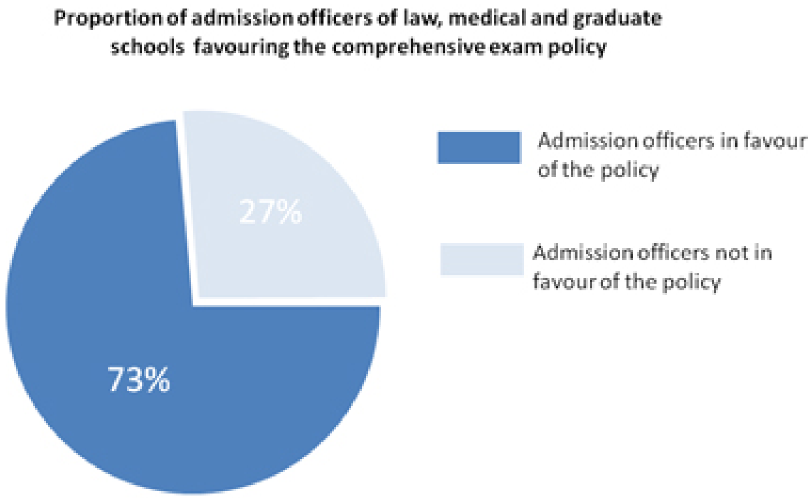
A study by the U.S. Department of Education revealed that universities with the comprehensive exam requirement average about 32% more financial aid available to students than comparable universities without the exams. Richard Collings, Director of Financial Aid at the University of Southern California (USC) has written that since the comprehensive exam was instituted at USC five years ago, more individuals and corporations have been willing to donate money for student scholarships.

Text Graphical **Condition**

The National Scholarship Achievement Board recently revealed the results of a five-year study conducted on the effectiveness of comprehensive exams at Duke University. The prospect of a comprehensive exam clearly seems to be effective

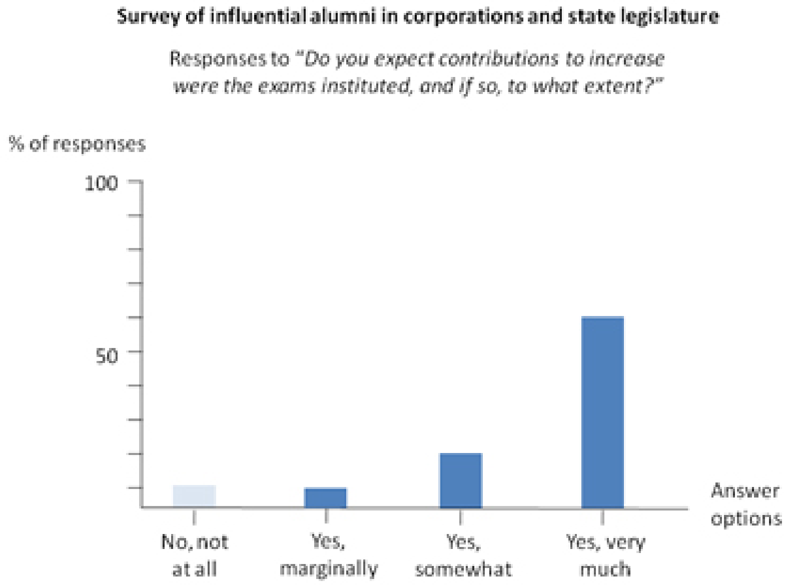


in challenging students to work harder and faculty to teach more effectively. It is likely that the benefits observed at Duke University could also be observed at other universities that adopt the exam policy.

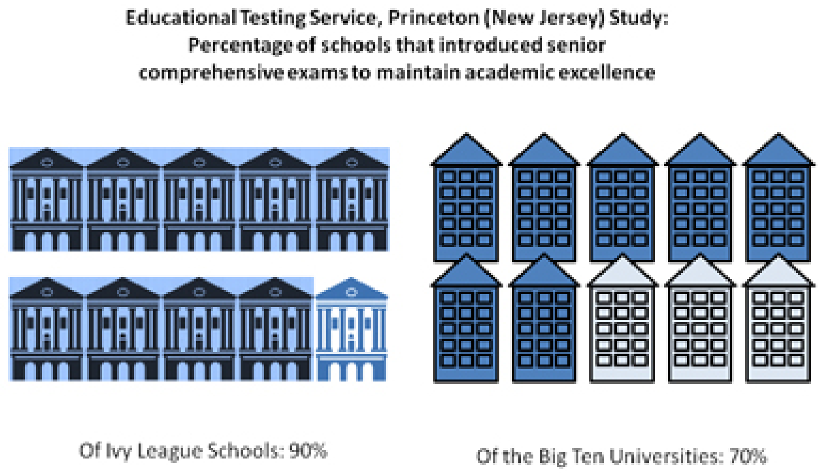


Graduate schools and law and medical schools are beginning to show clear and signifi-cant preferences for students who received their undergraduate degrees from institutions with comprehensive exams. As the Dean of the Harvard Business School said: 'Although Harvard has not and will not discriminate on the basis of race or sex, we do show a strong preference for applicants who have demonstrated their expertise in an area of study by passing a comprehensive exam at the undergraduate level.'

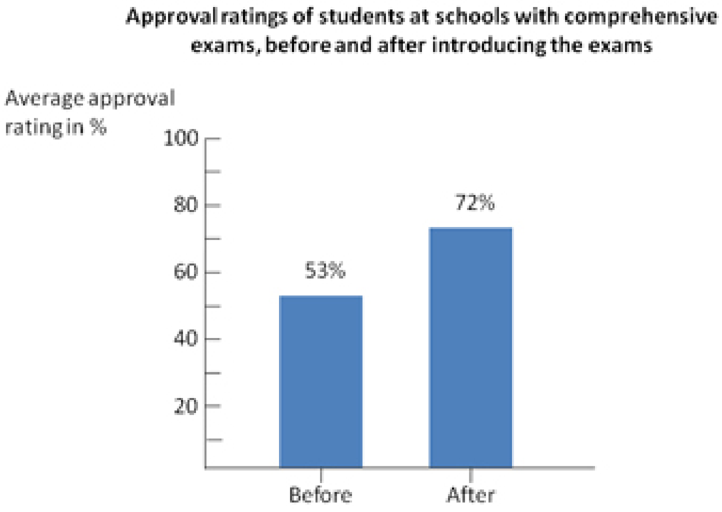
Results of this study indicate that students at schools without the exams would be at a significant disadvantage in the very near future. Thus, the institution of comprehensive exams will be an aid to those who seek admission to graduate and professional schools after graduation.



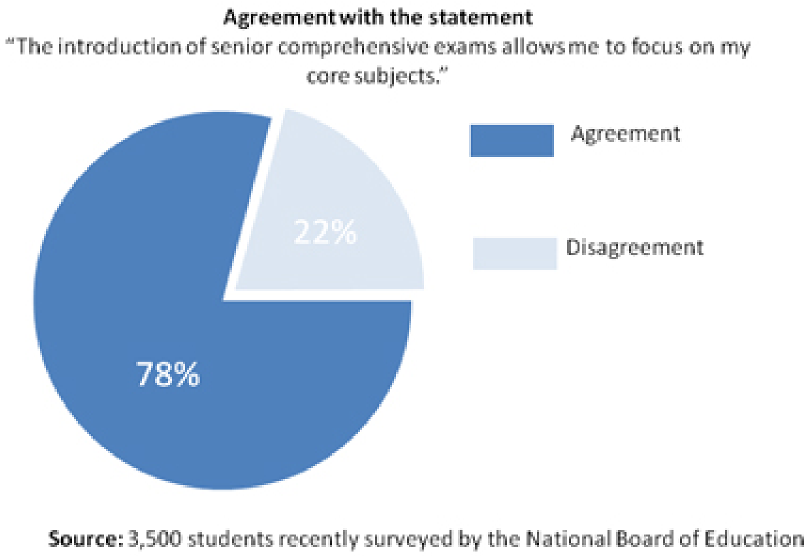
A member of the Board of Curators has stated publicly that alumni nationwide have refused to increase their contributions to the University because of what they feel are lax educational standards. In fact, the prestigious National Accrediting Board of Higher Education (NAB) has recently rejected the University's application for membership citing lack of a comprehensive exam as a major reason. Accreditation by the NAB enhances a university's reputation to graduate schools, employers, and demonstrates to alumni that the school is worth supporting. With increased alumni support, continued increases in tuition might be avoided.



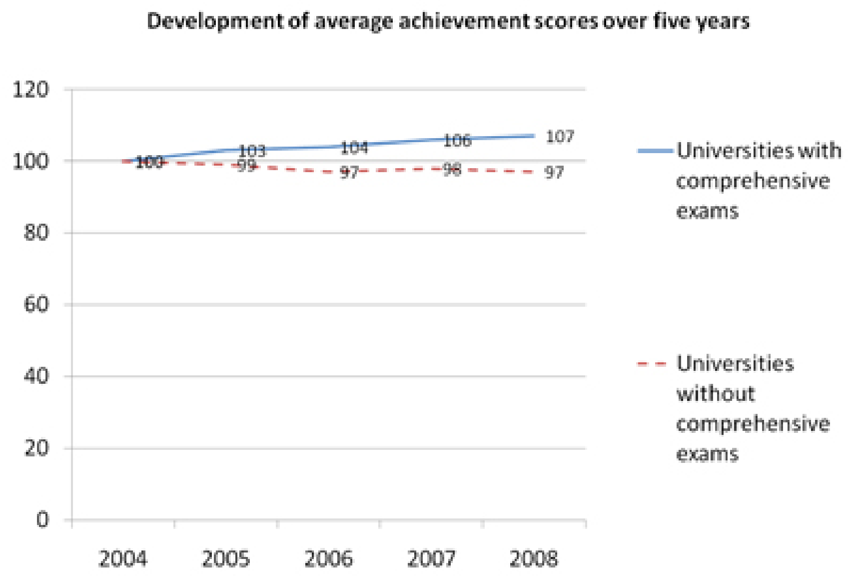
Professors at schools interviewed recently said that senior comprehensive exams assured that only high quality and knowledgeable students would be associated with the university. This, of course, increases the prestige of current students, alumni of the school, and the university as a whole. The exams should be instituted to increase the academic reputation of the university. A national educator's publication recently predicted that within the next 10 years, the top universities would have the exam policy, and the weaker ones would not.



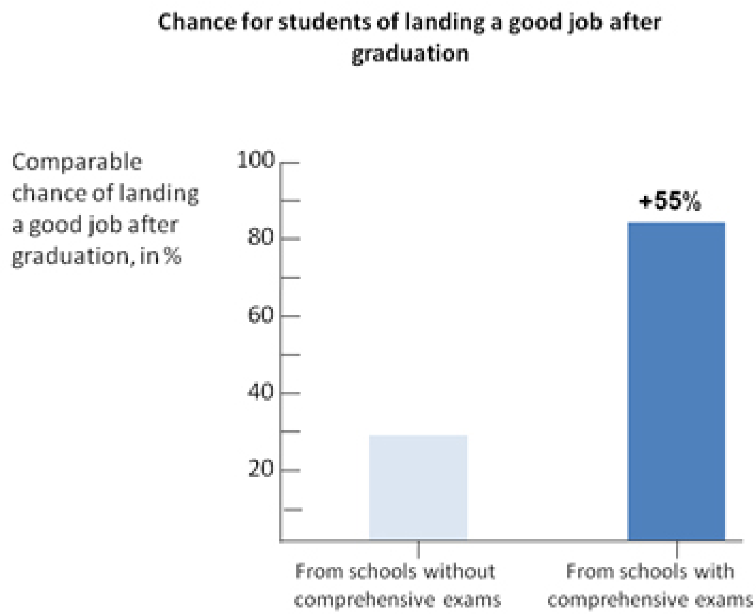
An interesting and important feature of the comprehensive exam requirement is that it has led to significant improvement in the quality of undergraduate teaching in the schools where it has been tried. The improvement in teaching effectiveness appears to be due to departments placing more emphasis on high quality and stimulating teaching because departments look bad when their majors do poorly on the exam. For example, at the University of Florida, student ratings of courses increased significantly after comprehensive exams were instituted.



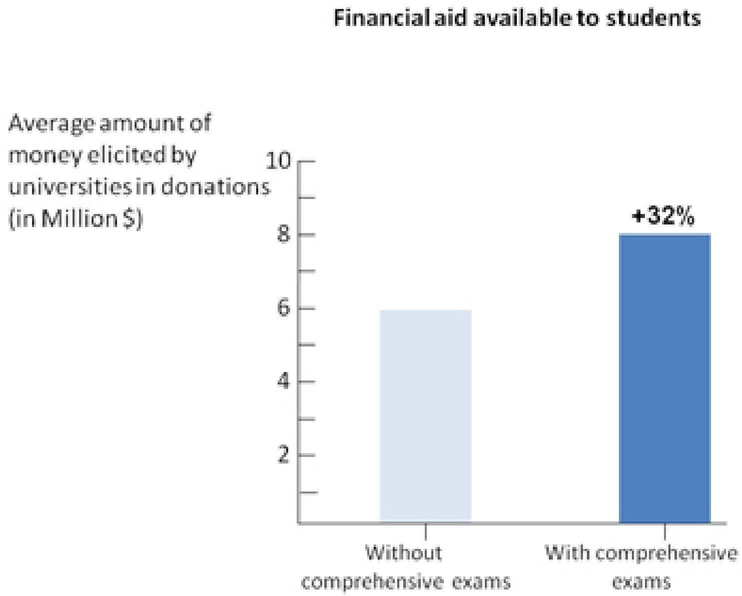
One aspect of the comprehensive exam requirement that students at the schools where it has been tried seem to like is that all regular final examinations for seniors are typically eliminated. This elimination of final exams in all courses for seniors allows them to better integrate and think about the material in their major area just prior to graduation rather than 'wasting' a lot of time cramming to pass tests in courses in which they are really not interested. Students presently have to take too many courses in subjects that are irrelevant to their career plans. The comprehensive exam places somewhat greater emphasis on the student's major and allows greater concentration on the material that the student feels is most relevant.



Faculty members at universities with the comprehensive exams who were interviewed by researchers from the Carnegie Commission on Higher Education revealed that the comprehensive exams appeared to provide an incentive for students to study the material in their major area. A thorough study undertaken by the Department of Education at the University of Notre Dame showed that universities with comprehensive exams have resisted the national trend of declining scores on standardised achievement tests.



Data from the University of Virginia, where comprehensive exams were recently insti-tuted, indicate that the average starting salary of graduates increased over $4,000 over the two-year period in which the exams were begun. At comparable universities without comprehensive exams, salaries increased only $850 over the same period. As Saul Siegel, a vice-president of IBM put it in Business Week recently: 'We are much quicker to offer the large salaries and executive positions to these kids because by passing their area exam, they have proven to us that they have expertise in their area rather than being people who may or may not be dependable and reliable.' Another benefit is that universities with the exams attract larger and more well-known corporations to campus to recruit students for their open positions.



Richard Collings, Director of Financial Aid at the University of Southern California (USC) has written that since the comprehensive exam was instituted at USC five years ago, more individuals and corporations have been willing to donate money for student scholarships.

Extended Text Condition

The National Scholarship Achievement Board recently revealed the results of a five-year study conducted on the effectiveness of comprehensive exams at Duke University be-tween 2002 and 2007. The results of the longitudinal study showed that since the comprehensive exam has been introduced at Duke in late 2002, the grade point average of undergraduates has increased by a considerable amount. At comparable schools without the exams, such as for example the University of Maryland, or the State University of Ohio, grades increased only marginally over the same period. The prospect of a comprehensive exam clearly seems to be effective in challenging students to focus more and work harder, and faculty to teach more effectively. It is quite likely that the numerous benefits observed at Duke University could also be observed at other universities that adopt the exam policy.

Graduate schools and law and medical schools are more and more beginning to show clear and significant preferences for students who received their undergraduate degrees from institutions that have implemented comprehensive exams. As the Dean of the Harvard Business School, Prof. Sean Lauder, said: ‘Although Harvard has not and will not discriminate on the basis of race, religion, or sex, we as a university do show a strong preference for applicants who have demonstrated their academic expertise in an area of study by passing a comprehensive exam at the undergraduate level.’ In addition, admissions officers of law, medical, and graduate schools have also increasingly endorsed the comprehensive exam policy and indicated that students at schools without the exams would be at a significant disadvantage in the very near future. Thus, the institution of comprehensive exams will be an aid to those students who seek admission to graduate and professional schools after their graduation.

A member of the Board of Curators, Dr John A Senter, has stated publicly that there is a growing trend where alumni nationwide refuse to increase their contributions to the University because of what they feel are lax educational standards as well as a lack of focus, resulting in the university's graduates being potentially disadvantaged. In fact, the prestigious National Accrediting Board of Higher Education (NAB) has recently rejected the University's application for membership citing lack of a comprehensive exam as a major reason. However, accreditation by the NAB enhances a university's reputation to graduate schools, employers, and demonstrates to alumni that the school is worth supporting. Consequently, a recent survey of influential alumni in corporations and the state legislature has revealed that contributions would improve significantly if the exams were instituted. With increased alumni support, continued increases in tuition might be avoided.

A study conducted by the Educational Testing Service Princeton, New Jersey, revealed that most of the Ivy League schools and several of the Big 10 universities have begun to implement senior comprehensive exams to maintain and further improve their academic excellence. Professors at those schools who were interviewed recently said that senior comprehensive exams assured that only high quality and knowledgeable students would be associated with the university. This, of course, increases the prestige not only of current students, alumni of the school, but also the university as a whole. Professors interviewed in the course of the study thus overwhelmingly approved of plans to institute the exams, in order to increase the academic reputation of the university. A national educator's publication recently predicted that within the next 10 years, the top universities would have the exam policy, and the weaker ones would not.

A particularly interesting and important feature of the comprehensive exam requirement is that it has led to noticeable, significant improvement in the quality of undergraduate teaching in the schools where it has been tried. Data from the Educational Testing Service confirm that teachers as well as courses at the schools with comprehensive exams were rated more positively by students after the exams than before. The improvement in teaching effec-tiveness appears to be due to departments placing more emphasis on high quality and stimulating teaching. Universities seem to be strongly motivated to improve their teaching after comprehensive exams have been implemented because departments are concerned about their reputation when their majors do poorly on the exam. For example, at the University of Florida, student ratings of courses increased significantly after comprehensive exams were instituted.

One aspect of the comprehensive exam requirement that students at the schools where it has been tried seem to like is that all regular final examinations for seniors are typically eliminated. This elimination of final exams in all courses for seniors allows them to better integrate and think about the material in their major area just prior to graduation rather than ‘wasting’ a lot of time cramming to pass tests in courses in which they are really not interested. Introducing the comprehensive exams facilitates a more holistic view of their subject area and promotes a greater understanding of the relationships between a number of topics. Students presently also complain about having to take too many courses in subjects that are irrelevant to their career plans. However, out of 3,500 students recently surveyed by the National Board of Education, the majority felt that the introduction of comprehensive exams allowed them to focus on their core subjects. The comprehensive exam thus places somewhat greater emphasis on the student’s major and allows greater concentration on the material that the student feels is most relevant.

Faculty members at universities with the comprehensive exams who were interviewed by researchers from the Carnegie Commission on Higher Education revealed that the comprehensive exams appeared to provide a strong incentive for students to invest more time and effort into studying the material in their major area. A thorough study undertaken by the Department of Education at the University of Notre Dame showed that universities with compre-hensive exams have successfully resisted the national trend of declining scores on standardised achievement tests. On the contrary, average scores on achievement tests for the universities with comprehensive exams have actually risen over the last five years, highlighting the benefits from the new form of revision.

Data from the University of Virginia, where comprehensive exams were recently instituted, indicate that the average starting salary of graduates increased over $4,000 per year over the two-year period in which the exams were begun. In contrast, at comparable universities without comprehensive exams, salaries increased only $850 over the same period. As Saul Siegel, a vice-president of IBM put it in Business Week recently: 'We are much quicker to offer the large salaries and executive positions to these kids because by passing their area exam, they have proven to us that they have expertise in their area, and they have displayed drive and commitment, rather than being people who may or may not be dependable and reliable.' Another benefit is that universities with the exams are subsequently able to attract larger and more well-known corporations to campus to recruit students for their open positions, and place their students into better paying positions. The end result is that students at schools with comprehensive exams have a 55% greater chance of landing a good job than students at schools without exams.

A study by the U.S. Department of Education revealed that universities with the comprehensive exam requirement average about 32% more financial aid available to students than comparable universities without the exams. Richard Collings, Director of Financial Aid at the University of Southern California (USC) has written that since the comprehensive exam was instituted at USC five years ago, more individuals and corporations have been willing to donate money for student scholarships, thus acknowledging both the increased effort on the university's side as well as the increase in academic excellence among the students.

Numeracy Questionnaire

General Numeracy Scale Items

Note: Participants did not see the answers listed here in *italics*.

1. Imagine that we rolled a fair, six-sided die 1,000 times. Out of 1,000 rolls, how many times do you think the die would come up even (2, 4, 6)? *(Answer: 500).*

2. In the BIG BUCKS LOTTERY, the chance of winning a £10.00 prize is 1%. What is your best guess about how many people would win a £10.00 prize if 1,000 people each buy a single ticket to BIG BUCKS? *(Answer: 10 persons out of 1000).*

3. In the ACME PUBLISHING SWEEPSTAKES, the chance of winning a car is 1 in 1,000. What percent of tickets to ACME PUBLISHING SWEEPSTAKES win a car? *(Answer: 0.1.%)*

Expanded Numeracy Scale Items

1. Which of the following numbers represents the biggest risk of getting a disease?

   ( ) 1 in 100

   ( ) 1 in 1000

   (*X*) 1 in 10

2. Which of the following numbers represents the biggest risk of getting a disease?

   ( ) 1%

   (*X*) 10%

   ( ) 5%

3. If person A's risk of getting a disease is 1% in ten years, and person B's risk is double that of A's, what is B's risk? *(Answer: 2% in ten years)*

4. If person A's chance of getting a disease is 1 in 100 in ten years, and person B's risk is double that of A's, what is B's risk? *(Answer: 2 out of 100)*

5. If the chance of getting a disease is 10%, how many people would be expected to get the disease:

   Out of 100? *(Answer: 10)*

   Out of 1000? *(Answer: 100)*

6. If the chance of getting a disease is 20 out of 100, this would be the same as having ( ) chance of getting the disease? *(Answer: 20%]*

7. The chance of getting a viral infection is .0005. Out of 10,000 people, about how many of them are expected to get infected? *(Answer: 5 people)*

Appendix B: Chapter 2 SPSS

```
*---------------------------------------------*.
*        DESCRIPTIVES              *.
*---------------------------------------------*.

*Descriptive: Gender*.
FREQUENCIES VARIABLES=Gender
  /ORDER=ANALYSIS.
```

Frequencies

```
[DataSet1] \\psf\Home\Documents\Thesis\SPSS files\Amendments SPSS\New Study 1 Data.sav
```

Statistics

Gender

N	Valid	103
	Missing	0

Gender

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Female	79	76.7	76.7	76.7
	Male	24	23.3	23.3	100.0
	Total	103	100.0	100.0	

```
*Descriptive: Age*.
DESCRIPTIVES VARIABLES=Age
```



```
  /STATISTICS=MEAN STDDEV MIN MAX.
```

Descriptives

```
[DataSet1] \\psf\Home\Documents\Thesis\SPSS files\Amendments SPSS\New Study 1 Data.sav
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Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation
Age	103	18.00	58.00	20.5291	5.78488
Valid N (listwise)	103				

```
*More age data to account for outliers*.
FREQUENCIES VARIABLES=Age
 /STATISTICS=MEDIAN MODE
  /ORDER=ANALYSIS.
```

Frequencies

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Statistics

Age

N	Valid	103
	Missing	0
Median		19.0000
Mode		19.00

Age

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	18.00	20	19.4	19.4	19.4
	18.50	1	1.0	1.0	20.4
	19.00	51	49.5	49.5	69.9
	20.00	16	15.5	15.5	85.4
	21.00	6	5.8	5.8	91.3
	22.00	1	1.0	1.0	92.2
	24.00	1	1.0	1.0	93.2
	27.00	1	1.0	1.0	94.2
	31.00	1	1.0	1.0	95.1
	32.00	1	1.0	1.0	96.1
	38.00	1	1.0	1.0	97.1
	44.00	1	1.0	1.0	98.1
	45.00	1	1.0	1.0	99.0
	58.00	1	1.0	1.0	100.0
	Total	103	100.0	100.0	

```
*Frequencies of Conditions*.
FREQUENCIES VARIABLES=Condition
  /ORDER=ANALYSIS.
```

Frequencies


```
[DataSet1] \\psf\Home\Documents\Thesis\SPSS files\Amendments SPSS\New Study 1 Data.sav
```

Statistics

Condition

N	Valid	103
	Missing	0

Condition

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	TextOnly	25	24.3	24.3	24.3
	TextNumbers	25	24.3	24.3	48.5
	TextGraphs	26	25.2	25.2	73.8
	ExtendedTxt	27	26.2	26.2	100.0
	Total	103	100.0	100.0	

```
*Descriptives Numeracy*.
Descriptives VARIABLES=CorrectAnswers
/STATISTICS=MEAN STDDEV MIN MAX.
```

Descriptives

```
[DataSet1] \\psf\Home\Documents\Thesis\SPSS files\Amendments SPSS\New Study 1 Data.sav
```

Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation
CorrectAnswers	103	4.00	11.00	8.7379	1.63875
Valid N (listwise)	103				

```
FREQUENCIES VARIABLES=CorrectAnswers
  /HISTOGRAM
  /ORDER=ANALYSIS.
```

Frequencies

```
[DataSet1] \\psf\Home\Documents\Thesis\SPSS files\Amendments SPSS\New Study 1 Data.sav
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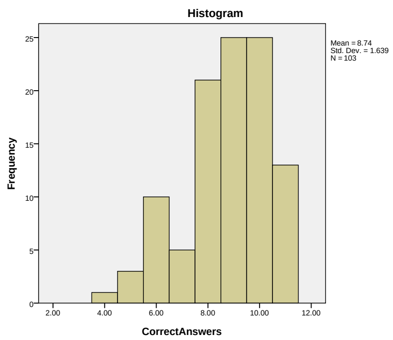
Statistics

CorrectAnswers

N	Valid	103
	Missing	0

CorrectAnswers

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	4.00	1	1.0	1.0	1.0
	5.00	3	2.9	2.9	3.9
	6.00	10	9.7	9.7	13.6
	7.00	5	4.9	4.9	18.4
	8.00	21	20.4	20.4	38.8
	9.00	25	24.3	24.3	63.1
	10.00	25	24.3	24.3	87.4
	11.00	13	12.6	12.6	100.0
	Total	103	100.0	100.0	



```
*----------------------------------------------*.
*        CONSOLIDATING DATA  *.
*----------------------------------------------*.
*Descriptives Good, Like*.
DESCRIPTIVES Variables=Good Like
/STATISTICS mean STDDEV min max.
```

Descriptives

[DataSet1] \\psf\Home\Documents\Thesis\SPSS files\Amendments SPSS\New Study 1 Data.sav

Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation
Good	103	1.00	7.00	2.5922	1.25586
Like	103	1.00	9.00	3.7961	2.02126
Valid N (listwise)	103				

```
*Testing whether Good, Like are significantly different*.
T-TEST PAIRS=Good WITH Like (PAIRED)
  /CRITERIA=CI(.9500)
  /MISSING=ANALYSIS.
```

T-Test

[DataSet1] \\psf\Home\Documents\Thesis\SPSS files\Amendments SPSS\New Study 1 Data.sav

Paired Samples Statistics

		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	Good	2.5922	103	1.25586	.12374
	Like	3.7961	103	2.02126	.19916

Paired Samples Correlations

		N	Correlation	Sig.
Pair 1	Good & Like	103	.581	.000

Paired Samples Test

		Paired Differences					t	df	Sig. (2-tailed)
					95% Confidence Interval of the Difference				
		Mean	Std. Deviation	Std. Error Mean	Lower	Upper			
Pair 1	Good - Like	-1.20388	1.64710	.16229	-1.52579	-.88198	-7.418	102	.000

```
*Descriptives Thought, Attend*.
DESCRIPTIVES VARIABLES=Thought Attend
/Statistics mean STDDEV min max.
```

Descriptives

[DataSet1] \\psf\Home\Documents\Thesis\SPSS files\Amendments SPSS\New Study 1 Data.sav

Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation
Thought	103	1.00	7.00	3.6699	1.46454
Attend	103	1.00	6.00	3.3010	1.34918
Valid N (listwise)	103				

```
*Question sets: Testing whether Thought/ Attend are significantly different*.
T-TEST PAIRS=Thought WITH Attend (PAIRED)
  /CRITERIA=CI(.9500)
  /MISSING=ANALYSIS.
```

T-Test

```
[DataSet1] \\psf\Home\Documents\Thesis\SPSS files\Amendments SPSS\New Study 1 Data.sav
```

Paired Samples Statistics

		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	Thought	3.6699	103	1.46454	.14431
	Attend	3.3010	103	1.34918	.13294

Paired Samples Correlations

		N	Correlation	Sig.
Pair 1	Thought & Attend	103	.527	.000

Paired Samples Test

		Paired Differences					t	df	Sig. (2-tailed)
					95% Confidence Interval of the Difference				
		Mean	Std. Deviation	Std. Error Mean	Lower	Upper			
Pair 1	Thought - Attend	.36893	1.37192	.13518	.10080	.63706	2.729	102	.007

```
*Descriptives Confident, Certain, Sure*.
DESCRIPTIVES Variables=Rec_Confident Rec_Certain Rec_Sure
/STATISTICS=Mean STDDEV Min Max.
```

Descriptives

```
[DataSet1] \\psf\Home\Documents\Thesis\SPSS files\Amendments SPSS\New Study 1 Data.sav
```

Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation
Rec_Confident	103	1.00	9.00	4.6311	1.81492
Rec_Certain	103	1.00	9.00	4.5922	1.87573
Rec_Sure	103	1.00	9.00	4.6311	1.82031
Valid N (listwise)	103				

```
*Testing whether Confident, Certain, Sure are significantly different*.
T-TEST PAIRS=Rec_Certain Rec_Certain Rec_Confident WITH Rec_Confident Rec_Sure Rec_Sure (PAIRED)
  /CRITERIA=CI(.9500)
```

```
  /MISSING=ANALYSIS.
```

T-Test

```
[DataSet1] \\psf\Home\Documents\Thesis\SPSS files\Amendments SPSS\New Study 1 Data.sav
```

Paired Samples Statistics

		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	Rec_Certain	4.5922	103	1.87573	.18482
	Rec_Confident	4.6311	103	1.81492	.17883
Pair 2	Rec_Certain	4.5922	103	1.87573	.18482
	Rec_Sure	4.6311	103	1.82031	.17936
Pair 3	Rec_Confident	4.6311	103	1.81492	.17883
	Rec_Sure	4.6311	103	1.82031	.17936

Paired Samples Correlations

		N	Correlation	Sig.
Pair 1	Rec_Certain & Rec_Confident	103	.808	.000
Pair 2	Rec_Certain & Rec_Sure	103	.820	.000
Pair 3	Rec_Confident & Rec_Sure	103	.807	.000

Paired Samples Test

		Paired Differences					t	df	Sig. (2-tailed)
					95% Confidence Interval of the Difference				
		Mean	Std. Deviation	Std. Error Mean	Lower	Upper			
Pair 1	Rec_Certain - Rec_Confident	-.03883	1.14551	.11287	-.26271	.18504	-.344	102	.732
Pair 2	Rec_Certain - Rec_Sure	-.03883	1.11075	.10945	-.25592	.17825	-.355	102	.723
Pair 3	Rec_Confident - Rec_Sure	.00000	1.12894	.11124	-.22064	.22064	.000	102	1.000

```
*Identifying possible covariates*.
CORRELATIONS
  /VARIABLES=ThoughtListing Thought Attend Extremity_Like
    Extremity_Good Good Like Rec_Certain Rec_Confident Rec_Sure Numeracy
  /PRINT=TWOTAIL NOSIG
  /MISSING=PAIRWISE.
```

Correlations

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[DataSet1] \\psf\Home\Documents\Thesis\SPSS files\Amendments SPSS\New Study 1 Data.sav
```

Correlations

		ThoughtListing	Thought	Attend	Extremity_Like	Extremity_Good	Good	Like	Rec_Certain
ThoughtListing	Pearson Correlation	1	.086	.080	.101	.094	-.102	-.073	-.012
	Sig. (2-tailed)		.388	.424	.309	.343	.307	.463	.907
	N	103	103	103	103	103	103	103	103
Thought	Pearson Correlation	.086	1	.527**	-.198*	-.296**	.278**	.315**	.279**
	Sig. (2-tailed)	.388		.000	.045	.002	.004	.001	.004
	N	103	103	103	103	103	103	103	103
Attend	Pearson Correlation	.080	.527**	1	-.228*	-.227*	.183	.339**	.359**
	Sig. (2-tailed)	.424	.000		.020	.021	.064	.000	.000
	N	103	103	103	103	103	103	103	103
Extremity_Like	Pearson Correlation	.101	-.198*	-.228*	1	.477**	-.497**	-.404**	-.363**
	Sig. (2-tailed)	.309	.045	.020		.000	.000	.000	.000
	N	103	103	103	103	103	103	103	103
Extremity_Good	Pearson Correlation	.094	-.296**	-.227*	.477**	1	-.938**	-.603**	-.384**
	Sig. (2-tailed)	.343	.002	.021	.000		.000	.000	.000
	N	103	103	103	103	103	103	103	103
Good	Pearson Correlation	-.102	.278**	.183	-.497**	-.938**	1	.581**	.324**
	Sig. (2-tailed)	.307	.004	.064	.000	.000		.000	.001
	N	103	103	103	103	103	103	103	103

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

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

Correlations

		Rec_Confident	Rec_Sure	Numeracy
ThoughtListing	Pearson Correlation	-.131	-.090	-.090
	Sig. (2-tailed)	.187	.368	.367
	N	103	103	103
Thought	Pearson Correlation	.238*	.300**	-.159
	Sig. (2-tailed)	.016	.002	.109
	N	103	103	103
Attend	Pearson Correlation	.294**	.389**	-.208*
	Sig. (2-tailed)	.003	.000	.035
	N	103	103	103
Extremity_Like	Pearson Correlation	-.394**	-.343**	.018
	Sig. (2-tailed)	.000	.000	.860
	N	103	103	103
Extremity_Good	Pearson Correlation	-.520**	-.433**	.114
	Sig. (2-tailed)	.000	.000	.253
	N	103	103	103
Good	Pearson Correlation	.471**	.375**	-.095
	Sig. (2-tailed)	.000	.000	.338
	N	103	103	103

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

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

Correlations

		ThoughtListing	Thought	Attend	Extremity_Like	Extremity_Good	Good	Like	Rec_Certain
Like	Pearson Correlation	-.073	.315**	.339**	-.404**	-.603**	.581**	1	.361**
	Sig. (2-tailed)	.463	.001	.000	.000	.000	.000		.000
	N	103	103	103	103	103	103	103	103
Rec_Certain	Pearson Correlation	-.012	.279**	.359**	-.363**	-.384**	.324**	.361**	1
	Sig. (2-tailed)	.907	.004	.000	.000	.000	.001	.000	
	N	103	103	103	103	103	103	103	103
Rec_Confident	Pearson Correlation	-.131	.238*	.294**	-.394**	-.520**	.471**	.423**	.808**
	Sig. (2-tailed)	.187	.016	.003	.000	.000	.000	.000	.000
	N	103	103	103	103	103	103	103	103
Rec_Sure	Pearson Correlation	-.090	.300**	.389**	-.343**	-.433**	.375**	.355**	.820**
	Sig. (2-tailed)	.368	.002	.000	.000	.000	.000	.000	.000
	N	103	103	103	103	103	103	103	103
Numeracy	Pearson Correlation	-.090	-.159	-.208*	.018	.114	-.095	-.058	-.048
	Sig. (2-tailed)	.367	.109	.035	.860	.253	.338	.562	.631
	N	103	103	103	103	103	103	103	103

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

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

Correlations

		Rec_Confident	Rec_Sure	Numeracy
Like	Pearson Correlation	.423**	.355**	-.058
	Sig. (2-tailed)	.000	.000	.562
	N	103	103	103
Rec_Certain	Pearson Correlation	.808**	.820**	-.048
	Sig. (2-tailed)	.000	.000	.631
	N	103	103	103
Rec_Confident	Pearson Correlation	1	.807**	-.105
	Sig. (2-tailed)		.000	.290
	N	103	103	103
Rec_Sure	Pearson Correlation	.807**	1	-.029
	Sig. (2-tailed)	.000		.768
	N	103	103	103
Numeracy	Pearson Correlation	-.105	-.029	1
	Sig. (2-tailed)	.290	.768	
	N	103	103	103

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

```
*-----------------------------------------------*.
*         HYPOTHESES TESTING  *.
*-----------------------------------------------*.
```

```
*Descriptives for Thought and Attend across conditions*.
EXAMINE VARIABLES=Thought Attend BY Condition
  /PLOT NONE
  /STATISTICS
  /CINTERVAL 95
  /MISSING LISTWISE
  /NOTOTAL.
```

Explore

[DataSet1] \\psf\Home\Documents\Thesis\SPSS files\Amendments SPSS\New Study 1 Data.sav

Condition

Case Processing Summary

		Cases					
		Valid		Missing		Total	
	Condition	N	Percent	N	Percent	N	Percent
Thought	TextOnly	25	100.0%	0	.0%	25	100.0%
	TextNumbers	25	100.0%	0	.0%	25	100.0%
	TextGraphs	26	100.0%	0	.0%	26	100.0%
	ExtendedTxt	27	100.0%	0	.0%	27	100.0%
Attend	TextOnly	25	100.0%	0	.0%	25	100.0%
	TextNumbers	25	100.0%	0	.0%	25	100.0%
	TextGraphs	26	100.0%	0	.0%	26	100.0%
	ExtendedTxt	27	100.0%	0	.0%	27	100.0%

Descriptives

	Condition			Statistic	Std. Error
Thought	TextOnly	Mean		3.9600	.34871
		95% Confidence Interval for Mean	Lower Bound	3.2403	
			Upper Bound	4.6797	
		5% Trimmed Mean		3.9556	
		Median		4.0000	
		Variance		3.040	
		Std. Deviation		1.74356	
		Minimum		1.00	
		Maximum		7.00	
		Range		6.00	
		Interquartile Range		2.00	
		Skewness		.271	.464
		Kurtosis		-.604	.902
	TextNumbers	Mean		3.5600	.31134
		95% Confidence Interval for Mean	Lower Bound	2.9174	
			Upper Bound	4.2026	

Descriptives

	Condition			Statistic	Std. Error
Thought	TextNumbers	5% Trimmed Mean		3.5667	
		Median		3.0000	
		Variance		2.423	
		Std. Deviation		1.55671	
		Minimum		1.00	
		Maximum		6.00	
		Range		5.00	
		Interquartile Range		3.00	
		Skewness		.095	.464
		Kurtosis		-1.151	.902
	TextGraphs	Mean		3.5769	.26120
		95% Confidence Interval for Mean	Lower Bound	3.0390	
			Upper Bound	4.1149	

Descriptives

	Condition			Statistic	Std. Error
Thought	TextGraphs	5% Trimmed Mean		3.5726	
		Median		3.0000	
		Variance		1.774	
		Std. Deviation		1.33186	
		Minimum		1.00	
		Maximum		6.00	
		Range		5.00	
		Interquartile Range		1.25	
		Skewness		.316	.456
		Kurtosis		-.394	.887
	ExtendedTxt	Mean		3.5926	.24025
		95% Confidence Interval for Mean	Lower Bound	3.0988	
			Upper Bound	4.0864	

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Descriptives

	Condition			Statistic	Std. Error
Thought	ExtendedTxt	5% Trimmed Mean		3.5473	
		Median		3.0000	
		Variance		1.558	
		Std. Deviation		1.24836	
		Minimum		2.00	
		Maximum		6.00	
		Range		4.00	
		Interquartile Range		2.00	
		Skewness		.349	.448
		Kurtosis		-.855	.872
Attend	TextOnly	Mean		3.6000	.27080
		95% Confidence Interval for Mean	Lower Bound	3.0411	
			Upper Bound	4.1589	

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Descriptives

	Condition			Statistic	Std. Error
Attend	TextOnly	5% Trimmed Mean		3.6222	
		Median		4.0000	
		Variance		1.833	
		Std. Deviation		1.35401	
		Minimum		1.00	
		Maximum		6.00	
		Range		5.00	
		Interquartile Range		2.50	
		Skewness		-.394	.464
		Kurtosis		-.635	.902
	TextNumbers	Mean		3.3600	.28213
		95% Confidence Interval for Mean	Lower Bound	2.7777	
			Upper Bound	3.9423	

Descriptives

	Condition			Statistic	Std. Error
Attend	TextNumbers	5% Trimmed Mean		3.3556	
		Median		3.0000	
		Variance		1.990	
		Std. Deviation		1.41067	
		Minimum		1.00	
		Maximum		6.00	
		Range		5.00	
		Interquartile Range		3.00	
		Skewness		.069	.464
		Kurtosis		-1.045	.902
	TextGraphs	Mean		2.8462	.27000
		95% Confidence Interval for Mean	Lower Bound	2.2901	
			Upper Bound	3.4022	

Descriptives

	Condition			Statistic	Std. Error
Attend	TextGraphs	5% Trimmed Mean		2.7863	
		Median		2.5000	
		Variance		1.895	
		Std. Deviation		1.37673	
		Minimum		1.00	
		Maximum		6.00	
		Range		5.00	
		Interquartile Range		1.25	
		Skewness		.797	.456
		Kurtosis		-.186	.887
	ExtendedTxt	Mean		3.4074	.23424
		95% Confidence Interval for Mean	Lower Bound	2.9259	
			Upper Bound	3.8889	

Descriptives

	Condition		Statistic	Std. Error
Attend	ExtendedTxt	5% Trimmed Mean	3.3971	
		Median	3.0000	
		Variance	1.481	
		Std. Deviation	1.21716	
		Minimum	1.00	
		Maximum	6.00	
		Range	5.00	
		Interquartile Range	1.00	
		Skewness	.233	.448
		Kurtosis	-.478	.872

```
*Testing for effect of condition on Attend or Thought, controlling for numeracy*.
GLM Thought Attend BY Condition WITH Numeracy
  /METHOD=SSTYPE(3)
  /INTERCEPT=INCLUDE
  /CRITERIA=ALPHA(.05)
  /DESIGN=Numeracy Condition.
```

General Linear Model

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[DataSet1] \\psf\Home\Documents\Thesis\SPSS files\Amendments SPSS\New Study 1 Data.sav
```

Between-Subjects Factors

		Value Label	N
Condition	1	TextOnly	25
	2	TextNumbers	25
	3	TextGraphs	26
	4	ExtendedTxt	27

Multivariate Tests [c]

Effect		Value	F	Hypothesis df	Error df	Sig.
Intercept	Pillai's Trace	.361	27.386[a]	2.000	97.000	.000
	Wilks' Lambda	.639	27.386[a]	2.000	97.000	.000
	Hotelling's Trace	.565	27.386[a]	2.000	97.000	.000
	Roy's Largest Root	.565	27.386[a]	2.000	97.000	.000
Numeracy	Pillai's Trace	.047	2.378[a]	2.000	97.000	.098
	Wilks' Lambda	.953	2.378[a]	2.000	97.000	.098
	Hotelling's Trace	.049	2.378[a]	2.000	97.000	.098

a. Exact statistic

c. Design: Intercept + Numeracy + Condition

Multivariate Tests[c]

Effect		Value	F	Hypothesis df	Error df	Sig.
Numeracy	Roy's Largest Root	.049	2.378[a]	2.000	97.000	.098
Condition	Pillai's Trace	.057	.953	6.000	196.000	.459
	Wilks' Lambda	.944	.948[a]	6.000	194.000	.462
	Hotelling's Trace	.059	.944	6.000	192.000	.465
	Roy's Largest Root	.048	1.566[b]	3.000	98.000	.202

a. Exact statistic

b. The statistic is an upper bound on F that yields a lower bound on the significance level.

c. Design: Intercept + Numeracy + Condition

Tests of Between-Subjects Effects

Source	Dependent Variable	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	Thought	8.338[a]	4	2.085	.971	.427
	Attend	15.679[b]	4	3.920	2.260	.068
Intercept	Thought	82.744	1	82.744	38.533	.000
	Attend	77.846	1	77.846	44.879	.000
Numeracy	Thought	5.546	1	5.546	2.583	.111

a. R Squared = .038 (Adjusted R Squared = -.001)

b. R Squared = .084 (Adjusted R Squared = .047)

Tests of Between-Subjects Effects

Source	Dependent Variable	Type III Sum of Squares	df	Mean Square	F	Sig.
Numeracy	Attend	7.673	1	7.673	4.423	.038
Condition	Thought	2.810	3	.937	.436	.728
	Attend	7.658	3	2.553	1.472	.227
Error	Thought	210.439	98	2.147		
	Attend	169.991	98	1.735		
Total	Thought	1606.000	103			
	Attend	1308.000	103			
Corrected Total	Thought	218.777	102			
	Attend	185.670	102			

```
*Descriptives for Actuall Processing across conditions*.
EXAMINE VARIABLES=Thoughtlisting BY Condition
  /PLOT NONE
  /STATISTICS DESCRIPTIVES
  /CINTERVAL 95
  /MISSING LISTWISE
  /NOTOTAL.
```

Explore


```
[DataSet1] \\psf\Home\Documents\Thesis\SPSS files\Amendments SPSS\New Study 1 Data.sav
```

Condition

Case Processing Summary

		Cases					
		Valid		Missing		Total	
	Condition	N	Percent	N	Percent	N	Percent
ThoughtListing	TextOnly	25	100.0%	0	.0%	25	100.0%
	TextNumbers	25	100.0%	0	.0%	25	100.0%
	TextGraphs	26	100.0%	0	.0%	26	100.0%
	ExtendedTxt	27	100.0%	0	.0%	27	100.0%

Descriptives

	Condition			Statistic	Std. Error
ThoughtListing	TextOnly	Mean		5.3200	.49907
		95% Confidence Interval for Mean	Lower Bound	4.2900	
			Upper Bound	6.3500	

Descriptives

	Condition			Statistic	Std. Error
ThoughtListing	TextOnly	5% Trimmed Mean		5.3556	
		Median		6.0000	
		Variance		6.227	
		Std. Deviation		2.49533	
		Minimum		.00	
		Maximum		10.00	
		Range		10.00	
		Interquartile Range		3.50	
		Skewness		-.205	.464
		Kurtosis		-.243	.902
	TextNumbers	Mean		6.1600	.67251
		95% Confidence Interval for Mean	Lower Bound	4.7720	
			Upper Bound	7.5480	

Descriptives

	Condition			Statistic	Std. Error
ThoughtListing	TextNumbers	5% Trimmed Mean		5.8333	
		Median		5.0000	
		Variance		11.307	
		Std. Deviation		3.36254	
		Minimum		3.00	
		Maximum		16.00	
		Range		13.00	
		Interquartile Range		4.50	
		Skewness		1.458	.464
		Kurtosis		1.805	.902
	TextGraphs	Mean		5.3846	.38859
		95% Confidence Interval for Mean	Lower Bound	4.5843	
			Upper Bound	6.1849	

Descriptives

	Condition			Statistic	Std. Error
ThoughtListing	TextGraphs	5% Trimmed Mean		5.2863	
		Median		5.5000	
		Variance		3.926	
		Std. Deviation		1.98145	
		Minimum		3.00	
		Maximum		10.00	
		Range		7.00	
		Interquartile Range		4.00	
		Skewness		.319	.456
		Kurtosis		-.670	.887
	ExtendedTxt	Mean		5.2963	.39156
		95% Confidence Interval for Mean	Lower Bound	4.4914	
			Upper Bound	6.1012	

Descriptives

	Condition		Statistic	Std. Error
ThoughtListing	ExtendedTxt	5% Trimmed Mean	5.1770	
		Median	5.0000	
		Variance	4.140	
		Std. Deviation	2.03460	
		Minimum	2.00	
		Maximum	11.00	
		Range	9.00	
		Interquartile Range	2.00	
		Skewness	.985	.448
		Kurtosis	1.124	.872

```
*Testing for effect of condition on Thoughtlisting*.
GLM Thoughtlisting BY Condition
  /METHOD=SSTYPE(3)
  /INTERCEPT=INCLUDE
  /CRITERIA=ALPHA(.05)
  /DESIGN=Condition.
```

General Linear Model

```
[DataSet1] \\psf\Home\Documents\Thesis\SPSS files\Amendments SPSS\New Study 1 Data.sav
```

Between-Subjects Factors

		Value Label	N
Condition	1	TextOnly	25
	2	TextNumbers	25
	3	TextGraphs	26
	4	ExtendedTxt	27

Tests of Between-Subjects Effects

Dependent Variable:ThoughtListing

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	13.048[a]	3	4.349	.687	.562
Intercept	3158.267	1	3158.267	499.005	.000
Condition	13.048	3	4.349	.687	.562
Error	626.583	99	6.329		
Total	3794.000	103			
Corrected Total	639.631	102			

a. R Squared = .020 (Adjusted R Squared = -.009)

```
DESCRIPTIVES VARIABLES=Good Like Avg_Extremity Avg_Certainty
  /STATISTICS=MEAN STDDEV MIN MAX.
```

Descriptives

```
[DataSet1] \\psf\Home\Documents\Thesis\SPSS files\Amendments SPSS\New Study 1 Data.sav
```


Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation
Good	103	1.00	7.00	2.5922	1.25586
Like	103	1.00	9.00	3.7961	2.02126
Avg_Extremity	103	.00	4.00	2.2427	1.00212
Avg_Certainty	103	1.00	9.00	4.6181	1.71778
Valid N (listwise)	103				

```
*Testing for effect of perceived amount of processing on attitude measures*.
GLM Good Like Avg_Extremity Avg_Certainty BY Thought Attend WITH Numeracy
  /METHOD=SSTYPE(3)
  /INTERCEPT=INCLUDE
  /PRINT=ETASQ OPOWER
  /CRITERIA=ALPHA(.05)
  /DESIGN=Numeracy Thought Attend Thought*Attend.
```

General Linear Model

```
[DataSet1] \\psf\Home\Documents\Thesis\SPSS files\Amendments SPSS\New Study 1 Data.sav
```

Between-Subjects Factors

		N
Thought	1.00	5
	2.00	17
	3.00	32
	4.00	18
	5.00	18
	6.00	10
	7.00	3
Attend	1.00	8
	2.00	25
	3.00	27
	4.00	18
	5.00	21
	6.00	4

Multivariate Tests [d]

Effect		Value	F	Hypothesis df	Error df	Sig.	Partial Eta Squared	Noncent. Parameter	Observed Power[b]
Intercept	Pillai's Trace	.794	68.362[a]	4.000	71.000	.000	.794	273.449	1.000
	Wilks' Lambda	.206	68.362[a]	4.000	71.000	.000	.794	273.449	1.000
	Hotelling's Trace	3.851	68.362[a]	4.000	71.000	.000	.794	273.449	1.000
	Roy's Largest Root	3.851	68.362[a]	4.000	71.000	.000	.794	273.449	1.000
Numeracy	Pillai's Trace	.036	.670[a]	4.000	71.000	.615	.036	2.680	.208
	Wilks' Lambda	.964	.670[a]	4.000	71.000	.615	.036	2.680	.208
	Hotelling's Trace	.038	.670[a]	4.000	71.000	.615	.036	2.680	.208
	Roy's Largest Root	.038	.670[a]	4.000	71.000	.615	.036	2.680	.208
Thought	Pillai's Trace	.415	1.429	24.000	296.000	.091	.104	34.297	.946
	Wilks' Lambda	.630	1.468	24.000	248.899	.078	.109	30.454	.906
	Hotelling's Trace	.516	1.496	24.000	278.000	.067	.114	35.896	.957
	Roy's Largest Root	.323	3.985[c]	6.000	74.000	.002	.244	23.911	.961
Attend	Pillai's Trace	.429	1.777	20.000	296.000	.023	.107	35.535	.969
	Wilks' Lambda	.612	1.886	20.000	236.430	.014	.116	30.878	.934
	Hotelling's Trace	.569	1.977	20.000	278.000	.008	.125	39.549	.984
	Roy's Largest Root	.431	6.385[c]	5.000	74.000	.000	.301	31.926	.995

a. Exact statistic

b. Computed using alpha = .05

c. The statistic is an upper bound on F that yields a lower bound on the significance level.

d. Design: Intercept + Numeracy + Thought + Attend + Thought * Attend

Multivariate Tests[d]

Effect		Value	F	Hypothesis df	Error df	Sig.	Partial Eta Squared	Noncent. Parameter	Observed Power[b]
Thought * Attend	Pillai's Trace	.934	1.409	64.000	296.000	.031	.234	90.175	.999
	Wilks' Lambda	.328	1.442	64.000	280.228	.024	.243	90.060	.999
	Hotelling's Trace	1.361	1.477	64.000	278.000	.018	.254	94.555	1.000
	Roy's Largest Root	.738	3.415[c]	16.000	74.000	.000	.425	54.636	.998

b. Computed using alpha = .05

c. The statistic is an upper bound on F that yields a lower bound on the significance level.

d. Design: Intercept + Numeracy + Thought + Attend + Thought * Attend

Tests of Between-Subjects Effects

Source	Dependent Variable	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared	Noncent. Parameter	Observed Power[b]
Corrected Model	Good	57.755[a]	28	2.063	1.480	.093	.359	41.446	.931
	Like	162.804[c]	28	5.814	1.695	.038	.391	47.447	.965
	Avg_Extremity	31.658[d]	28	1.131	1.182	.280	.309	33.101	.841
	Avg_Certainty	139.924[e]	28	4.997	2.296	.002	.465	64.290	.996

a. R Squared = .359 (Adjusted R Squared = .116)

b. Computed using alpha = .05

c. R Squared = .391 (Adjusted R Squared = .160)

d. R Squared = .309 (Adjusted R Squared = .048)

e. R Squared = .465 (Adjusted R Squared = .262)

Tests of Between-Subjects Effects

Source	Dependent Variable	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared	Noncent. Parameter	Observed Power[b]
Intercept	Good	25.403	1	25.403	18.230	.000	.198	18.230	.988
	Like	26.861	1	26.861	7.828	.007	.096	7.828	.789
	Avg_Extremity	11.321	1	11.321	11.837	.001	.138	11.837	.924
	Avg_Certainty	46.708	1	46.708	21.461	.000	.225	21.461	.995
Numeracy	Good	.614	1	.614	.441	.509	.006	.441	.100
	Like	2.389	1	2.389	.696	.407	.009	.696	.131
	Avg_Extremity	.060	1	.060	.063	.803	.001	.063	.057
	Avg_Certainty	.572	1	.572	.263	.610	.004	.263	.080
Thought	Good	17.790	6	2.965	2.128	.060	.147	12.767	.727
	Like	24.917	6	4.153	1.210	.311	.089	7.262	.448
	Avg_Extremity	6.842	6	1.140	1.192	.320	.088	7.154	.441
	Avg_Certainty	16.757	6	2.793	1.283	.275	.094	7.699	.473
Attend	Good	6.994	5	1.399	1.004	.422	.064	5.019	.339
	Like	41.803	5	8.361	2.437	.042	.141	12.183	.740
	Avg_Extremity	7.089	5	1.418	1.482	.206	.091	7.412	.493
	Avg_Certainty	52.975	5	10.595	4.868	.001	.248	24.340	.973

b. Computed using alpha = .05

Tests of Between-Subjects Effects

Source	Dependent Variable	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared	Noncent. Parameter	Observed Power[b]
Thought * Attend	Good	21.693	16	1.356	.973	.494	.174	15.567	.590
	Like	71.505	16	4.469	1.302	.219	.220	20.839	.754
	Avg_Extremity	10.873	16	.680	.711	.775	.133	11.369	.429
	Avg_Certainty	47.528	16	2.971	1.365	.183	.228	21.838	.779
Error	Good	103.119	74	1.394					
	Like	253.914	74	3.431					
	Avg_Extremity	70.774	74	.956					
	Avg_Certainty	161.056	74	2.176					
Total	Good	853.000	103						
	Like	1901.000	103						
	Avg_Extremity	620.500	103						
	Avg_Certainty	2497.667	103						
Corrected Total	Good	160.874	102						
	Like	416.718	102						
	Avg_Extremity	102.432	102						
	Avg_Certainty	300.980	102						

b. Computed using alpha = .05

Page 41

```
ONEWAY Like Avg_Certainty BY Attend
  /PLOT MEANS
  /MISSING ANALYSIS
  /POSTHOC=BONFERRONI ALPHA(0.05).
```

Oneway

```
[DataSet1] \\psf\Home\Documents\Thesis\SPSS files\Amendments SPSS\New Study 1 Data.sav
```

ANOVA

		Sum of Squares	df	Mean Square	F	Sig.
Like	Between Groups	59.475	5	11.895	3.230	.010
	Within Groups	357.243	97	3.683		
	Total	416.718	102			
Avg_Certainty	Between Groups	72.025	5	14.405	6.103	.000
	Within Groups	228.955	97	2.360		
	Total	300.980	102			

Post Hoc Tests

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Multiple Comparisons

Bonferroni

Dependent Variable	(I) Attend	(J) Attend	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval Lower Bound	95% Confidence Interval Upper Bound
Like	1.00	2.00	-1.15500	.77954	1.000	-3.5011	1.1911
		3.00	-1.46759	.77251	.906	-3.7926	.8574
		4.00	-2.54167*	.81546	.036	-4.9959	-.0874
		5.00	-2.11310	.79733	.141	-4.5128	.2866
		6.00	-3.37500	1.17520	.075	-6.9119	.1619
	2.00	1.00	1.15500	.77954	1.000	-1.1911	3.5011
		3.00	-.31259	.53265	1.000	-1.9157	1.2905
		4.00	-1.38667	.59323	.322	-3.1721	.3987
		5.00	-.95810	.56806	1.000	-2.6678	.7516
		6.00	-2.22000	1.03346	.513	-5.3303	.8903
	3.00	1.00	1.46759	.77251	.906	-.8574	3.7926
		2.00	.31259	.53265	1.000	-1.2905	1.9157
		4.00	-1.07407	.58396	1.000	-2.8316	.6834
		5.00	-.64550	.55837	1.000	-2.3260	1.0350
		6.00	-1.90741	1.02817	.999	-5.0018	1.1870

*. The mean difference is significant at the 0.05 level.

Multiple Comparisons

Bonferroni

Dependent Variable	(I) Attend	(J) Attend	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval Lower Bound	95% Confidence Interval Upper Bound
Like	4.00	1.00	2.54167*	.81546	.036	.0874	4.9959
		2.00	1.38667	.59323	.322	-.3987	3.1721
		3.00	1.07407	.58396	1.000	-.6834	2.8316
		5.00	.42857	.61643	1.000	-1.4267	2.2838
		6.00	-.83333	1.06082	1.000	-4.0260	2.3593
	5.00	1.00	2.11310	.79733	.141	-.2866	4.5128
		2.00	.95810	.56806	1.000	-.7516	2.6678
		3.00	.64550	.55837	1.000	-1.0350	2.3260
		4.00	-.42857	.61643	1.000	-2.2838	1.4267
		6.00	-1.26190	1.04695	1.000	-4.4128	1.8890
	6.00	1.00	3.37500	1.17520	.075	-.1619	6.9119
		2.00	2.22000	1.03346	.513	-.8903	5.3303
		3.00	1.90741	1.02817	.999	-1.1870	5.0018
		4.00	.83333	1.06082	1.000	-2.3593	4.0260
		5.00	1.26190	1.04695	1.000	-1.8890	4.4128

*. The mean difference is significant at the 0.05 level.

Multiple Comparisons

Bonferroni

Dependent Variable	(I) Attend	(J) Attend	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval Lower Bound	95% Confidence Interval Upper Bound
Avg_Certainty	1.00	2.00	-1.53667	.62407	.234	-3.4149	.3415
		3.00	-1.89815*	.61844	.042	-3.7594	-.0369
		4.00	-3.19444*	.65282	.000	-5.1592	-1.2297
		5.00	-2.63889*	.63831	.001	-4.5600	-.7178
		6.00	-1.75000	.94082	.989	-4.5815	1.0815
	2.00	1.00	1.53667	.62407	.234	-.3415	3.4149
		3.00	-.36148	.42642	1.000	-1.6449	.9219
		4.00	-1.65778*	.47492	.011	-3.0871	-.2285
		5.00	-1.10222	.45477	.258	-2.4709	.2665
		6.00	-.21333	.82735	1.000	-2.7033	2.2767
	3.00	1.00	1.89815*	.61844	.042	.0369	3.7594
		2.00	.36148	.42642	1.000	-.9219	1.6449
		4.00	-1.29630	.46750	.100	-2.7033	.1107
		5.00	-.74074	.44701	1.000	-2.0861	.6046
		6.00	.14815	.82311	1.000	-2.3291	2.6254

*. The mean difference is significant at the 0.05 level.

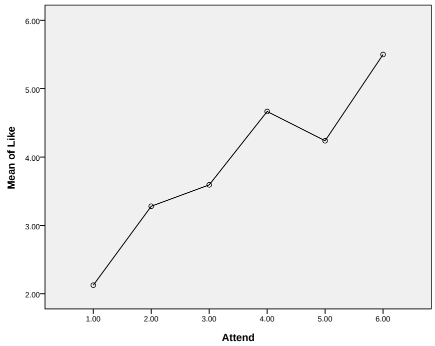
Multiple Comparisons

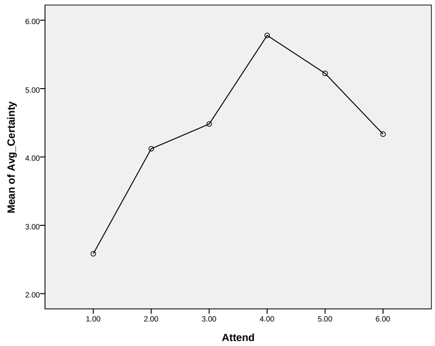
Bonferroni

Dependent Variable	(I) Attend	(J) Attend	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval Lower Bound	95% Confidence Interval Upper Bound
Avg_Certainty	4.00	1.00	3.19444*	.65282	.000	1.2297	5.1592
		2.00	1.65778*	.47492	.011	.2285	3.0871
		3.00	1.29630	.46750	.100	-.1107	2.7033
		5.00	.55556	.49349	1.000	-.9297	2.0408
		6.00	1.44444	.84925	1.000	-1.1115	4.0004
	5.00	1.00	2.63889*	.63831	.001	.7178	4.5600
		2.00	1.10222	.45477	.258	-.2665	2.4709
		3.00	.74074	.44701	1.000	-.6046	2.0861
		4.00	-.55556	.49349	1.000	-2.0408	.9297
		6.00	.88889	.83815	1.000	-1.6336	3.4114
	6.00	1.00	1.75000	.94082	.989	-1.0815	4.5815
		2.00	.21333	.82735	1.000	-2.2767	2.7033
		3.00	-.14815	.82311	1.000	-2.6254	2.3291
		4.00	-1.44444	.84925	1.000	-4.0004	1.1115
		5.00	-.88889	.83815	1.000	-3.4114	1.6336

*. The mean difference is significant at the 0.05 level.

Means Plots






```
*PARTIAL CORR
 /VARIABLES=Avg_Extremity Avg_Certainty Good Like Thought Attend BY Numeracy
 /SIGNIFICANCE=TWOTAIL
 /MISSING=LISTWISE.

*******************************************************.
*Correlation between certainty/actual processing*.
*******************************************************.

CORRELATIONS
  /VARIABLES=Thoughtlisting Avg_Certainty
  /PRINT=TWOTAIL NOSIG
  /MISSING=PAIRWISE.
```

Correlations

[DataSet1] \\psf\Home\Documents\Thesis\SPSS files\Amendments SPSS\New Study 1 Data.sav

Correlations

		ThoughtListing	Avg_Certainty
ThoughtListing	Pearson Correlation	1	-.082
	Sig. (2-tailed)		.410
	N	103	103
Avg_Certainty	Pearson Correlation	-.082	1
	Sig. (2-tailed)	.410	
	N	103	103

```
*******************************************************.
*                  DISCUSSION                             *.
*******************************************************.
*Cronbach's alpha for Good/Like*.
RELIABILITY
  /VARIABLES=Good Like
  /SCALE('Attitude positivity') ALL
  /MODEL=ALPHA
  /STATISTICS=DESCRIPTIVE SCALE CORR COV
  /SUMMARY=TOTAL.
```

Reliability

```
[DataSet1] \\psf\Home\Documents\Thesis\SPSS files\Amendments SPSS\New Study 1 Data.sav
```

Scale: Attitude positivity

Case Processing Summary

		N	%
Cases	Valid	103	100.0
	Excluded[a]	0	.0
	Total	103	100.0

a. Listwise deletion based on all variables in the procedure.

Reliability Statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.685	.735	2

Item Statistics

	Mean	Std. Deviation	N
Good	2.5922	1.25586	103
Like	3.7961	2.02126	103

Inter-Item Correlation Matrix

	Good	Like
Good	1.000	.581
Like	.581	1.000

Inter-Item Covariance Matrix

	Good	Like
Good	1.577	1.475
Like	1.475	4.085

Item-Total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted
Good	3.7961	4.085	.581	.338	.[a]
Like	2.5922	1.577	.581	.338	.[a]

a. The value is negative due to a negative average covariance among items. This violates reliability model assumptions. You may want to check item codings.

Scale Statistics

Mean	Variance	Std. Deviation	N of Items
6.3883	8.612	2.93469	2

```
SET Printback=On.
```

```
DESCRIPTIVES VARIABLES=Corr_Resp
  /STATISTICS=MEAN STDDEV MIN MAX.
```

Descriptives

Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation
Corr_Resp	18	7.00	11.00	9.5000	1.33945
Valid N (listwise)	18				

Appendix C: Chapter 3 Materials

Consent Form All Participants

Participant Consent Form

BACKGROUND INFORMATION

Title and researchers. The title of this research is “Health-related attitudes in undergraduate students”. Our names are Dr Briony Pulford and Daniela Rudloff from the University of Leicester School of Psychology.

Reason for the research. We are interested in assessing health-related attitudes, and we are collecting data from undergraduate students to enable us to compare attitudes across a range of different topics.

Details of participation. The research involves two testing sessions, which take place a week apart from each other. In the first testing session, you will be asked to answer a few questions concerning your attitude on a health-related topic. This part should take about 5 minutes.

In the second testing session you will either be given additional information to read or not, but in both cases you will again be asked to answer a few questions concerning your attitude and the information material presented. This session should take about 15 minutes. Please feel free to ask questions now if you have any.

CONSENT STATEMENT

1. I understand that my participation is voluntary and that I may withdraw from the research at any time, without giving any reason.

2. I am aware of what my participation will involve.

3. I understand that there are no risks involved in the participation of this study.

4. All questions that I have about the research have been satisfactorily answered.

I agree to participate.

Participant’s signature: ________________________________

Participant’s name (please print): ________________________________

Tick this box if you would like to receive a summary of the results by e-mail: [ ]

E-mail: ____________________________

Date: __________

Cover Sheet *Experimental* Group, *High* Importance

This is the second part of a study you already participated in a few weeks ago. In this part, too, we are interested in your attitude towards making MMR (measles, mumps, rubella) vaccinations mandatory. This would mean having government make all school age children have the vaccinations and parents not being able to opt out.

In this session you will be given information to read from the World Health Organisation (WHO) about the impact of vaccine-preventable diseases and the benefit of vaccinations. After you have read through this, we would like you to answer a few questions.

Because this is such an important topic ideally we would like to ask a substantial part of the Leicester student population. However, time and logistical constraints mean that we can only ask a small number of students. Your response will be analysed individually by the researchers and because of the small sample size your individual responses are very important.

Cover Sheet *Experimental* Group, *Low* Importance

This is the second part of a study you already participated in a few weeks ago. In this part, too, we are interested in your attitude towards making MMR (measles, mumps, rubella) vaccinations mandatory. This would mean having government make all school age children have the vaccinations and parents not being able to opt out.

In this session you will be given information to read from the World Health Organisation (WHO) about the impact of vaccine-preventable diseases and the benefit of vaccinations. After you have read through this, we would like you to answer a few questions.

This study is part of a larger study looking at students' attitudes towards a variety of health-related topics. This means that your responses will be analysed together with all the other participants' responses and will be averaged with all other responses.

Cover Sheet *Control* Group, *Low* Importance

This is the second part of a study you already participated in a few weeks ago. In this part, too, we are interested in your attitude towards making MMR (measles, mumps, rubella) vaccinations mandatory. This would mean having government make all school age children have the vaccinations and parents not being able to opt out.

This study is part of a larger study looking at students' attitudes towards a variety of health-related topics. This means that your responses will be analysed together with all the other participants' responses and will be averaged with all other responses.

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This is the second part of a study you already participated in a few weeks ago. In this part, too, we are interested in your attitude towards making MMR (measles, mumps, rubella) vaccinations mandatory. This would mean having government make all school age children have the vaccinations and parents not being able to opt out.

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Information Material ***Text Only***

Immunisation is a basic right, but not accessible to all

In recent decades the world has seen immense improvements in health, but the benefits are spread unevenly.

Although overall vaccination coverage is high, individual coverage rates vary widely between and within countries. Studies show that the poor often have less access to health services. In two dozen developing and transition countries, the wealthiest people benefit disproportionately from health care expenditure.

In every country, some groups lack access to immunisation and continue to be susceptible to disease. For instance, in the 2006-2007 measles outbreaks in Albania, Greece, Italy, Romania and Serbia, the vast majority of cases occurred among the Roma and migrant populations.

People who live in remote areas, or are displaced or socially and economically excluded tend to be other hard-to-reach groups. In addition, some people lack awareness of vaccination and the motivation to seek it, while others refuse it on ethical or religious grounds. All these groups remain vulnerable to disease.

Infectious diseases still kill

Even though the European Region has the lowest incidence of vaccine-preventable diseases, they continue to cause unnecessary deaths in young children across the Region every year.

Before the introduction of routine childhood vaccination, infectious diseases were the leading causes of death in children, and epidemics were frequent. Even today these diseases cause suffering and death; measles, Haemophilus influenzae type b (Hib), pertussis and neonatal tetanus are the great killers among vaccine-preventable diseases.

Every year, millions of children die before they reach the age of five. A considerable portion of these deaths are due to vaccine-preventable diseases; and measles and Hib alone are responsible for about two thirds of them.

Diseases can be controlled and eliminated

Concerted effort can eliminate or eradicate some diseases.

Smallpox used to kill several million people worldwide every year. It was eradicated in 1978 and is all but forgotten today.

WHO declared the European Region free from poliomyelitis (no endemic transmission) in 2002. With determined effort, global eradication lies within reach.

In the WHO European Region, all Member States agreed on the target of eliminating measles, rubella and congenital rubella syndrome by 2010. Over the past decade, reported cases for measles and rubella have fallen dramatically such that the number of today's cases is only a fraction of the cases in 1997.

Immunisation is cost-effective

Immunisation prevents death and disability at a fraction of the cost of treatment, to the benefit of both the individual and the society as a whole. Effective health policies and related expenditure must be seen as an investment, not a cost. Good health boosts economies while illness drains them.

Immunisation is one of the most cost-effective health achievements of modern times. It is one of the rare services that costs very little, but offers huge benefits to populations' health and well-being.

A study of a number of industrialised countries found that that the cost of measles vaccination and control was a small fraction of the cost of measles treatment.

In addition to saving on treatment costs, immunisation has significant, broader economic effects. It protects against the long-term effects of disease on people's physical and mental well-being and thereby their ability to complete education or training and to work. This protection entails immeasurable individual and societal benefits in terms of earning capacity, productivity and growth.

Information Material *Text Numerical*

Immunisation is a basic right, but not accessible to all

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Although overall vaccination coverage is high, individual coverage rates vary widely between and within countries. Coverage rates vary widely between and within countries. Studies show that the poor often have less access to health services. In 24 developing and transition countries, the wealthiest 20% of the population benefited from 26% of the government health expenditure, while the poorest 20% benefited from only 16%.

In every country, some groups lack access to immunisation and continue to be susceptible to disease. For instance, in the 2006-2007 measles outbreaks in Albania, Greece, Italy, Romania and Serbia, the vast majority of cases occurred among the Roma and migrant populations.

People who live in remote areas, or are displaced or socially and economically excluded tend to be other hard-to-reach groups. In addition, some people lack awareness of vaccination and the motivation to seek it, while others refuse it on ethical or religious grounds. All these groups remain vulnerable to disease.

Infectious diseases still kill

Even though the European Region has the lowest incidence of vaccine-preventable diseases, they continue to cause unnecessary deaths in young children across the Region every year.

Before the introduction of routine childhood vaccination, infectious diseases were the leading causes of death in children, and epidemics were frequent. Even today these diseases cause suffering and death; measles, Haemophilus influenzae type b (Hib), pertussis and neonatal tetanus are the great killers among vaccine-preventable diseases.

Every year, 10.6 million children die before the age of 5 years; vaccine-preventable diseases cause 1.4 million of these deaths, with measles and Hib alone causing 65% of these deaths.

Diseases can be controlled and eliminated

Concerted effort can eliminate or eradicate some diseases.

Smallpox used to kill 5 million people worldwide every year. It was eradicated in 1978 and is all but forgotten today.

WHO declared the European Region free from poliomyelitis (no endemic transmission) in 2002. With determined effort, global eradication lies within reach.

In the WHO European Region, all Member States agreed on the target of eliminating measles, rubella and congenital rubella syndrome by 2010. Over the past 10 years, reported cases for measles and rubella have fallen over 90%, from over 200 000 cases.

Immunisation is cost-effective

Immunisation prevents death and disability at a fraction of the cost of treatment, to the benefit of both the individual and the society as a whole. Effective health policies and related expenditure must be seen as an investment, not a cost. Good health boosts economies while illness drains them.

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A study of 11 industrialised countries found that the average cost of measles treatment was £312 per case, while the average cost of measles vaccination and control was £0.52 per person.

In addition to saving on treatment costs, immunisation has significant, broader economic effects. It protects against the long-term effects of disease on people's physical and mental well-being and thereby their ability to complete education or training and to work. This protection entails immeasurable individual and societal benefits in terms of earning capacity, productivity and growth.

Information Material ***Text Graphical***

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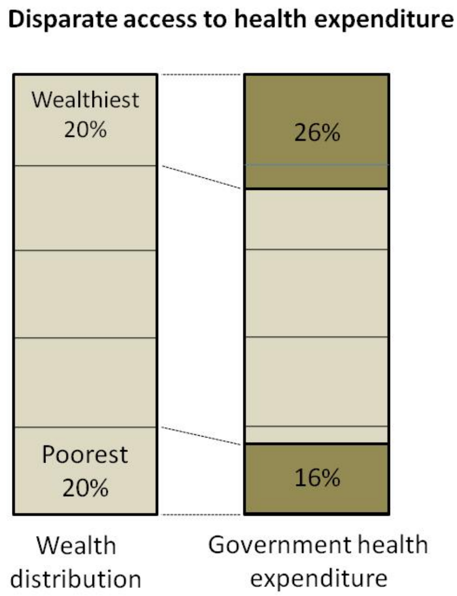
Immunisation is a basic right, but not accessible to all

In recent decades the world has seen immense improvements in health, but the benefits are spread unevenly.

Although overall vaccination coverage is high, individual coverage rates vary widely between and within countries. Studies show that among two dozen developing countries the poor often have less access to health services.



In every country, some groups lack access to immunisation and continue to be susceptible to disease. For instance, in the 2006-2007 measles outbreaks in Albania, Greece, Italy, Romania and Serbia, the vast majority of cases occurred among the Roma and migrant populations.

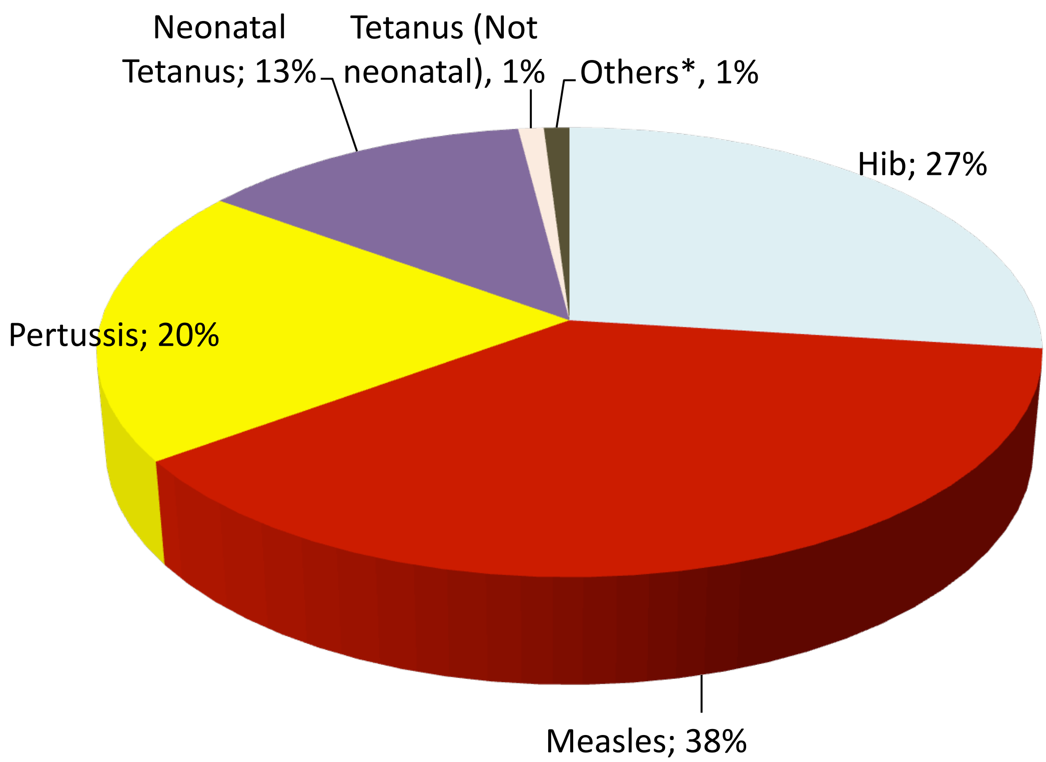
People who live in remote areas, or are displaced or socially and economically excluded tend to be other hard-to-reach groups. In addition, some people lack awareness of vaccination and the motivation to seek it, while others refuse it on ethical or religious grounds. All these groups remain vulnerable to disease.

Infectious diseases still kill

Even though the European Region has the lowest incidence of vaccine-preventable diseases, they continue to cause unnecessary deaths in young children across the Region every year.

Before the introduction of routine childhood vaccination, infectious diseases were the leading causes of death in children, and epidemics were frequent. Even today these diseases cause suffering and death; measles, Haemophilus influenzae type b (Hib), pertussis and neonatal tetanus are the great killers among vaccine-preventable diseases.

Every year, 10.6 million children die before the age of 5 years; vaccine-preventable diseases cause 1.4 million of these deaths:



* Others – polio, diphtheria and yellow fever

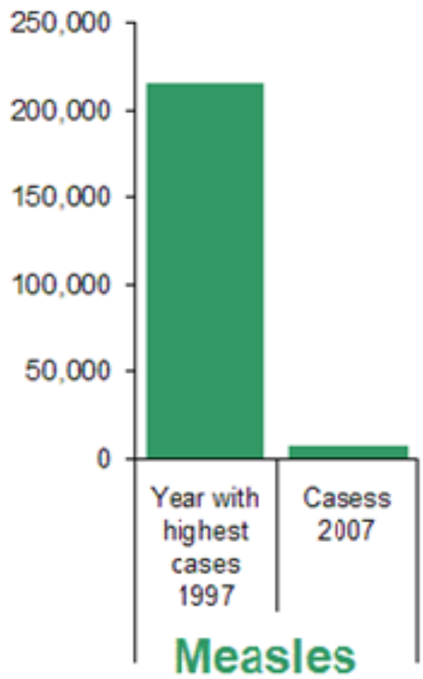
Diseases can be controlled and eliminated

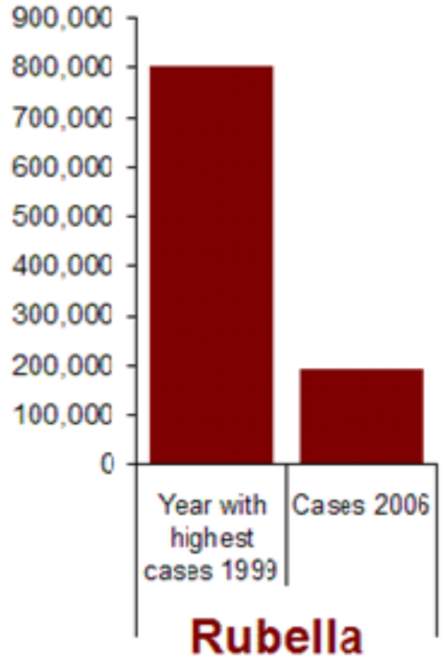
Concerted effort can eliminate or eradicate some diseases .

Smallpox used to kill 5 million people worldwide every year. It was eradicated in 1978 and is all but forgotten today.

WHO declared the European Region free from poliomyelitis (no endemic transmission) in 2002. With determined effort, global eradication lies within reach.

In the WHO European Region, all Member States agreed on the target of eliminating measles, rubella and congenital rubella syndrome by 2010. Over the past 10 years, reported cases have fallen over 90%, from over 200 000 cases.





Current Attitude Questions

We would like to know what **your current opinion is, at this particular point in time**, about making MMR vaccinations mandatory.

To what extent are you against or in favour of making MMR vaccinations mandatory?	Very much against				Very much in favour
	◯ -2	◯ -1	◯ 0	◯ +1	◯ +2
To what extent do you agree or disagree with making MMR vaccinations mandatory?	Disagree strongly				Agree strongly
	◯ -2	◯ -1	◯ 0	◯ +1	◯ +2
To what extent would you be pleased or displeased if MMR vaccinations were made mandatory?	Very pleased				Very displeased
	◯ +2	◯ +1	◯ 0	◯ -1	◯ -2

Current opinion (cont.)

How favourable or unfavourable do you feel about making MMR vaccinations mandatory?	Unfavourable 1 2 3 4 5 6 7 8 9 Favourable
How good or bad do you feel about making MMR vaccinations mandatory?	Bad 1 2 3 4 5 6 7 8 9 Good
How positive or negative do you feel about making MMR vaccinations mandatory?	Positive 1 2 3 4 5 6 7 8 9 Negative
How certain are you in your opinion about making MMR vaccinations mandatory?	Not certain at all 1 2 3 4 5 6 7 8 9 Very certain
How sure are you about your opinion about making MMR vaccinations mandatory?	Extremely sure 1 2 3 4 5 6 7 8 9 Not sure at all
How firm is your opinion about making MMR vaccinations mandatory?	Not firm at all 1 2 3 4 5 6 7 8 9 Extremely firm
How much confidence do you have in your current opinion about making MMR vaccinations mandatory?	No confidence at all 1 2 3 4 5 6 7 8 9 Very high confidence
How easily could your current opinion about making MMR vaccinations mandatory be changed?	Very easily 1 2 3 4 5 6 7 8 9 Not at all

Retrospective Attitude Questions

A couple of weeks ago you were asked to indicate your attitude on this topic. Please take a moment to try and recall what your attitude was **at that point of time and answer the following questions as you would have answered them two weeks ago**:

How favourable or unfavourable do you feel about making MMR vaccinations mandatory?

Unfavourable — Favourable

○	○	○	○	○	○	○	○	○
1	2	3	4	5	6	7	8	9

How good or bad do you feel about making MMR vaccinations mandatory?

Bad — Good

○	○	○	○	○	○	○	○	○
1	2	3	4	5	6	7	8	9

How positive or negative do you feel about making MMR vaccinations mandatory?

Positive — Negative

○	○	○	○	○	○	○	○	○
1	2	3	4	5	6	7	8	9

How certain are you in your opinion about making MMR vaccinations mandatory?

Not certain at all — Very certain

○	○	○	○	○	○	○	○	○
1	2	3	4	5	6	7	8	9

How sure are you about your opinion about making MMR vaccinations mandatory?

Extremely sure — Not sure at all

○	○	○	○	○	○	○	○	○
1	2	3	4	5	6	7	8	9

How firm is your opinion about making MMR vaccinations mandatory?

Not firm at all — Extremely firm

○	○	○	○	○	○	○	○	○
1	2	3	4	5	6	7	8	9

How much confidence do you have in your current opinion about making MMR vaccinations mandatory?

No confidence at all — Very high confidence

○	○	○	○	○	○	○	○	○
1	2	3	4	5	6	7	8	9

How easily could your current opinion about making MMR vaccinations mandatory be changed?

Very easily — Not at all

○	○	○	○	○	○	○	○	○
1	2	3	4	5	6	7	8	9

Past opinion (cont.)

To what extent are you against or in favour of making MMR vaccinations mandatory?

Very much against				Very much in favour
◯	◯	◯	◯	◯
-2	-1	0	+1	+2

To what extent do you agree or disagree with making MMR vaccinations mandatory?

Disagree strongly				Agree strongly
◯	◯	◯	◯	◯
-2	-1	0	+1	+2

To what extent would you be pleased or displeased if MMR vaccinations were made mandatory?

Very pleased				Very displeased
◯	◯	◯	◯	◯
+2	+1	0	-1	-2

Experimental: Manipulation Check, Motivation, Evaluation

Finally, we would like you to think briefly about the information material on vaccinations that was presented to you **in this session**, and think about **how you have read it and thought about it**. Then please answer the following questions:

	Not at all								Very much
To what extent did you pay attention to the material?	1	2	3	4	5	6	7	8	9
	Not at all								Very much
To what extent did you think about the material?	1	2	3	4	5	6	7	8	9
	Very important								Not at all important
How important do you consider your individual answer?	9	8	7	6	5	4	3	2	1
	Very informative								Not at all informative
How informative did you find the information material?	9	8	7	6	5	4	3	2	1
	Very easy								Very difficult
To what extent was the information material easy to understand?	9	8	7	6	5	4	3	2	1
	Very much								Not at all
To what extent did you think carefully about your own answers?	9	8	7	6	5	4	3	2	1
	Very pleasant								Not at all pleasant
To what extent was the information material pleasant to read?	9	8	7	6	5	4	3	2	1

If you have completed the questionnaire, please put it face down on the desk. You may leave the room.

Thank you very much for your participation!

Control: Manipulation Check

Finally, we would like you to think briefly how you **thought about the questions presented to you**. Then please answer the following questions:

	Very important								Not at all important
How important do you consider your individual answer?	9	8	7	6	5	4	3	2	1

	Very much								Not at all
To what extent did you think carefully about your own answers?	9	8	7	6	5	4	3	2	1

If you have completed the questionnaire, please put it face down on the desk. You may leave the room.

Thank you very much for your participation!

Appendix D: Chapter 3 SPSS

```
*---------------------------------------------------------------------------*.
*                       Participant demographics                 *.
*---------------------------------------------------------------------------*.

*Participants' gender distribution*.
FREQUENCIES VARIABLES=Gender
  /ORDER=ANALYSIS.
```

Frequencies

[DataSet1] \\psf\Home\Documents\Thesis\SPSS files\Amendments SPSS\New Study 2 Data 240211.sav

Statistics

Gender

N	**Valid**	**82**
	Missing	**0**

Gender

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	**Female**	**66**	**80.5**	**80.5**	**80.5**
	Male	**16**	**19.5**	**19.5**	**100.0**
	Total	**82**	**100.0**	**100.0**	

```
*Participants' age data*.
DESCRIPTIVES VARIABLES=Age
  /STATISTICS=MEAN STDDEV RANGE MIN MAX.
```

Descriptives

[DataSet1] \\psf\Home\Documents\Thesis\SPSS files\Amendments SPSS\New Study 2 Data 240211.sav

Descriptive Statistics

	N	Range	Minimum	Maximum	Mean	Std. Deviation
Calculated Age	82	26	18	44	20.77	3.574
Valid N (listwise)	82					

```
*Frequencies of conditions*.
CROSSTABS
  /TABLES=Format BY Order Importance
  /FORMAT=AVALUE TABLES
  /CELLS=COUNT
  /COUNT ROUND CELL.
```

Crosstabs

[DataSet1] \\psf\Home\Documents\Thesis\SPSS files\Amendments SPSS\New Study 2 Data 240211.sav

Case Processing Summary

	Cases					
	Valid		Missing		Total	
	N	Percent	N	Percent	N	Percent
Format * Order	82	100.0%	0	.0%	82	100.0%
Format * Importance	82	100.0%	0	.0%	82	100.0%

Format * Order Crosstabulation

Count

		Order		Total
		Current-Past	Past-Current	
Format	TextOnly	9	11	20
	TextNumbers	10	11	21
	TextGraphs	10	10	20
	Control	10	11	21
Total		39	43	82

Format * Importance Crosstabulation

Count

		Importance		Total
		High	Low	
Format	TextOnly	11	9	20
	TextNumbers	11	10	21
	TextGraphs	10	10	20
	Control	11	10	21
Total		43	39	82

```
DESCRIPTIVES VARIABLES=PRE_AttitudeAgreement Pre_Favourable Pre_GoodBad Pre_PositiveNegative
    Pre_Certain Pre_Sure Pre_Firm Pre_Confidence Pre_Change
  /STATISTICS=MEAN STDDEV RANGE MIN MAX KURTOSIS SKEWNESS.
```

Descriptives

[DataSet1] \\psf\Home\Documents\Thesis\SPSS files\Amendments SPSS\New Study 2 Data 240211.sav

Descriptive Statistics

	N	Range	Minimum	Maximum	Mean	Std. Deviation	Skewness		Kurtosis	
	Statistic	Statistic	Statistic	Statistic	Statistic	Statistic	Statistic	Std. Error	Statistic	Std. Error
PRE_AttitudeAgreement	82	4.00	-2.00	2.00	.6504	.98952	-.662	.266	.171	.526
Pre_Favourable	82	4.00	-2.00	2.00	.7561	1.15000	-.802	.266	-.170	.526
Pre_GoodBad	82	8	1	9	6.43	2.000	-.706	.266	-.124	.526
Pre_PositiveNegative	81	8	1	9	6.62	2.119	-.830	.267	-.205	.529
Pre_Certain	82	8	1	9	6.59	2.036	-1.124	.266	.711	.526
Pre_Sure	82	8	1	9	6.51	2.002	-1.041	.266	.270	.526
Pre_Firm	81	8	1	9	6.35	1.995	-.765	.267	-.126	.529
Pre_Confidence	81	7	2	9	6.46	1.969	-.795	.267	-.170	.529
Pre_Change	82	8	1	9	5.76	2.016	-.399	.266	-.553	.526
Valid N (listwise)	79									

```
*-------------------------------------------------------------------------------*.
* Testing whether data can be merged for indices        *.
*-------------------------------------------------------------------------------*.
*Correlations pre-testing Attitude Agreement*.
CORRELATIONS
  /VARIABLES=Pre_AgainstFavour Pre_Agree Pre_Pleased
  /PRINT=TWOTAIL NOSIG
  /MISSING=PAIRWISE.
```

Correlations

[DataSet1] \\psf\Home\Documents\Thesis\SPSS files\Amendments SPSS\New Study 2 Data 240211.sav

Correlations

		Pre_Against Favour	Pre_Agree	Pre_Pleased
Pre_AgainstFavour	Pearson Correlation	1	.602**	.812**
	Sig. (2-tailed)		.000	.000
	N	82	81	82
Pre_Agree	Pearson Correlation	.602**	1	.613**
	Sig. (2-tailed)	.000		.000
	N	81	81	81
Pre_Pleased	Pearson Correlation	.812**	.613**	1
	Sig. (2-tailed)	.000	.000	
	N	82	81	82

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

```
*Correlations pre-testing Attitude Positivity*.
CORRELATIONS
  /VARIABLES=Pre_Favourable Pre_GoodBad Pre_PositiveNegative
  /PRINT=TWOTAIL NOSIG
  /MISSING=PAIRWISE.
```

Correlations

[DataSet1] \\psf\Home\Documents\Thesis\SPSS files\Amendments SPSS\New Study 2 Data 240211.sav

Correlations

		Pre_ Favourable	Pre_GoodBad	Pre_Positive Negative
Pre_Favourable	Pearson Correlation	1	.776**	.780**
	Sig. (2-tailed)		.000	.000
	N	82	82	81
Pre_GoodBad	Pearson Correlation	.776**	1	.863**
	Sig. (2-tailed)	.000		.000
	N	82	82	81
Pre_PositiveNegative	Pearson Correlation	.780**	.863**	1
	Sig. (2-tailed)	.000	.000	
	N	81	81	81

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

```
*Correlations pre-testing Attitude Certainty*.
CORRELATIONS
  /VARIABLES=Pre_Certain Pre_Sure Pre_Firm Pre_Confidence Pre_Change
  /PRINT=TWOTAIL NOSIG
  /MISSING=PAIRWISE.
```

Correlations

[DataSet1] \\psf\Home\Documents\Thesis\SPSS files\Amendments SPSS\New Study 2 Data 240211.sav

Correlations

		Pre_Certain	Pre_Sure	Pre_Firm	Pre_Confidence	Pre_Change
Pre_Certain	Pearson Correlation	1	.477**	.801**	.795**	.534**
	Sig. (2-tailed)		.000	.000	.000	.000
	N	82	82	81	81	82
Pre_Sure	Pearson Correlation	.477**	1	.435**	.540**	.273*
	Sig. (2-tailed)	.000		.000	.000	.013
	N	82	82	81	81	82
Pre_Firm	Pearson Correlation	.801**	.435**	1	.861**	.668**
	Sig. (2-tailed)	.000	.000		.000	.000
	N	81	81	81	80	81
Pre_Confidence	Pearson Correlation	.795**	.540**	.861**	1	.607**
	Sig. (2-tailed)	.000	.000	.000		.000
	N	81	81	80	81	81
Pre_Change	Pearson Correlation	.534**	.273*	.668**	.607**	1
	Sig. (2-tailed)	.000	.013	.000	.000	
	N	82	82	81	81	82

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

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

```
*Correlations current opinion Attitude Agreement*.
CORRELATIONS
  /VARIABLES=CO_AgainstFavour CO_Agree CO_Pleased
  /PRINT=TWOTAIL NOSIG
  /MISSING=PAIRWISE.
```

Correlations

[DataSet1] \\psf\Home\Documents\Thesis\SPSS files\Amendments SPSS\New Study 2 Data 240211.sav

Correlations

		CO_Against Favour	CO_Agree	CO_Pleased
CO_AgainstFavour	Pearson Correlation	1	.901**	.720**
	Sig. (2-tailed)		.000	.000
	N	81	81	81
CO_Agree	Pearson Correlation	.901**	1	.742**
	Sig. (2-tailed)	.000		.000
	N	81	81	81
CO_Pleased	Pearson Correlation	.720**	.742**	1
	Sig. (2-tailed)	.000	.000	
	N	81	81	81

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

```
*correlations current opinion Attitude Positivity*.
CORRELATIONS
  /VARIABLES=CO_Favourable CO_GoodBad CO_PositiveNegative
  /PRINT=TWOTAIL NOSIG
  /MISSING=PAIRWISE.
```

Correlations

[DataSet1] \\psf\Home\Documents\Thesis\SPSS files\Amendments SPSS\New Study 2 Data 240211.sav

Correlations

		CO_ Favourable	CO_GoodBad	CO_Positive Negative
CO_Favourable	Pearson Correlation	1	.915**	.752**
	Sig. (2-tailed)		.000	.000
	N	81	81	80
CO_GoodBad	Pearson Correlation	.915**	1	.745**
	Sig. (2-tailed)	.000		.000
	N	81	81	80
CO_PositiveNegative	Pearson Correlation	.752**	.745**	1
	Sig. (2-tailed)	.000	.000	
	N	80	80	80

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

```
*Correlations Current Opinion Attitude Certainty*.
CORRELATIONS
  /VARIABLES=CO_Certain CO_Sure CO_Firm CO_Confidence CO_Change
  /PRINT=TWOTAIL NOSIG
  /MISSING=PAIRWISE.
```

Correlations

[DataSet1] \\psf\Home\Documents\Thesis\SPSS files\Amendments SPSS\New Study 2 Data 240211.sav

Correlations

		CO_Certain	CO_Sure	CO_Firm	CO_ Confidence	CO_Change
CO_Certain	Pearson Correlation	1	.645**	.868**	.950**	.737**
	Sig. (2-tailed)		.000	.000	.000	.000
	N	81	81	81	81	81
CO_Sure	Pearson Correlation	.645**	1	.600**	.696**	.475**
	Sig. (2-tailed)	.000		.000	.000	.000
	N	81	81	81	81	81
CO_Firm	Pearson Correlation	.868**	.600**	1	.870**	.631**
	Sig. (2-tailed)	.000	.000		.000	.000
	N	81	81	81	81	81
CO_Confidence	Pearson Correlation	.950**	.696**	.870**	1	.742**
	Sig. (2-tailed)	.000	.000	.000		.000
	N	81	81	81	81	81
CO_Change	Pearson Correlation	.737**	.475**	.631**	.742**	1
	Sig. (2-tailed)	.000	.000	.000	.000	
	N	81	81	81	81	81

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

```
*Correlations past opinion Attitude Agreement*.
CORRELATIONS
  /VARIABLES=PO_AgainstFavour PO_Agree PO_Pleased
  /PRINT=TWOTAIL NOSIG
  /MISSING=PAIRWISE.
```

Correlations

[DataSet1] \\psf\Home\Documents\Thesis\SPSS files\Amendments SPSS\New Study 2 Data 240211.sav

Correlations

		PO_Against Favour	PO_Agree	PO_Pleased
PO_AgainstFavour	Pearson Correlation	1	.910**	.875**
	Sig. (2-tailed)		.000	.000
	N	82	82	82
PO_Agree	Pearson Correlation	.910**	1	.833**
	Sig. (2-tailed)	.000		.000
	N	82	82	82
PO_Pleased	Pearson Correlation	.875**	.833**	1
	Sig. (2-tailed)	.000	.000	
	N	82	82	82

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

```
*correlations past opinion Attitude Positivity*.
CORRELATIONS
  /VARIABLES=PO_Favourable PO_GoodBad PO_PositiveNegative
  /PRINT=TWOTAIL NOSIG
  /MISSING=PAIRWISE.
```

Correlations

[DataSet1] \\psf\Home\Documents\Thesis\SPSS files\Amendments SPSS\New Study 2 Data 240211.sav

Correlations

		PO_ Favourable	PO_GoodBad	PO_Positive Negative
PO_Favourable	Pearson Correlation	1	.907**	.658**
	Sig. (2-tailed)		.000	.000
	N	82	82	82
PO_GoodBad	Pearson Correlation	.907**	1	.689**
	Sig. (2-tailed)	.000		.000
	N	82	82	82
PO_PositiveNegative	Pearson Correlation	.658**	.689**	1
	Sig. (2-tailed)	.000	.000	
	N	82	82	82

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

```
*Correlations past Opinion Attitude Certainty*.
CORRELATIONS
  /VARIABLES=PO_Certain PO_Sure PO_Firm PO_Confidence PO_Change
  /PRINT=TWOTAIL NOSIG
  /MISSING=PAIRWISE.
```

Correlations

[DataSet1] \\psf\Home\Documents\Thesis\SPSS files\Amendments SPSS\New Study 2 Data 240211.sav

Correlations

		Retrospective Attitude: Certain	Retrospective Attitude: Sure	Retrospective Attitude: Firm	Retrospective Attitude: Confidence	Retrospective Attitude: Change
Retrospective Attitude: Certain	Pearson Correlation	1	.682**	.850**	.859**	.671**
	Sig. (2-tailed)		.000	.000	.000	.000
	N	81	81	81	81	81
Retrospective Attitude: Sure	Pearson Correlation	.682**	1	.570**	.613**	.510**
	Sig. (2-tailed)	.000		.000	.000	.000
	N	81	82	82	82	82
Retrospective Attitude: Firm	Pearson Correlation	.850**	.570**	1	.881**	.668**
	Sig. (2-tailed)	.000	.000		.000	.000
	N	81	82	82	82	82
Retrospective Attitude: Confidence	Pearson Correlation	.859**	.613**	.881**	1	.760**
	Sig. (2-tailed)	.000	.000	.000		.000
	N	81	82	82	82	82
Retrospective Attitude: Change	Pearson Correlation	.671**	.510**	.668**	.760**	1
	Sig. (2-tailed)	.000	.000	.000	.000	
	N	81	82	82	82	82

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

```
*-------------------------------------------------------------------------*.
* Hypothesis testing                                                      *.
*-------------------------------------------------------------------------*.

*Descriptives Current Attitude across Format*.
EXAMINE VARIABLES=CO_AttitudePositivity CO_AttitudeAgreement CO_Certain CO_Sure CO_Firm CO_Confidence
    CO_Change BY Format
  /PLOT BOXPLOT
  /COMPARE GROUP
/STATISTICS None
  /CINTERVAL 95
```



```
  /MISSING LISTWISE
  /NOTOTAL.
```

Explore

[DataSet1] \\psf\Home\Documents\Thesis\SPSS files\Amendments SPSS\New Study 2 Data 240211.sav

Format

Case Processing Summary

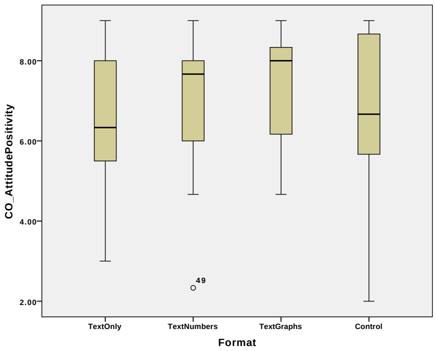
		Cases					
		Valid		Missing		Total	
	Format	N	Percent	N	Percent	N	Percent
CO_AttitudePositivity	**TextOnly**	20	100.0%	0	.0%	20	100.0%
	TextNumbers	21	100.0%	0	.0%	21	100.0%
	TextGraphs	19	95.0%	1	5.0%	20	100.0%
	Control	21	100.0%	0	.0%	21	100.0%
CO_AttitudeAgreement	**TextOnly**	20	100.0%	0	.0%	20	100.0%
	TextNumbers	21	100.0%	0	.0%	21	100.0%
	TextGraphs	19	95.0%	1	5.0%	20	100.0%
	Control	21	100.0%	0	.0%	21	100.0%
CO_Certain	**TextOnly**	20	100.0%	0	.0%	20	100.0%
	TextNumbers	21	100.0%	0	.0%	21	100.0%
	TextGraphs	19	95.0%	1	5.0%	20	100.0%
	Control	21	100.0%	0	.0%	21	100.0%
CO_Sure	**TextOnly**	20	100.0%	0	.0%	20	100.0%
	TextNumbers	21	100.0%	0	.0%	21	100.0%
	TextGraphs	19	95.0%	1	5.0%	20	100.0%
	Control	21	100.0%	0	.0%	21	100.0%

Case Processing Summary

	Format	Cases					
		Valid		Missing		Total	
		N	Percent	N	Percent	N	Percent
CO_Firm	TextOnly	20	100.0%	0	.0%	20	100.0%
	TextNumbers	21	100.0%	0	.0%	21	100.0%
	TextGraphs	19	95.0%	1	5.0%	20	100.0%
	Control	21	100.0%	0	.0%	21	100.0%
CO_Confidence	TextOnly	20	100.0%	0	.0%	20	100.0%
	TextNumbers	21	100.0%	0	.0%	21	100.0%
	TextGraphs	19	95.0%	1	5.0%	20	100.0%
	Control	21	100.0%	0	.0%	21	100.0%
CO_Change	TextOnly	20	100.0%	0	.0%	20	100.0%
	TextNumbers	21	100.0%	0	.0%	21	100.0%
	TextGraphs	19	95.0%	1	5.0%	20	100.0%
	Control	21	100.0%	0	.0%	21	100.0%

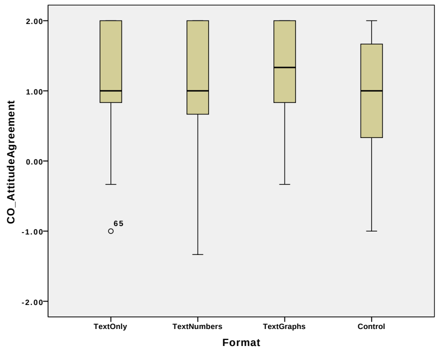
CO_AttitudePositivity

Page 15

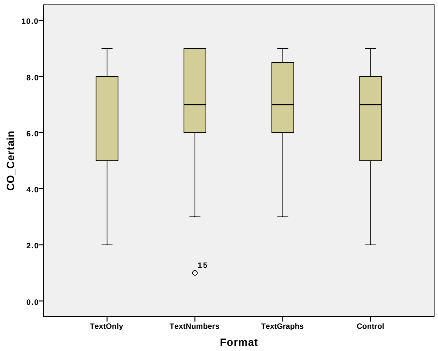


CO_AttitudeAgreement

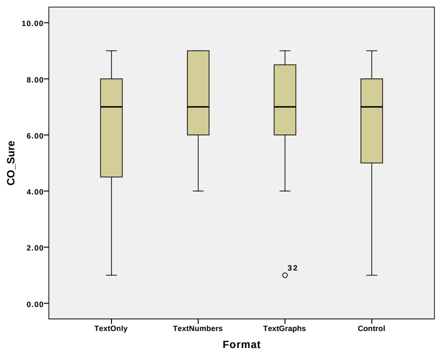
Page 16



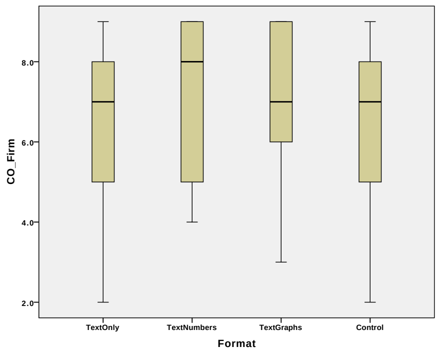
CO_Certain



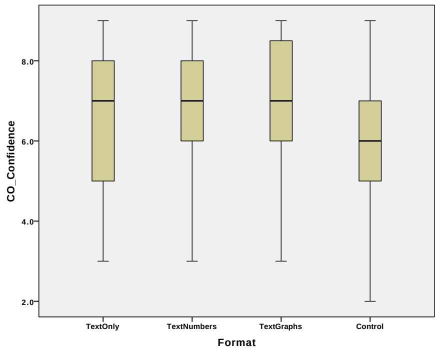
CO_Sure



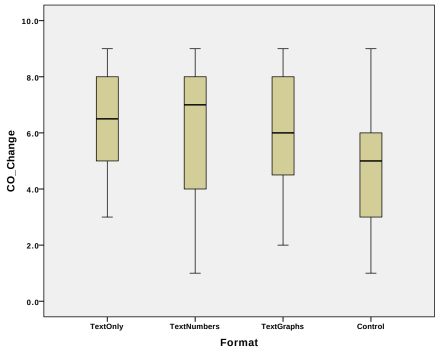
CO_Firm



CO_Confidence



CO_Change




```
ONEWAY CO_AttitudePositivity CO_AttitudeAgreement CO_Certain CO_Sure CO_Firm CO_Confidence
    CO_Change BY Format
  /STATISTICS DESCRIPTIVES
  /MISSING ANALYSIS.
```

Oneway

```
[DataSet1] \\psf\Home\Documents\Thesis\SPSS files\Amendments SPSS\New Study 2 Data 240211.sav
```

Descriptives

		N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean Lower Bound	Upper Bound	Minimum	Maximum
CO_AttitudePositivity	TextOnly	20	6.5167	1.74207	.38954	5.7014	7.3320	3.00	9.00
	TextNumbers	21	7.1111	1.74271	.38029	6.3178	7.9044	2.33	9.00
	TextGraphs	19	7.3333	1.39222	.31940	6.6623	8.0044	4.67	9.00
	Control	21	6.6984	1.87943	.41013	5.8429	7.5539	2.00	9.00
	Total	81	6.9095	1.70376	.18931	6.5327	7.2862	2.00	9.00
CO_AttitudeAgreement	TextOnly	20	1.0833	.82982	.18555	.6950	1.4717	-1.00	2.00
	TextNumbers	21	1.0476	1.01809	.22217	.5842	1.5110	-1.33	2.00
	TextGraphs	19	1.2632	.70780	.16238	.9220	1.6043	-.33	2.00
	Control	21	.8889	.90880	.19832	.4752	1.3026	-1.00	2.00
	Total	81	1.0658	.87149	.09683	.8731	1.2585	-1.33	2.00
CO_Certain	TextOnly	20	6.750	2.0487	.4581	5.791	7.709	2.0	9.0
	TextNumbers	21	6.857	2.1745	.4745	5.867	7.847	1.0	9.0
	TextGraphs	19	7.000	1.7951	.4118	6.135	7.865	3.0	9.0
	Control	21	6.381	1.9869	.4336	5.477	7.285	2.0	9.0
	Total	81	6.741	1.9861	.2207	6.302	7.180	1.0	9.0
CO_Sure	TextOnly	20	6.1500	2.36810	.52952	5.0417	7.2583	1.00	9.00
	TextNumbers	21	7.1905	1.69172	.36916	6.4204	7.9605	4.00	9.00
	TextGraphs	19	6.7895	2.09706	.48110	5.7787	7.8002	1.00	9.00
	Control	21	6.3333	2.10555	.45947	5.3749	7.2918	1.00	9.00

Descriptives

		N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean Lower Bound	Upper Bound	Minimum	Maximum
CO_Sure	Total	81	6.6173	2.07706	.23078	6.1580	7.0766	1.00	9.00
CO_Firm	TextOnly	20	6.550	1.9324	.4321	5.646	7.454	2.0	9.0
	TextNumbers	21	7.095	1.7862	.3898	6.282	7.908	4.0	9.0
	TextGraphs	19	6.842	1.9794	.4541	5.888	7.796	3.0	9.0
	Control	21	6.524	2.0644	.4505	5.584	7.464	2.0	9.0
	Total	81	6.753	1.9205	.2134	6.328	7.178	2.0	9.0
CO_Confidence	TextOnly	20	6.500	1.6702	.3735	5.718	7.282	3.0	9.0
	TextNumbers	21	6.857	1.8516	.4041	6.014	7.700	3.0	9.0
	TextGraphs	19	7.053	1.8700	.4290	6.151	7.954	3.0	9.0
	Control	21	6.190	1.9396	.4232	5.308	7.073	2.0	9.0
	Total	81	6.642	1.8324	.2036	6.237	7.047	2.0	9.0
CO_Change	TextOnly	20	6.400	1.5694	.3509	5.665	7.135	3.0	9.0
	TextNumbers	21	5.810	2.4823	.5417	4.680	6.939	1.0	9.0
	TextGraphs	19	6.053	2.3915	.5486	4.900	7.205	2.0	9.0
	Control	21	5.095	2.2783	.4972	4.058	6.132	1.0	9.0
	Total	81	5.827	2.2237	.2471	5.335	6.319	1.0	9.0

ANOVA

		Sum of Squares	df	Mean Square	F	Sig.
CO_AttitudePositivity	Between Groups	8.289	3	2.763	.950	.421
	Within Groups	223.936	77	2.908		
	Total	232.225	80			
CO_AttitudeAgreement	Between Groups	1.410	3	.470	.610	.611
	Within Groups	59.350	77	.771		
	Total	60.760	80			
CO_Certain	Between Groups	4.282	3	1.427	.353	.787
	Within Groups	311.274	77	4.043		
	Total	315.556	80			
CO_Sure	Between Groups	13.523	3	4.508	1.047	.377
	Within Groups	331.613	77	4.307		
	Total	345.136	80			
CO_Firm	Between Groups	4.538	3	1.513	.401	.753
	Within Groups	290.524	77	3.773		
	Total	295.062	80			
CO_Confidence	Between Groups	8.860	3	2.953	.875	.458
	Within Groups	259.757	77	3.373		
	Total	268.617	80			
CO_Change	Between Groups	18.785	3	6.262	1.280	.287
	Within Groups	376.795	77	4.893		
	Total	395.580	80			

```
*Descriptives manipulation check Importance - Perceived Importance*.
EXAMINE VARIABLES=MC_Important BY Importance
  /PLOT BOXPLOT
  /COMPARE GROUP
  /STATISTICS DESCRIPTIVES
```



```
  /CINTERVAL 95
  /MISSING LISTWISE
  /NOTOTAL.
```

Explore

[DataSet1] \\psf\Home\Documents\Thesis\SPSS files\Amendments SPSS\New Study 2 Data 240211.sav

Importance

Case Processing Summary

	Importance	Cases					
		Valid		Missing		Total	
		N	Percent	N	Percent	N	Percent
MC_Important	High	43	100.0%	0	.0%	43	100.0%
	Low	38	97.4%	1	2.6%	39	100.0%

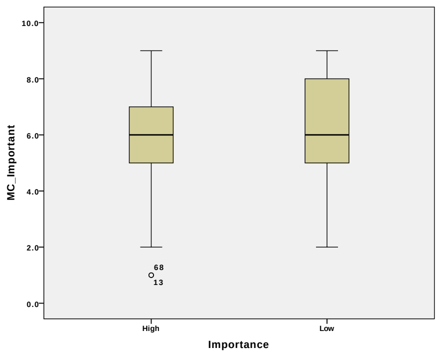
Descriptives

Importance				Statistic	Std. Error
MC_Important	High	Mean		6.000	.3104
		95% Confidence Interval for Mean	Lower Bound	5.374	
			Upper Bound	6.626	

Descriptives

	Importance			Statistic	Std. Error
MC_Important	High	5% Trimmed Mean		6.107	
		Median		6.000	
		Variance		4.143	
		Std. Deviation		2.0354	
		Minimum		1.0	
		Maximum		9.0	
		Range		8.0	
		Interquartile Range		2.0	
		Skewness		-.817	.361
		Kurtosis		.240	.709
	Low	Mean		6.053	.2968
		95% Confidence Interval for Mean	Lower Bound	5.451	
			Upper Bound	6.654	
		5% Trimmed Mean		6.088	
		Median		6.000	
		Variance		3.349	
		Std. Deviation		1.8299	
		Minimum		2.0	
		Maximum		9.0	
		Range		7.0	
		Interquartile Range		3.0	
		Skewness		-.445	.383
		Kurtosis		-.577	.750

MC_Important



Testing for effect of manipulated importance on perceived importance.

```
DESCRIPTIVES VARIABLES=MC_Important
  /STATISTICS=MEAN STDDEV MIN MAX.
```

Descriptives

[DataSet1] \\psf\Home\Documents\Thesis\SPSS files\Amendments SPSS\New Study 2 Data 240211.sav

```
ONEWAY MC_Important BY Importance
  /MISSING ANALYSIS.
```

Oneway

```
[DataSet1] \\psf\Home\Documents\Thesis\SPSS files\Amendments SPSS\New Study 2 Data 240211.sav
```

ANOVA

MC_Important

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	.056	1	.056	.015	.903
Within Groups	297.895	79	3.771		
Total	297.951	80			

```
DESCRIPTIVES VARIABLES=MC_Think_Material
  /STATISTICS=MEAN STDDEV MIN MAX.
```

Descriptives

```
[DataSet1] \\psf\Home\Documents\Thesis\SPSS files\Amendments SPSS\New Study 2 Data 240211.sav
```

Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation
MC_Think_Material	60	3.0	9.0	7.067	1.2870
Valid N (listwise)	60				

```
*Descriptives manipulation check Importance - Thinking about Material*.
EXAMINE VARIABLES=MC_Think_Material BY Importance
  /PLOT BOXPLOT
  /COMPARE GROUP
  /STATISTICS DESCRIPTIVES
  /CINTERVAL 95
  /MISSING LISTWISE
  /NOTOTAL.

DESCRIPTIVES VARIABLES=MC_Think_Material
  /STATISTICS=MEAN STDDEV MIN MAX.
```


Descriptives

```
[DataSet1] /Users/daniela/Documents/Thesis/SPSS files/Amendments SPSS/New Study 2 Data 240211.sav
```

Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation
MC_Think_Material	60	3.0	9.0	7.067	1.2870
Valid N (listwise)	60				

Explore

```
[DataSet1] \\psf\Home\Documents\Thesis\SPSS files\Amendments SPSS\New Study 2 Data 240211.sav
```

Importance

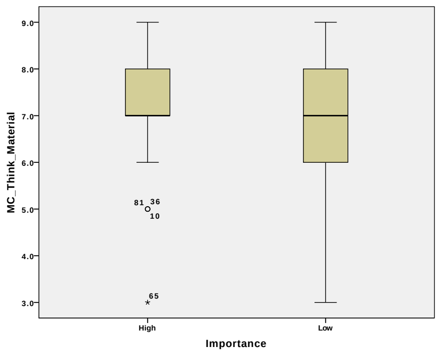
Case Processing Summary

		Cases					
		Valid		Missing		Total	
	Importance	N	Percent	N	Percent	N	Percent
MC_Think_Material	High	32	74.4%	11	25.6%	43	100.0%
	Low	28	71.8%	11	28.2%	39	100.0%

Descriptives

Importance				Statistic	Std. Error
MC_Think_Material	High	Mean		7.063	.2242
		95% Confidence Interval for Mean	Lower Bound	6.605	
			Upper Bound	7.520	
		5% Trimmed Mean		7.139	
		Median		7.000	
		Variance		1.609	
		Std. Deviation		1.2684	
		Minimum		3.0	
		Maximum		9.0	
		Range		6.0	
		Interquartile Range		1.0	
		Skewness		-1.237	.414
		Kurtosis		2.240	.809
	Low	Mean		7.071	.2516
		95% Confidence Interval for Mean	Lower Bound	6.555	
			Upper Bound	7.588	
		5% Trimmed Mean		7.143	
		Median		7.000	
		Variance		1.772	
		Std. Deviation		1.3313	
		Minimum		3.0	
		Maximum		9.0	
		Range		6.0	
		Interquartile Range		2.0	
		Skewness		-.647	.441
		Kurtosis		1.900	.858

MC_Think_Material




```
ONEWAY MC_Think_Material BY Importance
  /MISSING ANALYSIS.
```

Oneway

```
[DataSet1] \\psf\Home\Documents\Thesis\SPSS files\Amendments SPSS\New Study 2 Data 240211.sav
```

```
*Testing for effect of order on perceived importance*.
ONEWAY MC_Important BY Order
  /MISSING ANALYSIS.
```

Oneway

[DataSet1] \\psf\Home\Documents\Thesis\SPSS files\Amendments SPSS\New Study 2 Data 240211.sav

ANOVA

MC_Important

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	**5.943**	**1**	**5.943**	**1.608**	**.209**
Within Groups	**292.007**	**79**	**3.696**		
Total	**297.951**	**80**			

```
*Testing for effect of actual (perceived) importance on current attitude indices*.
ONEWAY CO_AttitudePositivity CO_AttitudeAgreement CO_Sure CO_Certain
    CO_Firm CO_Confidence CO_Change BY MC_Important
  /MISSING ANALYSIS.
```

Oneway

[DataSet1] \\psf\Home\Documents\Thesis\SPSS files\Amendments SPSS\New Study 2 Data 240211.sav

ANOVA

		Sum of Squares	df	Mean Square	F	Sig.
CO_AttitudePositivity	Between Groups	13.174	8	1.647	.541	.822
	Within Groups	219.051	72	3.042		
	Total	232.225	80			
CO_AttitudeAgreement	Between Groups	3.676	8	.459	.580	.791
	Within Groups	57.084	72	.793		
	Total	60.760	80			
CO_Sure	Between Groups	14.188	8	1.774	.386	.925
	Within Groups	330.948	72	4.596		
	Total	345.136	80			
CO_Certain	Between Groups	25.783	8	3.223	.801	.604
	Within Groups	289.773	72	4.025		
	Total	315.556	80			
CO_Firm	Between Groups	23.988	8	2.998	.796	.608
	Within Groups	271.074	72	3.765		
	Total	295.062	80			
CO_Confidence	Between Groups	19.243	8	2.405	.695	.695
	Within Groups	249.374	72	3.464		
	Total	268.617	80			
CO_Change	Between Groups	45.681	8	5.710	1.175	.326
	Within Groups	349.899	72	4.860		
	Total	395.580	80			

```
*Testing for effect of perceived importance / format on Current attitude*.
GLM CO_AttitudePositivity CO_AttitudeAgreement CO_Certain CO_Sure CO_Firm CO_Confidence CO_Change
    BY Format MC_Important
  /METHOD=SSTYPE(3)
  /INTERCEPT=INCLUDE
```

```
 /CRITERIA=ALPHA(.05)
/PRINT=ETASQ OPOWER HOMOGENEITY
 /DESIGN= Format MC_Important Format*MC_Important.
```

General Linear Model

[DataSet1] \\psf\Home\Documents\Thesis\SPSS files\Amendments SPSS\New Study 2 Data 240211.sav

Between-Subjects Factors

		Value Label	N
Format	**1.0**	**TextOnly**	**20**
	2.0	**TextNumbers**	**21**
	3.0	**TextGraphs**	**19**
	4.0	**Control**	**21**
MC_Important	**1.0**		**2**
	2.0		**2**
	3.0		**7**
	4.0		**6**
	5.0		**8**
	6.0		**20**
	7.0		**16**
	8.0		**15**
	9.0		**5**

Box's Test of Equality of Covariance Matrices[a]

Box's M	88.101
F	1.655
df1	28
df2	782.408
Sig.	.018

Tests the null hypothesis that the observed covariance matrices of the dependent variables are equal across groups.

a. Design: Intercept + Format + MC_Important + Format * MC_Important

Multivariate Tests[d]

Effect		Value	F	Hypothesis df	Error df	Sig.	Partial Eta Squared	Noncent. Parameter
Intercept	Pillai's Trace	.977	280.589[a]	7.000	47.000	.000	.977	1964.121
	Wilks' Lambda	.023	280.589[a]	7.000	47.000	.000	.977	1964.121
	Hotelling's Trace	41.790	280.589[a]	7.000	47.000	.000	.977	1964.121
	Roy's Largest Root	41.790	280.589[a]	7.000	47.000	.000	.977	1964.121
Format	Pillai's Trace	.330	.866	21.000	147.000	.635	.110	18.185
	Wilks' Lambda	.703	.841	21.000	135.509	.665	.111	16.861
	Hotelling's Trace	.375	.816	21.000	137.000	.696	.111	17.146
	Roy's Largest Root	.174	1.216[c]	7.000	49.000	.312	.148	8.515
MC_Important	Pillai's Trace	.629	.654	56.000	371.000	.973	.090	36.622
	Wilks' Lambda	.500	.635	56.000	258.414	.979	.094	26.934
	Hotelling's Trace	.771	.624	56.000	317.000	.983	.099	34.921
	Roy's Largest Root	.363	2.403[c]	8.000	53.000	.027	.266	19.223
Format * MC_Important	Pillai's Trace	1.416	.840	112.000	371.000	.864	.202	94.081
	Wilks' Lambda	.180	.850	112.000	313.522	.843	.217	86.998
	Hotelling's Trace	2.134	.863	112.000	317.000	.819	.234	96.618
	Roy's Largest Root	.871	2.885[c]	16.000	53.000	.002	.466	46.161

a. Exact statistic

c. The statistic is an upper bound on F that yields a lower bound on the significance level.

d. Design: Intercept + Format + MC_Important + Format * MC_Important

Multivariate Tests[d]

Effect		Observed Power[b]
Intercept	Pillai's Trace	1.000
	Wilks' Lambda	1.000
	Hotelling's Trace	1.000
	Roy's Largest Root	1.000
Format	Pillai's Trace	.650
	Wilks' Lambda	.601
	Hotelling's Trace	.612
	Roy's Largest Root	.467
MC_Important	Pillai's Trace	.828
	Wilks' Lambda	.621
	Hotelling's Trace	.793
	Roy's Largest Root	.848
Format * MC_Important	Pillai's Trace	.994
	Wilks' Lambda	.985
	Hotelling's Trace	.994
	Roy's Largest Root	.989

b. Computed using alpha = .05

d. Design: Intercept + Format + MC_Important + Format * MC_Important

Levene's Test of Equality of Error Variances[a]

	F	df1	df2	Sig.
CO_AttitudePositivity	1.648	27	53	.060
CO_AttitudeAgreement	2.298	27	53	.005
CO_Certain	2.149	27	53	.009
CO_Sure	3.422	27	53	.000
CO_Firm	2.380	27	53	.003
CO_Confidence	1.987	27	53	.016
CO_Change	2.841	27	53	.001

Tests the null hypothesis that the error variance of the dependent variable is equal across groups.

a. Design: Intercept + Format + MC_Important + Format * MC_Important

Tests of Between-Subjects Effects

Source	Dependent Variable	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared	Noncent. Parameter
Corrected Model	CO_AttitudePositivity	83.461[a]	27	3.091	1.101	.373	.359	29.735
	CO_AttitudeAgreement	19.802[c]	27	.733	.949	.547	.326	25.623
	CO_Certain	124.747[d]	27	4.620	1.283	.216	.395	34.650
	CO_Sure	109.936[e]	27	4.072	.918	.586	.319	24.773

a. R Squared = .359 (Adjusted R Squared = .033)

c. R Squared = .326 (Adjusted R Squared = -.018)

d. R Squared = .395 (Adjusted R Squared = .087)

e. R Squared = .319 (Adjusted R Squared = -.029)

Tests of Between-Subjects Effects

Source	Dependent Variable	Observed Power[b]
Corrected Model	CO_AttitudePositivity	.752
	CO_AttitudeAgreement	.666
	CO_Certain	.833
	CO_Sure	.646

b. Computed using alpha = .05

Tests of Between-Subjects Effects

Source	Dependent Variable	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared	Noncent. Parameter
Corrected Model	CO_Firm	94.737[f]	27	3.509	.928	.573	.321	25.065
	CO_Confidence	102.784[g]	27	3.807	1.217	.266	.383	32.850
	CO_Change	116.664[h]	27	4.321	.821	.706	.295	22.169
Intercept	CO_AttitudePositivity	2087.151	1	2087.151	743.588	.000	.933	743.588
	CO_AttitudeAgreement	49.470	1	49.470	64.014	.000	.547	64.014
	CO_Certain	1986.911	1	1986.911	551.896	.000	.912	551.896
	CO_Sure	1812.679	1	1812.679	408.469	.000	.885	408.469
	CO_Firm	1992.553	1	1992.553	527.170	.000	.909	527.170
	CO_Confidence	1929.099	1	1929.099	616.536	.000	.921	616.536
	CO_Change	1447.133	1	1447.133	274.985	.000	.838	274.985
Format	CO_AttitudePositivity	14.122	3	4.707	1.677	.183	.087	5.031
	CO_AttitudeAgreement	1.754	3	.585	.756	.524	.041	2.269
	CO_Certain	9.677	3	3.226	.896	.449	.048	2.688
	CO_Sure	16.503	3	5.501	1.240	.305	.066	3.719
	CO_Firm	8.046	3	2.682	.710	.551	.039	2.129
	CO_Confidence	13.791	3	4.597	1.469	.233	.077	4.408
	CO_Change	8.977	3	2.992	.569	.638	.031	1.706

f. R Squared = .321 (Adjusted R Squared = -.025)

g. R Squared = .383 (Adjusted R Squared = .068)

h. R Squared = .295 (Adjusted R Squared = -.064)

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Tests of Between-Subjects Effects

Source	Dependent Variable	Observed Power[b]
Corrected Model	CO_Firm	.653
	CO_Confidence	.806
	CO_Change	.581
Intercept	CO_AttitudePositivity	1.000
	CO_AttitudeAgreement	1.000
	CO_Certain	1.000
	CO_Sure	1.000
	CO_Firm	1.000
	CO_Confidence	1.000
	CO_Change	1.000
Format	CO_AttitudePositivity	.414
	CO_AttitudeAgreement	.201
	CO_Certain	.233
	CO_Sure	.313
	CO_Firm	.191
	CO_Confidence	.367
	CO_Change	.160

b. Computed using alpha = .05

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Tests of Between-Subjects Effects

Source	Dependent Variable	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared	Noncent. Parameter
MC_Important	CO_AttitudePositivity	8.501	8	1.063	.379	.927	.054	3.029
	CO_AttitudeAgreement	2.418	8	.302	.391	.921	.056	3.129
	CO_Certain	30.230	8	3.779	1.050	.412	.137	8.397
	CO_Sure	25.538	8	3.192	.719	.674	.098	5.755
	CO_Firm	25.440	8	3.180	.841	.571	.113	6.731
	CO_Confidence	22.062	8	2.758	.881	.538	.117	7.051
	CO_Change	45.543	8	5.693	1.082	.390	.140	8.654
Format * MC_Important	CO_AttitudePositivity	63.726	16	3.983	1.419	.169	.300	22.704
	CO_AttitudeAgreement	14.623	16	.914	1.183	.312	.263	18.922
	CO_Certain	93.463	16	5.841	1.623	.095	.329	25.961
	CO_Sure	75.032	16	4.689	1.057	.417	.242	16.908
	CO_Firm	64.261	16	4.016	1.063	.412	.243	17.002
	CO_Confidence	74.055	16	4.628	1.479	.143	.309	23.668
	CO_Change	57.043	16	3.565	.677	.803	.170	10.839

Tests of Between-Subjects Effects

Source	Dependent Variable	Observed Power[b]
MC_Important	CO_AttitudePositivity	.163
	CO_AttitudeAgreement	.167
	CO_Certain	.435
	CO_Sure	.297
	CO_Firm	.348
	CO_Confidence	.365
	CO_Change	.449
Format * MC_Important	CO_AttitudePositivity	.768
	CO_AttitudeAgreement	.667
	CO_Certain	.835
	CO_Sure	.603
	CO_Firm	.606
	CO_Confidence	.789
	CO_Change	.383

b. Computed using alpha = .05

Tests of Between-Subjects Effects

Source	Dependent Variable	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared	Noncent. Parameter
Error	CO_AttitudePositivity	148.764	53	2.807				
	CO_AttitudeAgreement	40.958	53	.773				
	CO_Certain	190.808	53	3.600				
	CO_Sure	235.200	53	4.438				
	CO_Firm	200.325	53	3.780				
	CO_Confidence	165.833	53	3.129				
	CO_Change	278.917	53	5.263				
Total	CO_AttitudePositivity	4099.222	81					
	CO_AttitudeAgreement	152.778	81					
	CO_Certain	3996.000	81					
	CO_Sure	3892.000	81					
	CO_Firm	3989.000	81					
	CO_Confidence	3842.000	81					
	CO_Change	3146.000	81					

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Tests of Between-Subjects Effects

Source	Dependent Variable	Observed Power[b]
Error	CO_AttitudePositivity	
	CO_AttitudeAgreement	
	CO_Certain	
	CO_Sure	
	CO_Firm	
	CO_Confidence	
	CO_Change	
Total	CO_AttitudePositivity	
	CO_AttitudeAgreement	
	CO_Certain	
	CO_Sure	
	CO_Firm	
	CO_Confidence	
	CO_Change	

b. Computed using alpha = .05

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Tests of Between-Subjects Effects

Source	Dependent Variable	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared	Noncent. Parameter
Corrected Total	CO_AttitudePositivity	232.225	80					
	CO_AttitudeAgreement	60.760	80					
	CO_Certain	315.556	80					
	CO_Sure	345.136	80					
	CO_Firm	295.062	80					
	CO_Confidence	268.617	80					
	CO_Change	395.580	80					

Tests of Between-Subjects Effects

Source	Dependent Variable	Observed Power[b]
Corrected Total	CO_AttitudePositivity	
	CO_AttitudeAgreement	
	CO_Certain	
	CO_Sure	
	CO_Firm	
	CO_Confidence	
	CO_Change	

b. Computed using alpha = .05

```
*Testing for effect of format on retrospective attitude indices*.
ONEWAY PO_Certain PO_Sure PO_Firm PO_Confidence PO_Change PO_AttitudeAgreement
    PO_AttitudePositivity BY Format
  /STATISTICS DESCRIPTIVES HOMOGENEITY BROWNFORSYTHE WELCH
  /MISSING ANALYSIS.
```

Oneway

[DataSet1] \\psf\Home\Documents\Thesis\SPSS files\Amendments SPSS\New Study 2 Data 240211.sav

Descriptives

		N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
						Lower Bound	Upper Bound		
Retrospective Attitude: Certain	TextOnly	20	6.350	1.8994	.4247	5.461	7.239	1.0	8.0
	TextNumbers	20	6.400	1.8180	.4065	5.549	7.251	2.0	9.0
	TextGraphs	20	6.550	1.9324	.4321	5.646	7.454	1.0	9.0
	Control	21	6.238	2.0713	.4520	5.295	7.181	1.0	9.0
	Total	81	6.383	1.9011	.2112	5.962	6.803	1.0	9.0
Retrospective Attitude: Sure	TextOnly	20	5.8000	2.09259	.46792	4.8206	6.7794	1.00	8.00
	TextNumbers	21	5.8571	2.32993	.50843	4.7966	6.9177	2.00	9.00
	TextGraphs	20	5.7500	2.40340	.53742	4.6252	6.8748	1.00	9.00
	Control	21	5.8571	2.28661	.49898	4.8163	6.8980	1.00	9.00
	Total	82	5.8171	2.23953	.24732	5.3250	6.3092	1.00	9.00
Retrospective Attitude: Firm	TextOnly	20	6.300	1.6255	.3635	5.539	7.061	2.0	8.0
	TextNumbers	21	6.333	1.9833	.4328	5.431	7.236	1.0	9.0
	TextGraphs	20	6.450	2.3278	.5205	5.361	7.539	1.0	9.0
	Control	21	6.286	2.0036	.4372	5.374	7.198	1.0	9.0
	Total	82	6.341	1.9640	.2169	5.910	6.773	1.0	9.0
Retrospective Attitude: Confidence	TextOnly	20	6.400	1.6351	.3656	5.635	7.165	2.0	8.0
	TextNumbers	21	6.762	1.7293	.3774	5.975	7.549	2.0	9.0
	TextGraphs	20	6.300	2.2266	.4979	5.258	7.342	1.0	9.0
	Control	21	6.333	2.0083	.4383	5.419	7.248	2.0	9.0

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Descriptives

		N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
						Lower Bound	Upper Bound		
Retrospective Attitude: Confidence	Total	82	6.451	1.8866	.2083	6.037	6.866	1.0	9.0
Retrospective Attitude: Change	TextOnly	20	6.300	1.8382	.4110	5.440	7.160	2.0	9.0
	TextNumbers	21	6.333	1.9322	.4216	5.454	7.213	3.0	9.0
	TextGraphs	20	5.800	2.1423	.4790	4.797	6.803	1.0	9.0
	Control	21	5.143	2.0805	.4540	4.196	6.090	1.0	9.0
	Total	82	5.890	2.0246	.2236	5.445	6.335	1.0	9.0
Retrospective Attitude Agreement	TextOnly	20	.6167	.94451	.21120	.1746	1.0587	-1.00	2.00
	TextNumbers	21	.8571	1.10339	.24078	.3549	1.3594	-2.00	2.00
	TextGraphs	20	.9833	.59702	.13350	.7039	1.2627	.00	2.00
	Control	21	.9048	.85728	.18707	.5145	1.2950	-1.00	2.00
	Total	82	.8415	.89078	.09837	.6457	1.0372	-2.00	2.00
Retrospective Attitude Positivity	TextOnly	20	6.1167	1.69718	.37950	5.3224	6.9110	3.00	9.00
	TextNumbers	21	6.5873	1.97176	.43027	5.6898	7.4848	2.00	9.00
	TextGraphs	20	6.7667	1.38539	.30978	6.1183	7.4150	5.00	9.00
	Control	21	6.7619	1.89486	.41349	5.8994	7.6244	2.00	9.00
	Total	82	6.5610	1.74419	.19261	6.1777	6.9442	2.00	9.00

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Test of Homogeneity of Variances

	Levene Statistic	df1	df2	Sig.
Retrospective Attitude: Certain	.159	3	77	.923
Retrospective Attitude: Sure	.166	3	78	.919
Retrospective Attitude: Firm	.505	3	78	.680
Retrospective Attitude: Confidence	.740	3	78	.531
Retrospective Attitude: Change	.093	3	78	.964
Retrospective Attitude Agreement	2.691	3	78	.052
Retrospective Attitude Positivity	1.061	3	78	.371

ANOVA

		Sum of Squares	df	Mean Square	F	Sig.
Retrospective Attitude: Certain	Between Groups	1.026	3	.342	.091	.965
	Within Groups	288.110	77	3.742		
	Total	289.136	80			
Retrospective Attitude: Sure	Between Groups	.163	3	.054	.010	.999
	Within Groups	406.093	78	5.206		
	Total	406.256	81			
Retrospective Attitude: Firm	Between Groups	.337	3	.112	.028	.994
	Within Groups	312.102	78	4.001		

ANOVA

		Sum of Squares	df	Mean Square	F	Sig.
Retrospective Attitude: Firm	Total	312.439	81			
Retrospective Attitude: Confidence	Between Groups	2.829	3	.943	.258	.856
	Within Groups	285.476	78	3.660		
	Total	288.305	81			
Retrospective Attitude: Change	Between Groups	19.374	3	6.458	1.611	.194
	Within Groups	312.638	78	4.008		
	Total	332.012	81			
Retrospective Attitude Agreement	Between Groups	1.503	3	.501	.622	.603
	Within Groups	62.770	78	.805		
	Total	64.272	81			
Retrospective Attitude Positivity	Between Groups	5.657	3	1.886	.611	.610
	Within Groups	240.761	78	3.087		
	Total	246.417	81			

Robust Tests of Equality of Means

		Statistic[a]	df1	df2	Sig.
Retrospective Attitude: Certain	Welch	.084	3	42.767	.968
	Brown-Forsythe	.092	3	76.632	.964
Retrospective Attitude: Sure	Welch	.010	3	43.263	.999
	Brown-Forsythe	.010	3	77.252	.999
Retrospective Attitude: Firm	Welch	.023	3	43.014	.995
	Brown-Forsythe	.028	3	73.277	.994
Retrospective Attitude: Confidence	Welch	.274	3	43.017	.844
	Brown-Forsythe	.257	3	73.170	.856
Retrospective Attitude: Change	Welch	1.554	3	43.229	.214
	Brown-Forsythe	1.612	3	76.823	.194
Retrospective Attitude Agreement	Welch	.704	3	42.384	.555
	Brown-Forsythe	.627	3	68.590	.600
Retrospective Attitude Positivity	Welch	.662	3	43.096	.580
	Brown-Forsythe	.615	3	74.419	.607

a. Asymptotically F distributed.

```
*Tests for differences in attitude overall between Pre-testing and current attitude*.
T-TEST PAIRS=Pre_AttitudePositivity Pre_Sure Pre_Certain Pre_Firm Pre_Confidence Pre_Change
WITH CO_AttitudePositivity  CO_Sure CO_Certain CO_Firm CO_Confidence CO_Change
    (PAIRED)
  /CRITERIA=CI(.9500)
  /MISSING=ANALYSIS.
```

T-Test

[DataSet1] \\psf\Home\Documents\Thesis\SPSS files\Amendments SPSS\New Study 2 Data 240211.sav

Paired Samples Statistics

		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	PRE_AttitudePositivity	4.5864	81	1.64720	.18302
	CO_AttitudePositivity	6.9095	81	1.70376	.18931
Pair 2	Pre_Sure	6.51	81	2.013	.224
	CO_Sure	6.6173	81	2.07706	.23078
Pair 3	Pre_Certain	6.58	81	2.049	.228
	CO_Certain	6.741	81	1.9861	.2207
Pair 4	Pre_Firm	6.34	80	2.006	.224
	CO_Firm	6.725	80	1.9158	.2142
Pair 5	Pre_Confidence	6.49	80	1.962	.219
	CO_Confidence	6.638	80	1.8435	.2061
Pair 6	Pre_Change	5.78	81	2.019	.224
	CO_Change	5.827	81	2.2237	.2471

Paired Samples Correlations

		N	Correlation	Sig.
Pair 1	PRE_AttitudePositivity & CO_AttitudePositivity	81	.681	.000
Pair 2	Pre_Sure & CO_Sure	81	.328	.003
Pair 3	Pre_Certain & CO_Certain	81	.630	.000
Pair 4	Pre_Firm & CO_Firm	80	.575	.000
Pair 5	Pre_Confidence & CO_Confidence	80	.610	.000
Pair 6	Pre_Change & CO_Change	81	.607	.000

Paired Samples Test

		Paired Differences					t	df	Sig. (2-tailed)
					95% Confidence Interval of the Difference				
		Mean	Std. Deviation	Std. Error Mean	Lower	Upper			
Pair 1	PRE_AttitudePositivity - CO_AttitudePositivity	-2.32305	1.33862	.14874	-2.61904	-2.02705	-15.619	80	.000
Pair 2	Pre_Sure - CO_Sure	-.11111	2.37171	.26352	-.63554	.41332	-.422	80	.674
Pair 3	Pre_Certain - CO_Certain	-.1605	1.7353	.1928	-.5442	.2232	-.832	80	.408
Pair 4	Pre_Firm - CO_Firm	-.3875	1.8106	.2024	-.7904	.0154	-1.914	79	.059
Pair 5	Pre_Confidence - CO_Confidence	-.1500	1.6846	.1883	-.5249	.2249	-.796	79	.428
Pair 6	Pre_Change - CO_Change	-.0494	1.8901	.2100	-.4673	.3686	-.235	80	.815

```
*Descriptives Total Attitude Change*.
EXAMINE VARIABLES=Total_Att_Change BY Format
  /PLOT NONE
  /STATISTICS DESCRIPTIVES
  /CINTERVAL 95
  /MISSING LISTWISE
  /NOTOTAL.
```

Explore

[DataSet1] \\psf\Home\Documents\Thesis\SPSS files\Amendments SPSS\New Study 2 Data 240211.sav

Format

Case Processing Summary

		Cases					
		Valid		Missing		Total	
	Format	N	Percent	N	Percent	N	Percent
Total_Att_Change	TextOnly	20	100.0%	0	.0%	20	100.0%
	TextNumbers	21	100.0%	0	.0%	21	100.0%
	TextGraphs	19	95.0%	1	5.0%	20	100.0%
	Control	21	100.0%	0	.0%	21	100.0%

Descriptives

	Format			Statistic	Std. Error
Total_Att_Change	TextOnly	Mean		17.7000	1.16325
		95% Confidence Interval for Mean	Lower Bound	15.2653	
			Upper Bound	20.1347	
		5% Trimmed Mean		17.8333	
		Median		18.0000	
		Variance		27.063	
		Std. Deviation		5.20223	
		Minimum		8.00	
		Maximum		25.00	
		Range		17.00	
		Interquartile Range		9.75	
		Skewness		-.146	.512
		Kurtosis		-1.239	.992
	TextNumbers	Mean		15.8095	1.71495
		95% Confidence Interval for Mean	Lower Bound	12.2322	
			Upper Bound	19.3868	

Descriptives

	Format			Statistic	Std. Error
Total_Att_Change	TextNumbers	5% Trimmed Mean		15.1878	
		Median		15.0000	
		Variance		61.762	
		Std. Deviation		7.85887	
		Minimum		7.00	
		Maximum		36.00	
		Range		29.00	
		Interquartile Range		10.00	
		Skewness		1.174	.501
		Kurtosis		1.202	.972
	TextGraphs	Mean		18.0526	1.43571
		95% Confidence Interval for Mean	Lower Bound	15.0363	
			Upper Bound	21.0689	
		5% Trimmed Mean		18.2251	
		Median		19.0000	
		Variance		39.164	
		Std. Deviation		6.25809	
		Minimum		7.00	
		Maximum		26.00	
		Range		19.00	
		Interquartile Range		11.00	
		Skewness		-.551	.524
		Kurtosis		-1.044	1.014
	Control	Mean		15.0000	1.86318
		95% Confidence Interval for Mean	Lower Bound	11.1135	
			Upper Bound	18.8865	

Descriptives

	Format		Statistic	Std. Error
Total_Att_Change	Control	5% Trimmed Mean	13.7196	
		Median	12.0000	
		Variance	72.900	
		Std. Deviation	8.53815	
		Minimum	8.00	
		Maximum	46.00	
		Range	38.00	
		Interquartile Range	7.50	
		Skewness	2.633	.501
		Kurtosis	8.572	.972

```
*Testing for effect of format on attitude change*.
ONEWAY Total_Att_Change BY Format
  /MISSING ANALYSIS.
```

Oneway

[DataSet1] \\psf\Home\Documents\Thesis\SPSS files\Amendments SPSS\New Study 2 Data 240211.sav

ANOVA

Total_Att_Change

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	131.170	3	43.723	.861	.465
Within Groups	3912.385	77	50.810		
Total	4043.556	80			

```
*Descriptives Evaluations*.
EXAMINE VARIABLES=MC_Informative MC_Pleasantread MC_Understandable BY Format
  /PLOT BOXPLOT
```

```
/COMPARE GROUPS
/STATISTICS DESCRIPTIVES
/CINTERVAL 95
/MISSING LISTWISE
/NOTOTAL.
```

Explore

[DataSet1] \\psf\Home\Documents\Thesis\SPSS files\Amendments SPSS\New Study 2 Data 240211.sav

Warnings

There are no valid cases for MC_Informative when Format = 4.000. Statistics cannot be computed for this level.
There are no valid cases for MC_Pleasantread when Format = 4.000. Statistics cannot be computed for this level.
There are no valid cases for MC_Understandable when Format = 4.000. Statistics cannot be computed for this level.

Format

Case Processing Summary

		Cases					
		Valid		Missing		Total	
	Format	N	Percent	N	Percent	N	Percent
MC_Informative	TextOnly	20	100.0%	0	.0%	20	100.0%
	TextNumbers	21	100.0%	0	.0%	21	100.0%
	TextGraphs	19	95.0%	1	5.0%	20	100.0%
MC_Pleasantread	TextOnly	20	100.0%	0	.0%	20	100.0%
	TextNumbers	21	100.0%	0	.0%	21	100.0%
	TextGraphs	19	95.0%	1	5.0%	20	100.0%
MC_Understandable	TextOnly	20	100.0%	0	.0%	20	100.0%
	TextNumbers	21	100.0%	0	.0%	21	100.0%
	TextGraphs	19	95.0%	1	5.0%	20	100.0%

Descriptives[a,b,c]

	Format			Statistic	Std. Error
MC_Informative	TextOnly	Mean		7.000	.2616
		95% Confidence Interval for Mean	Lower Bound	6.453	
			Upper Bound	7.547	
		5% Trimmed Mean		7.000	
		Median		7.000	
		Variance		1.368	
		Std. Deviation		1.1698	
		Minimum		5.0	
		Maximum		9.0	
		Range		4.0	
		Interquartile Range		2.0	
		Skewness		.000	.512
		Kurtosis		-.684	.992
	TextNumbers	Mean		7.714	.2405
		95% Confidence Interval for Mean	Lower Bound	7.213	
			Upper Bound	8.216	

a. There are no valid cases for MC_Informative when Format = 4.000. Statistics cannot be computed for this level.

b. There are no valid cases for MC_Pleasantread when Format = 4.000. Statistics cannot be computed for this level.

c. There are no valid cases for MC_Understandable when Format = 4.000. Statistics cannot be computed for this level.

Descriptives[a,b,c]

Format				Statistic	Std. Error
MC_Informative	TextNumbers	5% Trimmed Mean		7.791	
		Median		8.000	
		Variance		1.214	
		Std. Deviation		1.1019	
		Minimum		5.0	
		Maximum		9.0	
		Range		4.0	
		Interquartile Range		2.0	
		Skewness		-.607	.501
		Kurtosis		.210	.972
	TextGraphs	Mean		7.474	.2689
		95% Confidence Interval for Mean	Lower Bound	6.909	
			Upper Bound	8.039	

a. There are no valid cases for MC_Informative when Format = 4.000. Statistics cannot be computed for this level.

b. There are no valid cases for MC_Pleasantread when Format = 4.000. Statistics cannot be computed for this level.

c. There are no valid cases for MC_Understandable when Format = 4.000. Statistics cannot be computed for this level.

Descriptives[a,b,c]

Format				Statistic	Std. Error
MC_Informative	TextGraphs	5% Trimmed Mean		7.526	
		Median		8.000	
		Variance		1.374	
		Std. Deviation		1.1723	
		Minimum		5.0	
		Maximum		9.0	
		Range		4.0	
		Interquartile Range		1.0	
		Skewness		-.392	.524
		Kurtosis		-.532	1.014
MC_Pleasantread	TextOnly	Mean		5.350	.3574
		95% Confidence Interval for Mean	Lower Bound	4.602	
			Upper Bound	6.098	

a. There are no valid cases for MC_Informative when Format = 4.000. Statistics cannot be computed for this level.

b. There are no valid cases for MC_Pleasantread when Format = 4.000. Statistics cannot be computed for this level.

c. There are no valid cases for MC_Understandable when Format = 4.000. Statistics cannot be computed for this level.

Descriptives[a,b,c]

	Format			Statistic	Std. Error
MC_Pleasantread	TextOnly	5% Trimmed Mean		5.333	
		Median		5.000	
		Variance		2.555	
		Std. Deviation		1.5985	
		Minimum		3.0	
		Maximum		8.0	
		Range		5.0	
		Interquartile Range		2.5	
		Skewness		-.041	.512
		Kurtosis		-.807	.992
	TextNumbers	Mean		5.714	.5307
		95% Confidence Interval for Mean	Lower Bound	4.607	
			Upper Bound	6.821	

a. There are no valid cases for MC_Informative when Format = 4.000. Statistics cannot be computed for this level.

b. There are no valid cases for MC_Pleasantread when Format = 4.000. Statistics cannot be computed for this level.

c. There are no valid cases for MC_Understandable when Format = 4.000. Statistics cannot be computed for this level.

Descriptives[a,b,c]

	Format			Statistic	Std. Error
MC_Pleasantread	TextNumbers	5% Trimmed Mean		5.791	
		Median		6.000	
		Variance		5.914	
		Std. Deviation		2.4319	
		Minimum		1.0	
		Maximum		9.0	
		Range		8.0	
		Interquartile Range		4.5	
		Skewness		-.254	.501
		Kurtosis		-.963	.972
	TextGraphs	Mean		6.158	.3177
		95% Confidence Interval for Mean	Lower Bound	5.490	
			Upper Bound	6.825	

a. There are no valid cases for MC_Informative when Format = 4.000. Statistics cannot be computed for this level.

b. There are no valid cases for MC_Pleasantread when Format = 4.000. Statistics cannot be computed for this level.

c. There are no valid cases for MC_Understandable when Format = 4.000. Statistics cannot be computed for this level.

Descriptives[a,b,c]

	Format			Statistic	Std. Error
MC_Pleasantread	TextGraphs	5% Trimmed Mean		6.120	
		Median		6.000	
		Variance		1.918	
		Std. Deviation		1.3850	
		Minimum		4.0	
		Maximum		9.0	
		Range		5.0	
		Interquartile Range		2.0	
		Skewness		.247	.524
		Kurtosis		-.554	1.014
MC_Understandable	TextOnly	Mean		7.250	.3315
		95% Confidence Interval for Mean	Lower Bound	6.556	
			Upper Bound	7.944	

a. There are no valid cases for MC_Informative when Format = 4.000. Statistics cannot be computed for this level.

b. There are no valid cases for MC_Pleasantread when Format = 4.000. Statistics cannot be computed for this level.

c. There are no valid cases for MC_Understandable when Format = 4.000. Statistics cannot be computed for this level.

Descriptives[a,b,c]

	Format			Statistic	Std. Error
MC_Understandable	TextOnly	5% Trimmed Mean		7.278	
		Median		7.000	
		Variance		2.197	
		Std. Deviation		1.4824	
		Minimum		5.0	
		Maximum		9.0	
		Range		4.0	
		Interquartile Range		3.0	
		Skewness		-.047	.512
		Kurtosis		-1.297	.992
	TextNumbers	Mean		8.000	.2582
		95% Confidence Interval for Mean	Lower Bound	7.461	
			Upper Bound	8.539	

a. There are no valid cases for MC_Informative when Format = 4.000. Statistics cannot be computed for this level.

b. There are no valid cases for MC_Pleasantread when Format = 4.000. Statistics cannot be computed for this level.

c. There are no valid cases for MC_Understandable when Format = 4.000. Statistics cannot be computed for this level.

Descriptives[a,b,c]

	Format			Statistic	Std. Error
MC_Understandable	TextNumbers	5% Trimmed Mean		8.108	
		Median		8.000	
		Variance		1.400	
		Std. Deviation		1.1832	
		Minimum		5.0	
		Maximum		9.0	
		Range		4.0	
		Interquartile Range		1.5	
		Skewness		-1.201	.501
		Kurtosis		.764	.972
	TextGraphs	Mean		7.895	.2851
		95% Confidence Interval for Mean	Lower Bound	7.296	
			Upper Bound	8.494	

a. There are no valid cases for MC_Informative when Format = 4.000. Statistics cannot be computed for this level.

b. There are no valid cases for MC_Pleasantread when Format = 4.000. Statistics cannot be computed for this level.

c. There are no valid cases for MC_Understandable when Format = 4.000. Statistics cannot be computed for this level.

Descriptives[a,b,c]

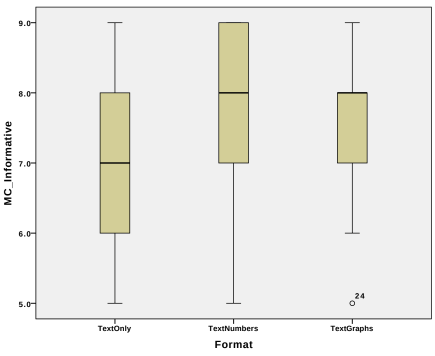
	Format		Statistic	Std. Error
MC_Understandable	TextGraphs	5% Trimmed Mean	7.994	
		Median	8.000	
		Variance	1.544	
		Std. Deviation	1.2425	
		Minimum	5.0	
		Maximum	9.0	
		Range	4.0	
		Interquartile Range	2.0	
		Skewness	-.945	.524
		Kurtosis	.004	1.014

a. There are no valid cases for MC_Informative when Format = 4.000. Statistics cannot be computed for this level.

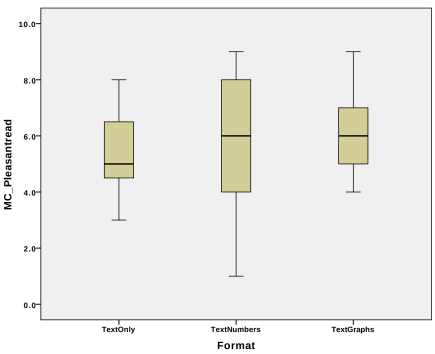
b. There are no valid cases for MC_Pleasantread when Format = 4.000. Statistics cannot be computed for this level.

c. There are no valid cases for MC_Understandable when Format = 4.000. Statistics cannot be computed for this level.

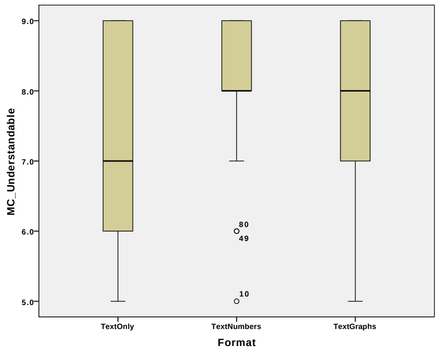
MC_Informative



MC_Pleasantread



MC_Understandable




```
*Testing for difference in participants' evaluation of formats*.
GLM MC_Informative MC_Understandable MC_Pleasantread BY Format
  /METHOD=SSTYPE(3)
  /INTERCEPT=INCLUDE
  /CRITERIA=ALPHA(.05)
 /PRINT=ETASQ OPOWER HOMOGENEITY
  /DESIGN= Format.
```

General Linear Model

[DataSet1] \\psf\Home\Documents\Thesis\SPSS files\Amendments SPSS\New Study 2 Data 240211.sav

Between-Subjects Factors

		Value Label	N
Format	1.0	TextOnly	20
	2.0	TextNumbers	21
	3.0	TextGraphs	19

Box's Test of Equality of Covariance Matrices[a]

Box's M	19.441
F	1.495
df1	12
df2	15493.572
Sig.	.118

Tests the null hypothesis that the observed covariance matrices of the dependent variables are equal across groups.

a. Design: Intercept + Format

Multivariate Tests[d]

Effect		Value	F	Hypothesis df	Error df	Sig.	Partial Eta Squared	Noncent. Parameter	Observed Power[b]
Intercept	Pillai's Trace	.982	1018.780[a]	3.000	55.000	.000	.982	3056.340	1.000
	Wilks' Lambda	.018	1018.780[a]	3.000	55.000	.000	.982	3056.340	1.000
	Hotelling's Trace	55.570	1018.780[a]	3.000	55.000	.000	.982	3056.340	1.000
	Roy's Largest Root	55.570	1018.780[a]	3.000	55.000	.000	.982	3056.340	1.000
Format	Pillai's Trace	.106	1.045	6.000	112.000	.400	.053	6.268	.398
	Wilks' Lambda	.896	1.038[a]	6.000	110.000	.405	.054	6.230	.395
	Hotelling's Trace	.115	1.031	6.000	108.000	.409	.054	6.189	.392
	Roy's Largest Root	.095	1.771[c]	3.000	56.000	.163	.087	5.314	.437

a. Exact statistic

b. Computed using alpha = .05

c. The statistic is an upper bound on F that yields a lower bound on the significance level.

d. Design: Intercept + Format

Levene's Test of Equality of Error Variances[a]

	F	df1	df2	Sig.
MC_Informative	.090	2	57	.914
MC_Understandable	1.203	2	57	.308
MC_Pleasantread	4.381	2	57	.017

Tests the null hypothesis that the error variance of the dependent variable is equal across groups.

a. Design: Intercept + Format

Tests of Between-Subjects Effects

Source	Dependent Variable	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared	Noncent. Parameter
Corrected Model	MC_Informative	5.377[a]	2	2.689	2.043	.139	.067	4.086
	MC_Understandable	6.644[c]	2	3.322	1.941	.153	.064	3.883
	MC_Pleasantread	6.371[d]	2	3.186	.902	.412	.031	1.804
Intercept	MC_Informative	3276.565	1	3276.565	2489.441	.000	.978	2489.441
	MC_Understandable	3565.235	1	3565.235	2083.448	.000	.973	2083.448
	MC_Pleasantread	1974.058	1	1974.058	558.801	.000	.907	558.801
Format	MC_Informative	5.377	2	2.689	2.043	.139	.067	4.086
	MC_Understandable	6.644	2	3.322	1.941	.153	.064	3.883
	MC_Pleasantread	6.371	2	3.186	.902	.412	.031	1.804
Error	MC_Informative	75.023	57	1.316				
	MC_Understandable	97.539	57	1.711				
	MC_Pleasantread	201.362	57	3.533				
Total	MC_Informative	3366.000	60					
	MC_Understandable	3677.000	60					
	MC_Pleasantread	2180.000	60					
Corrected Total	MC_Informative	80.400	59					
	MC_Understandable	104.183	59					
	MC_Pleasantread	207.733	59					

a. R Squared = .067 (Adjusted R Squared = .034)

c. R Squared = .064 (Adjusted R Squared = .031)

d. R Squared = .031 (Adjusted R Squared = -.003)

Tests of Between-Subjects Effects

Source	Dependent Variable	Observed Power[b]
Corrected Model	MC_Informative	.404
	MC_Understandable	.386
	MC_Pleasantread	.198
Intercept	MC_Informative	1.000
	MC_Understandable	1.000
	MC_Pleasantread	1.000
Format	MC_Informative	.404
	MC_Understandable	.386
	MC_Pleasantread	.198
Error	MC_Informative	
	MC_Understandable	
	MC_Pleasantread	
Total	MC_Informative	
	MC_Understandable	
	MC_Pleasantread	
Corrected Total	MC_Informative	
	MC_Understandable	
	MC_Pleasantread	

b. Computed using alpha = .05

```
**Discussion*.
CORRELATIONS
  /VARIABLES=MC_Think_Answers MC_Important
  /PRINT=TWOTAIL NOSIG
```



```
  /MISSING=PAIRWISE.
```

Correlations

[DataSet1] \\psf\Home\Documents\Thesis\SPSS files\Amendments SPSS\New Study 2 Data 240211.sav

Correlations

		MC_Think_Answers	MC_Important
MC_Think_Answers	**Pearson Correlation**	1	.397**
	Sig. (2-tailed)		.000
	N	81	81
MC_Important	**Pearson Correlation**	.397**	1
	Sig. (2-tailed)	.000	
	N	81	81

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

Appendix E: Chapter 4 Materials

Consent Form

Participant Consent Form

BACKGROUND INFORMATION

Title and researchers. The title of this research is *Long-term recall of arguments.* Our names are Daniela Rudloff and Dr Briony Pulford from the University of Leicester School of Psychology.

Reason for the research. We are studying participants' perception of arguments on the introduction of senior comprehensive exams for American undergraduate degrees, and we are collecting data from the general public.

Details of participation. The research involves completing two questionnaires online. You will be asked read some information about introducing senior comprehensive exams. You will then be asked to indicate your attitude about the text you read and answer a few questions. After completion of the online questionnaire, you will be asked in either two, twelve or twenty days to repeat the second part of the questionnaire. The initial online survey should take about ten minutes; the second survey should take less than five minutes.

CONSENT STATEMENT

I understand that my participation is voluntary and that I may withdraw from the research at any time, without giving any reason.

I am aware of what my participation will involve.

I understand that there are no risks involved in the participation of this study.

[ ] Please tick this box to indicate that you agree to participate.

[ ] Please tick this box if you would like to receive a summary of the results by e-mail.

Appendix F: Chapter 4 SPSS

Frequencies

[DataSet1] \\psf\Home\Documents\Thesis\SPSS files\Amendments SPSS\New Study 3 Data.sav

Statistics

Gender

N	Valid	293
	Missing	0

Gender

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Female	255	87.0	87.0	87.0
	Male	35	11.9	11.9	99.0
	Undisclosed	3	1.0	1.0	100.0
	Total	293	100.0	100.0	

```
*Participants descriptives: age*.
DESCRIPTIVES VARIABLES=Age
  /STATISTICS=MEAN STDDEV MIN MAX.
```

Descriptives

[DataSet1] \\psf\Home\Documents\Thesis\SPSS files\Amendments SPSS\New Study 3 Data.sav

Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation
Age	293	18	72	34.11	11.917
Valid N (listwise)	293				

```
*Participants descriptives: first language*.
FREQUENCIES VARIABLES=firstlanguage
  /ORDER=ANALYSIS.
```


Frequencies

[DataSet1] \\psf\Home\Documents\Thesis\SPSS files\Amendments SPSS\New Study 3 Data.sav

Statistics

Firstlanguage

N	Valid	293
	Missing	0

Firstlanguage

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Arabic	1	.3	.3	.3
	Bahasa Malaysia	1	.3	.3	.7
	bengali	1	.3	.3	1.0
	Chinese-cantonese	1	.3	.3	1.4
	Danish	1	.3	.3	1.7
	Do not wish to disclose	1	.3	.3	2.0
	Dutch	5	1.7	1.7	3.8
	English	253	86.3	86.3	90.1
	Estonian	1	.3	.3	90.4
	farsi	1	.3	.3	90.8
	Filipino	1	.3	.3	91.1
	Finnish	2	.7	.7	91.8
	Frecnh	1	.3	.3	92.2
	French	6	2.0	2.0	94.2
	German	6	2.0	2.0	96.2
	Hebrew	1	.3	.3	96.6
	Icelandic	1	.3	.3	96.9
	italian	1	.3	.3	97.3

Firstlanguage

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Polish	1	.3	.3	97.6
	Portuguese	1	.3	.3	98.0
	romanian	1	.3	.3	98.3
	Russian	2	.7	.7	99.0
	Sinhalese	1	.3	.3	99.3
	Turkish	1	.3	.3	99.7
	Welsh	1	.3	.3	100.0
	Total	293	100.0	100.0	

```
*Participants descriptives: country*.
FREQUENCIES VARIABLES=Country
  /ORDER=ANALYSIS.
```

Frequencies

[DataSet1] \\psf\Home\Documents\Thesis\SPSS files\Amendments SPSS\New Study 3 Data.sav

Statistics

Country

N	Valid	293
	Missing	0

Country

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Australia	4	1.4	1.4	1.4
	Belgium	1	.3	.3	1.7
	Canada	19	6.5	6.5	8.2
	Denmark	1	.3	.3	8.5
	Finland	2	.7	.7	9.2
	France	7	2.4	2.4	11.6
	Germany	5	1.7	1.7	13.3
	Hong Kong	1	.3	.3	13.7
	Iceland	1	.3	.3	14.0
	Ireland	2	.7	.7	14.7
	Malaysia	1	.3	.3	15.0
	Netherlands	5	1.7	1.7	16.7
	New Zealand	1	.3	.3	17.1
	Philippines	1	.3	.3	17.4
	Romania	1	.3	.3	17.7
	Turkey	1	.3	.3	18.1
	United Arab Emirates	1	.3	.3	18.4
	United Kingdom	113	38.6	38.6	57.0
	United States	126	43.0	43.0	100.0
	Total	293	100.0	100.0	

```
*Condition descriptives: number of participants across conditions*.
CROSSTABS
  /TABLES=Format BY Time_condition
  /FORMAT=AVALUE TABLES
  /CELLS=COUNT
  /COUNT ROUND CELL.
```

Crosstabs

[DataSet1] \\psf\Home\Documents\Thesis\SPSS files\Amendments SPSS\New Study 3 Data.sav

Case Processing Summary

	Cases					
	Valid		Missing		Total	
	N	Percent	N	Percent	N	Percent
Format * Time_condition	293	100.0%	0	.0%	293	100.0%

Format * Time_condition Crosstabulation

Count

		Time_condition			Total
		2 days	12 days	20 days	
Format	Text graphical	37	40	22	99
	Text numerical	37	34	36	107
	Text only	26	25	36	87
Total		100	99	94	293

```
*Initial scorer agreement, correct count, first round*.
CORRELATIONS
  /VARIABLES=ScorerD_I_Correct ScorerA_I_Correct
  /PRINT=TWOTAIL NOSIG
  /MISSING=PAIRWISE.
```

Correlations

[DataSet1] \\psf\Home\Documents\Thesis\SPSS files\Amendments SPSS\New Study 3 Data.sav

Correlations

		Scorer D, 1st part, counted correct	Scorer A, 1st part, counted correct
Scorer D, 1st part, counted correct	Pearson Correlation	1	.917**
	Sig. (2-tailed)		.000
	N	293	293
Scorer A, 1st part, counted correct	Pearson Correlation	.917**	1
	Sig. (2-tailed)	.000	
	N	293	293

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

```
*Initial scorer agreement, incorrect count, first round*.
CORRELATIONS
  /VARIABLES=ScorerD_I_Incorrect ScorerA_I_Incorrect
  /PRINT=TWOTAIL NOSIG
  /MISSING=PAIRWISE.
```

Correlations

[DataSet1] \\psf\Home\Documents\Thesis\SPSS files\Amendments SPSS\New Study 3 Data.sav

Correlations

		Scorer D, 1st part, counted incorrect	Scorer A, 1st part, counted incorrect
Scorer D, 1st part, counted incorrect	Pearson Correlation	1	.428**
	Sig. (2-tailed)		.000
	N	293	293
Scorer A, 1st part, counted incorrect	Pearson Correlation	.428**	1
	Sig. (2-tailed)	.000	
	N	293	293

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

```
*Initial scorer agreement, total count, first round*.
CORRELATIONS
  /VARIABLES=ScorerD_I_Total ScorerA_I_Total
  /PRINT=TWOTAIL NOSIG
  /MISSING=PAIRWISE.
```

Correlations

```
[DataSet1] \\psf\Home\Documents\Thesis\SPSS files\Amendments SPSS\New Study 3 Data.sav
```

Correlations

		ScorerD_I_Total	ScorerA_I_Total
ScorerD_I_Total	**Pearson Correlation**	**1**	**.951****
	Sig. (2-tailed)		**.000**
	N	**293**	**293**
ScorerA_I_Total	**Pearson Correlation**	**.951****	**1**
	Sig. (2-tailed)	**.000**	
	N	**293**	**293**

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

```
*Initial scorer agreement, correct count, second round*.
CORRELATIONS
  /VARIABLES=ScorerD_Z_Correct ScorerA_Z_Correct
  /PRINT=TWOTAIL NOSIG
  /MISSING=PAIRWISE.
```

Correlations

```
[DataSet1] \\psf\Home\Documents\Thesis\SPSS files\Amendments SPSS\New Study 3 Data.sav
```


Correlations

		Scorer D, 2nd part, counted correct	Scorer A, 2nd part, counted correct
Scorer D, 2nd part, counted correct	Pearson Correlation	1	.924**
	Sig. (2-tailed)		.000
	N	293	293
Scorer A, 2nd part, counted correct	Pearson Correlation	.924**	1
	Sig. (2-tailed)	.000	
	N	293	293

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

```
*Initial scorer agreement, incorrect count, second round*.
CORRELATIONS
  /VARIABLES=ScorerD_Z_Incorrect ScorerA_Z_Incorrect
  /PRINT=TWOTAIL NOSIG
  /MISSING=PAIRWISE.
```

Correlations

```
[DataSet1] \\psf\Home\Documents\Thesis\SPSS files\Amendments SPSS\New Study 3 Data.sav
```

Correlations

		Scorer D, 2nd part, counted incorrect	Scorer A, 2nd part, counted incorrect
Scorer D, 2nd part, counted incorrect	Pearson Correlation	1	.304**
	Sig. (2-tailed)		.000
	N	293	293
Scorer A, 2nd part, counted incorrect	Pearson Correlation	.304**	1
	Sig. (2-tailed)	.000	
	N	293	293

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

```
*Initial scorer agreement, total count, second round*.
CORRELATIONS
  /VARIABLES=ScorerD_Z_Total ScorerA_Z_Total
  /PRINT=TWOTAIL NOSIG
  /MISSING=PAIRWISE.
```

Correlations

```
[DataSet1] \\psf\Home\Documents\Thesis\SPSS files\Amendments SPSS\New Study 3 Data.sav
```


Correlations

		ScorerD_Z_Total	ScorerA_Z_Total
ScorerD_Z_Total	Pearson Correlation	1	.970**
	Sig. (2-tailed)		.000
	N	293	293
ScorerA_Z_Total	Pearson Correlation	.970**	1
	Sig. (2-tailed)	.000	
	N	293	293

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

```
*Comparing time to read at first time of testing*.
MEANS TABLES= I_Duration BY Format
  /CELLS MEAN COUNT STDDEV.
```

Means

```
[DataSet1] \\psf\Home\Documents\Thesis\SPSS files\Amendments SPSS\New Study 3 Data.sav
```

Case Processing Summary

	Cases					
	Included		Excluded		Total	
	N	Percent	N	Percent	N	Percent
Minutes for 1st part * Format	291	99.3%	2	.7%	293	100.0%

Report

Minutes for 1st part

Format	Mean	N	Std. Deviation
Text graphical	00:20:44	98	00:16:38.987
Text numerical	00:19:45	106	00:14:30.827
Text only	00:22:13	87	00:17:21.447
Total	00:20:49	291	00:16:06.265

```
ONEWAY I_duration BY Rc_Format
  /MISSING ANALYSIS.
```

Oneway

```
[DataSet1] \\psf\Home\Documents\Thesis\SPSS files\Amendments SPSS\New Study 3 Data.sav
```

ANOVA

Minutes for 1st part

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	1.058E6	2	528940.860	.565	.569
Within Groups	2.697E8	288	936479.052		
Total	2.708E8	290			

```
*Condition descriptives: difficulty by condition*.
MEANS TABLES=RC_difficulty BY Format
  /CELLS MEAN COUNT STDDEV.
```

Means

```
[DataSet1] \\psf\Home\Documents\Thesis\SPSS files\Amendments SPSS\New Study 3 Data.sav
```


Case Processing Summary

	Cases					
	Included		Excluded		Total	
	N	Percent	N	Percent	N	Percent
RC_difficulty * Format	293	100.0%	0	.0%	293	100.0%

Report

RC_difficulty

Format	Mean	N	Std. Deviation
Text graphical	2.5859	99	.89226
Text numerical	2.4206	107	.99088
Text only	2.6322	87	.95376
Total	2.5392	293	.94868

```
*Boxplot Difficulty across formats*.
EXAMINE VARIABLES=RC_Difficulty BY Format
  /PLOT=BOXPLOT
  /STATISTICS=NONE
  /NOTOTAL.
```

Explore

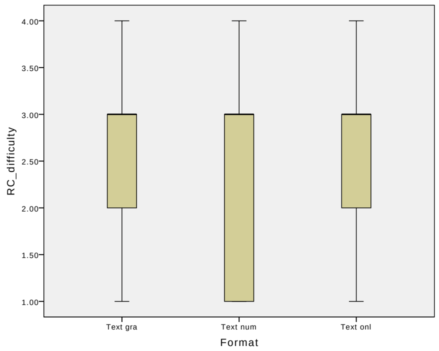
```
[DataSet1] \\psf\Home\Documents\Thesis\SPSS files\Amendments SPSS\New Study 3 Data.sav
```

Format

Case Processing Summary

	Format	Cases					
		Valid		Missing		Total	
		N	Percent	N	Percent	N	Percent
RC_difficulty	Text graphical	99	100.0%	0	.0%	99	100.0%
	Text numerical	107	100.0%	0	.0%	107	100.0%
	Text only	87	100.0%	0	.0%	87	100.0%

RC_difficulty




```
*Checking for effect of format on difficulty*.
ONEWAY RC_Difficulty BY Rc_Format
  /MISSING ANALYSIS.
```

Oneway


```
[DataSet1] \\psf\Home\Documents\Thesis\SPSS files\Amendments SPSS\New Study 3 Data.sav
```

ANOVA

RC_difficulty

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	2.474	2	1.237	1.378	.254
Within Groups	260.325	290	.898		
Total	262.799	292			

```
*Condition descriptives: actual duration by condition*.
MEANS TABLES=Actual_duration BY Time_condition
  /CELLS MEAN COUNT STDDEV.
```

Means

```
[DataSet1] \\psf\Home\Documents\Thesis\SPSS files\Amendments SPSS\New Study 3 Data.sav
```

Case Processing Summary

	Cases					
	Included		Excluded		Total	
	N	Percent	N	Percent	N	Percent
Actual_duration * Time_condition	293	100.0%	0	.0%	293	100.0%

Report

Actual_duration

Time_condition	Mean	N	Std. Deviation
2 days	3.2100	100	2.40494
12 days	13.1717	99	1.96936
20 days	20.7660	94	3.28707
Total	12.2082	293	7.63695

```
*Boxplot Difficulty across formats*.
EXAMINE VARIABLES=Actual_duration BY Time_condition
  /PLOT=BOXPLOT
  /STATISTICS=descriptives
  /NOTOTAL.
```

Explore

[DataSet1] \\psf\Home\Documents\Thesis\SPSS files\Amendments SPSS\New Study 3 Data.sav

Time_condition

Case Processing Summary

		Cases					
		Valid		Missing		Total	
	Time_condition	N	Percent	N	Percent	N	Percent
Actual_duration	2 days	100	100.0%	0	.0%	100	100.0%
	12 days	99	100.0%	0	.0%	99	100.0%
	20 days	94	100.0%	0	.0%	94	100.0%

Descriptives

	Time_condition			Statistic	Std. Error
Actual_duration	2 days	Mean		3.2100	.24049
		95% Confidence Interval for Mean	Lower Bound	2.7328	
			Upper Bound	3.6872	

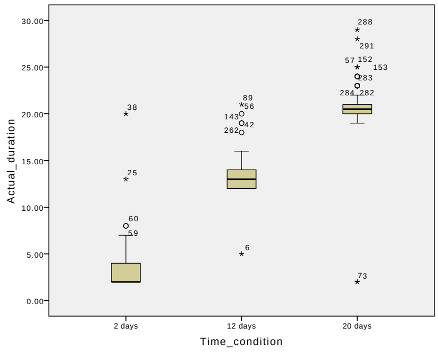
Descriptives

	Time_condition			Statistic	Std. Error
Actual_duration	2 days	5% Trimmed Mean		2.8333	
		Median		2.0000	
		Variance		5.784	
		Std. Deviation		2.40494	
		Minimum		2.00	
		Maximum		20.00	
		Range		18.00	
		Interquartile Range		2.00	
		Skewness		4.434	.241
		Kurtosis		25.915	.478
	12 days	Mean		13.1717	.19793
		95% Confidence Interval for Mean	Lower Bound	12.7789	
			Upper Bound	13.5645	
		5% Trimmed Mean		12.9686	
		Median		13.0000	
		Variance		3.878	
		Std. Deviation		1.96936	
		Minimum		5.00	
		Maximum		21.00	
		Range		16.00	
		Interquartile Range		2.00	
		Skewness		1.073	.243
		Kurtosis		6.653	.481
	20 days	Mean		20.7660	.33904
		95% Confidence Interval for Mean	Lower Bound	20.0927	
			Upper Bound	21.4392	

Descriptives

Time_condition			Statistic	Std. Error
Actual_duration	20 days	5% Trimmed Mean	20.9279	
		Median	20.5000	
		Variance	10.805	
		Std. Deviation	3.28707	
		Minimum	2.00	
		Maximum	29.00	
		Range	27.00	
		Interquartile Range	1.00	
		Skewness	-3.658	.249
		Kurtosis	22.154	.493

Actual_duration




```
*Post-hoc tests whether all conditions differ significantly from each other*.
*Comparing Time 2 vs. Time 12*.
T-TEST GROUPS=Time_condition(2 12)
  /MISSING=ANALYSIS
  /VARIABLES=Actual_duration
  /CRITERIA=CI(.9500).
```

T-Test

[DataSet1] \\psf\Home\Documents\Thesis\SPSS files\Amendments SPSS\New Study 3 Data.sav

Group Statistics

	Time_condition	N	Mean	Std. Deviation	Std. Error Mean
Actual_duration	2 days	100	3.2100	2.40494	.24049
	12 days	99	13.1717	1.96936	.19793

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means				
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference
Actual_duration	Equal variances assumed	.143	.705	-31.951	197	.000	-9.96172	.31178
	Equal variances not assumed			-31.983	190.324	.000	-9.96172	.31147

Independent Samples Test

		t-test for Equality of Means	
		95% Confidence Interval of the Difference	
		Lower	Upper
Actual_duration	Equal variances assumed	-10.57657	-9.34686
	Equal variances not assumed	-10.57609	-9.34734

```
*Comparing Time 12 vs. Time 20*.
T-TEST GROUPS=Time_condition(12 20)
  /MISSING=ANALYSIS
  /VARIABLES=Actual_duration
  /CRITERIA=CI(.9500).
```

T-Test

[DataSet1] \\psf\Home\Documents\Thesis\SPSS files\Amendments SPSS\New Study 3 Data.sav

Group Statistics

	Time_condition	N	Mean	Std. Deviation	Std. Error Mean
Actual_duration	12 days	99	13.1717	1.96936	.19793
	20 days	94	20.7660	3.28707	.33904

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means				
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference
Actual_duration	Equal variances assumed	.627	.430	-19.583	191	.000	-7.59424	.38779
	Equal variances not assumed			-19.344	150.595	.000	-7.59424	.39258

Independent Samples Test

		t-test for Equality of Means	
		95% Confidence Interval of the Difference	
		Lower	Upper
Actual_duration	Equal variances assumed	-8.35914	-6.82934
	Equal variances not assumed	-8.36992	-6.81856

```
*Comparing Time 2 vs. Time 20*.
T-TEST GROUPS=Time_condition(2 20)
  /MISSING=ANALYSIS
  /VARIABLES=Actual_duration
  /CRITERIA=CI(.9500).
```

T-Test

[DataSet1] \\psf\Home\Documents\Thesis\SPSS files\Amendments SPSS\New Study 3 Data.sav

Group Statistics

	Time_condition	N	Mean	Std. Deviation	Std. Error Mean
Actual_duration	2 days	100	3.2100	2.40494	.24049
	20 days	94	20.7660	3.28707	.33904

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means				
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference
Actual_duration	Equal variances assumed	.223	.637	-42.635	192	.000	-17.55596	.41178
	Equal variances not assumed			-42.235	169.761	.000	-17.55596	.41567

Independent Samples Test

		t-test for Equality of Means	
		95% Confidence Interval of the Difference	
		Lower	Upper
Actual_duration	Equal variances assumed	-18.36815	-16.74377
	Equal variances not assumed	-18.37651	-16.73541

```
*Correlations Like/Dislike and Good/Bad to check whether they can be subsumed under one attitude index*.
CORRELATIONS
  /VARIABLES=I_Dislike I_Goodbad
  /PRINT=TWOTAIL NOSIG
  /MISSING=PAIRWISE.
```

Correlations

[DataSet1] \\psf\Home\Documents\Thesis\SPSS files\Amendments SPSS\New Study 3 Data.sav

Correlations

		I_Dislike	I_Goodbad
I_Dislike	Pearson Correlation	1	.897**
	Sig. (2-tailed)		.000
	N	292	292
I_Goodbad	Pearson Correlation	.897**	1
	Sig. (2-tailed)	.000	
	N	292	293

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

```
*Boxplot Attitude Index 1st round across formats*.
EXAMINE VARIABLES=Attitude_Index_1stround  BY Format
  /PLOT=BOXPLOT
  /STATISTICS=None
  /NOTOTAL.
```

Explore

[DataSet1] \\psf\Home\Documents\Thesis\SPSS files\Amendments SPSS\New Study 3 Data.sav

Format

Case Processing Summary

		Cases					
		Valid		Missing		Total	
	Format	N	Percent	N	Percent	N	Percent
Attitude_Index_1stround	Text graphical	98	99.0%	1	1.0%	99	100.0%
	Text numerical	107	100.0%	0	.0%	107	100.0%
	Text only	87	100.0%	0	.0%	87	100.0%

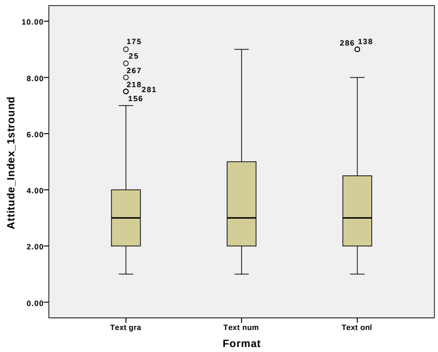
Descriptives

	Format			Statistic	Std. Error
Attitude_Index_1stround	Text graphical	Mean		3.2602	.18734
		95% Confidence Interval for Mean	Lower Bound	2.8884	
			Upper Bound	3.6320	
		5% Trimmed Mean		3.1162	
		Median		3.0000	
		Variance		3.439	
		Std. Deviation		1.85454	
		Minimum		1.00	
		Maximum		9.00	
		Range		8.00	
		Interquartile Range		2.00	
		Skewness		1.159	.244
		Kurtosis		1.112	.483
	Text numerical	Mean		3.6542	.18297
		95% Confidence Interval for Mean	Lower Bound	3.2915	
			Upper Bound	4.0170	
		5% Trimmed Mean		3.5569	
		Median		3.0000	
		Variance		3.582	
		Std. Deviation		1.89265	
		Minimum		1.00	
		Maximum		9.00	
		Range		8.00	
		Interquartile Range		3.00	
		Skewness		.721	.234
		Kurtosis		-.020	.463

Descriptives

	Format			Statistic	Std. Error
Attitude_Index_1stround	Text only	Mean		3.6264	.21847
		95% Confidence Interval for Mean	Lower Bound	3.1921	
			Upper Bound	4.0607	
		5% Trimmed Mean		3.4933	
		Median		3.0000	
		Variance		4.152	
		Std. Deviation		2.03775	
		Minimum		1.00	
		Maximum		9.00	
		Range		8.00	
		Interquartile Range		2.50	
		Skewness		.915	.258
		Kurtosis		.285	.511

Attitude_Index_1stround




```
UNIANOVA Attitude_Index_1stround BY Format
  /METHOD=SSTYPE(3)
  /INTERCEPT=INCLUDE
  /CRITERIA=ALPHA(0.05)
  /DESIGN=Format.
```

Univariate Analysis of Variance

[DataSet1] \\psf\Home\Documents\Thesis\SPSS files\Amendments SPSS\New Study 3 Data.sav

Tests of Between-Subjects Effects

Dependent Variable:Attitude_Index_1stround

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	9.516[a]	2	4.758	1.285	.278
Intercept	3579.081	1	3579.081	966.298	.000
Format	9.516	2	4.758	1.285	.278
Error	1070.430	289	3.704		
Total	4685.000	292			
Corrected Total	1079.945	291			

a. R Squared = .009 (Adjusted R Squared = .002)

```
EXAMINE VARIABLES=I_Uncertain  BY Format
  /PLOT=BOXPLOT
  /STATISTICS=descriptives
  /NOTOTAL.
```

Explore

[DataSet1] \\psf\Home\Documents\Thesis\SPSS files\Amendments SPSS\New Study 3 Data.sav

Format

Case Processing Summary

		Cases					
		Valid		Missing		Total	
	Format	N	Percent	N	Percent	N	Percent
I_Uncertain	Text graphical	99	100.0%	0	.0%	99	100.0%
	Text numerical	107	100.0%	0	.0%	107	100.0%
	Text only	86	98.9%	1	1.1%	87	100.0%

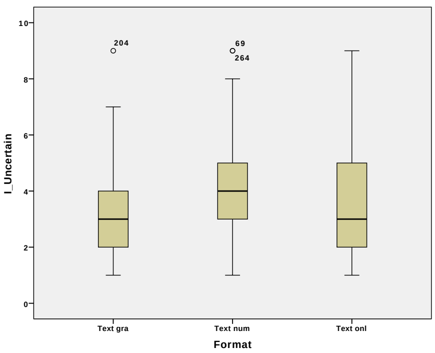
Descriptives

	Format			Statistic	Std. Error
I_Uncertain	Text graphical	Mean		3.13	.181
		95% Confidence Interval for Mean	Lower Bound	2.77	
			Upper Bound	3.49	
		5% Trimmed Mean		3.01	
		Median		3.00	
		Variance		3.238	
		Std. Deviation		1.799	
		Minimum		1	
		Maximum		9	
		Range		8	
		Interquartile Range		2	
		Skewness		.668	.243
		Kurtosis		.091	.481
	Text numerical	Mean		3.80	.194
		95% Confidence Interval for Mean	Lower Bound	3.42	
			Upper Bound	4.19	
		5% Trimmed Mean		3.71	
		Median		4.00	
		Variance		4.027	
		Std. Deviation		2.007	
		Minimum		1	
		Maximum		9	
		Range		8	
		Interquartile Range		2	
		Skewness		.546	.234
		Kurtosis		-.193	.463

Descriptives

	Format			Statistic	Std. Error
I_Uncertain	Text only	Mean		3.50	.200
		95% Confidence Interval for Mean	Lower Bound	3.10	
			Upper Bound	3.90	
		5% Trimmed Mean		3.38	
		Median		3.00	
		Variance		3.429	
		Std. Deviation		1.852	
		Minimum		1	
		Maximum		9	
		Range		8	
		Interquartile Range		3	
		Skewness		.859	.260
		Kurtosis		.687	.514

I_Uncertain




```
*Checking whether means of certain/uncertain are different, first round*.
UNIANOVA I_Uncertain BY Format
  /METHOD=SSTYPE(3)
  /INTERCEPT=INCLUDE
  /CRITERIA=ALPHA(0.05)
  /PRINT=ETASQ OPOWER HOMOGENEITY
  /DESIGN=Format.
```

Univariate Analysis of Variance

[DataSet1] \\psf\Home\Documents\Thesis\SPSS files\Amendments SPSS\New Study 3 Data.sav

Between-Subjects Factors

		Value Label	N
Format	G	Text graphical	99
	N	Text numerical	107
	T	Text only	86

Levene's Test of Equality of Error Variances[a]

Dependent Variable:I_Uncertain

F	df1	df2	Sig.
.351	2	289	.705

Tests the null hypothesis that the error variance of the dependent variable is equal across groups.

a. Design: Intercept + Format

Tests of Between-Subjects Effects

Dependent Variable:I_Uncertain

Source	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared	Noncent. Parameter	Observed Power[b]
Corrected Model	23.274[a]	2	11.637	3.247	.040	.022	6.494	.616
Intercept	3504.145	1	3504.145	977.818	.000	.772	977.818	1.000
Format	23.274	2	11.637	3.247	.040	.022	6.494	.616
Error	1035.671	289	3.584					
Total	4608.000	292						
Corrected Total	1058.945	291						

a. R Squared = .022 (Adjusted R Squared = .015)

b. Computed using alpha = 0.05

```
* ------------------ Post-hoc test for differences in certain/uncertain ------------------ *.
```

```
*Post-hoc test for differences in certain/uncertain between Text only/Text numerical*.
T-TEST GROUPS=Format('T' 'N')
  /MISSING=ANALYSIS
  /VARIABLES=I_Uncertain
  /CRITERIA=CI(.9500).
```

T-Test

[DataSet1] \\psf\Home\Documents\Thesis\SPSS files\Amendments SPSS\New Study 3 Data.sav

Group Statistics

	Format	N	Mean	Std. Deviation	Std. Error Mean
I_Uncertain	Text only	86	3.50	1.852	.200
	Text numerical	107	3.80	2.007	.194

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means				
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference
I_Uncertain	Equal variances assumed	.462	.498	-1.081	191	.281	-.304	.281
	Equal variances not assumed			-1.091	187.344	.277	-.304	.278

Independent Samples Test

		t-test for Equality of Means	
		95% Confidence Interval of the Difference	
		Lower	Upper
I_Uncertain	Equal variances assumed	-.858	.250
	Equal variances not assumed	-.853	.245


```
*Post-hoc test for differences in certain/uncertain between Text only/Text graphical*.
T-TEST GROUPS=Format('T' 'G')
  /MISSING=ANALYSIS
  /VARIABLES=I_Uncertain
  /CRITERIA=CI(.9500).
```

T-Test

[DataSet1] \\psf\Home\Documents\Thesis\SPSS files\Amendments SPSS\New Study 3 Data.sav

Group Statistics

	Format	N	Mean	Std. Deviation	Std. Error Mean
I_Uncertain	Text only	86	3.50	1.852	.200
	Text graphical	99	3.13	1.799	.181

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means				
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference
I_Uncertain	Equal variances assumed	.000	.991	1.371	183	.172	.369	.269
	Equal variances not assumed			1.369	177.842	.173	.369	.269

Independent Samples Test

		t-test for Equality of Means	
		95% Confidence Interval of the Difference	
		Lower	Upper
I_Uncertain	Equal variances assumed	-.162	.899
	Equal variances not assumed	-.163	.900

```
*Post-hoc test for differences in certain/uncertain between Text graphical/Text numerical*.
T-TEST GROUPS=Format('G' 'N')
  /MISSING=ANALYSIS
  /VARIABLES=I_Uncertain
  /CRITERIA=CI(.9500).
```

T-Test

[DataSet1] \\psf\Home\Documents\Thesis\SPSS files\Amendments SPSS\New Study 3 Data.sav

Group Statistics

	Format	N	Mean	Std. Deviation	Std. Error Mean
I_Uncertain	Text graphical	99	3.13	1.799	.181
	Text numerical	107	3.80	2.007	.194

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means				
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference
I_Uncertain	Equal variances assumed	.520	.472	-2.525	204	.012	-.672	.266
	Equal variances not assumed			-2.535	203.805	.012	-.672	.265

Independent Samples Test

		t-test for Equality of Means	
		95% Confidence Interval of the Difference	
		Lower	Upper
I_Uncertain	Equal variances assumed	-1.198	-.147
	Equal variances not assumed	-1.195	-.150


```
* ---------------------------------------------------------------------------------------------------------
*.
*Boxplot Correct recall across formats*.
EXAMINE VARIABLES=Agreed_I_Correct BY Format
  /PLOT=BOXPLOT
  /STATISTICS=Descriptive
  /NOTOTAL.
```

Explore

[DataSet1] \\psf\Home\Documents\Thesis\SPSS files\Amendments SPSS\New Study 3 Data.sav

Format

Case Processing Summary

		Cases					
		Valid		Missing		Total	
	Format	N	Percent	N	Percent	N	Percent
Agreed correct count, 1st part	Text graphical	99	100.0%	0	.0%	99	100.0%
	Text numerical	107	100.0%	0	.0%	107	100.0%
	Text only	87	100.0%	0	.0%	87	100.0%

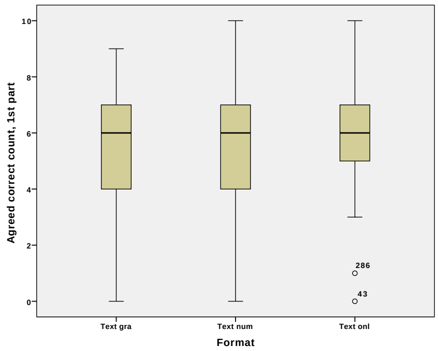
Descriptives

	Format			Statistic	Std. Error
Agreed correct count, 1st part	Text graphical	Mean		5.57	.211
		95% Confidence Interval for Mean	Lower Bound	5.15	
			Upper Bound	5.98	
		5% Trimmed Mean		5.67	
		Median		6.00	
		Variance		4.391	
		Std. Deviation		2.095	
		Minimum		0	
		Maximum		9	
		Range		9	
		Interquartile Range		3	
		Skewness		-.620	.243
		Kurtosis		-.244	.481
	Text numerical	Mean		5.73	.204
		95% Confidence Interval for Mean	Lower Bound	5.32	
			Upper Bound	6.13	
		5% Trimmed Mean		5.80	
		Median		6.00	
		Variance		4.464	
		Std. Deviation		2.113	
		Minimum		0	
		Maximum		10	
		Range		10	
		Interquartile Range		3	
		Skewness		-.351	.234
		Kurtosis		-.017	.463

Descriptives

	Format			Statistic	Std. Error
Agreed correct count, 1st part	Text only	Mean		5.80	.188
		95% Confidence Interval for Mean	Lower Bound	5.43	
			Upper Bound	6.18	
		5% Trimmed Mean		5.83	
		Median		6.00	
		Variance		3.089	
		Std. Deviation		1.758	
		Minimum		0	
		Maximum		10	
		Range		10	
		Interquartile Range		2	
		Skewness		-.378	.258
		Kurtosis		.907	.511

Agreed correct count, 1st part




```
*Boxplot Incorrect recall across formats*.
EXAMINE VARIABLES=Agreed_I_Incorrect BY Format
  /PLOT=BOXPLOT
  /STATISTICS=DESCRIPTIVES
  /NOTOTAL.
```

Explore

[DataSet1] \\psf\Home\Documents\Thesis\SPSS files\Amendments SPSS\New Study 3 Data.sav

Format

Case Processing Summary

		Cases					
		Valid		Missing		Total	
	Format	N	Percent	N	Percent	N	Percent
Agreed incorrect count, 1st part	Text graphical	99	100.0%	0	.0%	99	100.0%
	Text numerical	107	100.0%	0	.0%	107	100.0%
	Text only	87	100.0%	0	.0%	87	100.0%

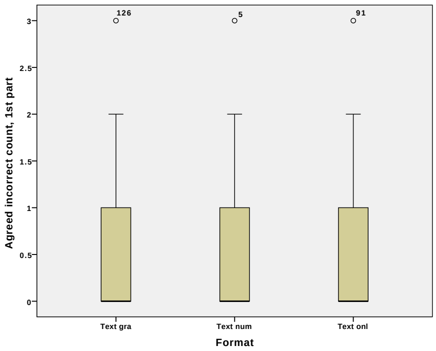
Descriptives

	Format			Statistic	Std. Error
Agreed incorrect count, 1st part	Text graphical	Mean		.38	.067
		95% Confidence Interval for Mean	Lower Bound	.25	
			Upper Bound	.52	
		5% Trimmed Mean		.30	
		Median		.00	
		Variance		.443	
		Std. Deviation		.666	
		Minimum		0	
		Maximum		3	
		Range		3	
		Interquartile Range		1	
		Skewness		1.710	.243
		Kurtosis		2.387	.481
	Text numerical	Mean		.38	.062
		95% Confidence Interval for Mean	Lower Bound	.26	
			Upper Bound	.51	

Descriptives

	Format			Statistic	Std. Error
Agreed incorrect count, 1st part	Text numerical	5% Trimmed Mean		.30	
		Median		.00	
		Variance		.408	
		Std. Deviation		.639	
		Minimum		0	
		Maximum		3	
		Range		3	
		Interquartile Range		1	
		Skewness		1.666	.234
		Kurtosis		2.495	.463
	Text only	Mean		.36	.061
		95% Confidence Interval for Mean	Lower Bound	.23	
			Upper Bound	.48	
		5% Trimmed Mean		.30	
		Median		.00	
		Variance		.325	
		Std. Deviation		.570	
		Minimum		0	
		Maximum		3	
		Range		3	
		Interquartile Range		1	
		Skewness		1.746	.258
		Kurtosis		4.157	.511

Agreed incorrect count, 1st part




```
ONEWAY Agreed_I_Correct Agreed_I_Incorrect BY Rc_Format
  /STATISTICS DESCRIPTIVES HOMOGENEITY BROWNFORSYTHE WELCH
  /MISSING ANALYSIS.
```

Oneway

```
[DataSet1] \\psf\Home\Documents\Thesis\SPSS files\Amendments SPSS\New Study 3 Data.sav
```

Descriptives

		N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
						Lower Bound	Upper Bound		
Agreed correct count, 1st part	Text_only	87	5.80	1.758	.188	5.43	6.18	0	10
	Text_numerical	107	5.73	2.113	.204	5.32	6.13	0	10
	Text_graphical	99	5.57	2.095	.211	5.15	5.98	0	9
	Total	293	5.70	2.003	.117	5.47	5.93	0	10
Agreed incorrect count, 1st part	Text_only	87	.36	.570	.061	.23	.48	0	3
	Text_numerical	107	.38	.639	.062	.26	.51	0	3
	Text_graphical	99	.38	.666	.067	.25	.52	0	3
	Total	293	.38	.627	.037	.30	.45	0	3

Test of Homogeneity of Variances

	Levene Statistic	df1	df2	Sig.
Agreed correct count, 1st part	3.348	2	290	.037
Agreed incorrect count, 1st part	.741	2	290	.478

ANOVA

		Sum of Squares	df	Mean Square	F	Sig.
Agreed correct count, 1st part	Between Groups	2.824	2	1.412	.350	.705
	Within Groups	1169.142	290	4.032		
	Total	1171.966	292			
Agreed incorrect count, 1st part	Between Groups	.045	2	.023	.057	.944
	Within Groups	114.658	290	.395		
	Total	114.703	292			

Robust Tests of Equality of Means

		Statistic[a]	df1	df2	Sig.
Agreed correct count, 1st part	Welch	.364	2	192.762	.695
	Brown-Forsythe	.357	2	288.739	.700
Agreed incorrect count, 1st part	Welch	.063	2	191.979	.939
	Brown-Forsythe	.058	2	287.891	.944

a. Asymptotically F distributed.

```
*Correlations Like/Dislike and Good/Bad to check whether they can be subsumed under one attitude index*.
CORRELATIONS
  /VARIABLES=Z_Goodbad Z_Dislike
  /PRINT=TWOTAIL NOSIG
  /MISSING=PAIRWISE.
```

Correlations

[DataSet1] \\psf\Home\Documents\Thesis\SPSS files\Amendments SPSS\New Study 3 Data.sav

Correlations

		Z_Goodbad	Z_Dislike
Z_Goodbad	Pearson Correlation	1	.914**
	Sig. (2-tailed)		.000
	N	292	292
Z_Dislike	Pearson Correlation	.914**	1
	Sig. (2-tailed)	.000	
	N	292	293

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

```
*Boxplot Attitude_Index 2nd round across formats*.
EXAMINE VARIABLES=Attitude_Index_2ndround  BY Format
  /PLOT=BOXPLOT
  /STATISTICS=DESCRIPTIVES
  /NOTOTAL.
```

Explore

[DataSet1] \\psf\Home\Documents\Thesis\SPSS files\Amendments SPSS\New Study 3 Data.sav

Format

Case Processing Summary

	Format	Cases					
		Valid		Missing		Total	
		N	Percent	N	Percent	N	Percent
Attitude_Index_2ndround	Text graphical	99	100.0%	0	.0%	99	100.0%
	Text numerical	106	99.1%	1	.9%	107	100.0%
	Text only	87	100.0%	0	.0%	87	100.0%

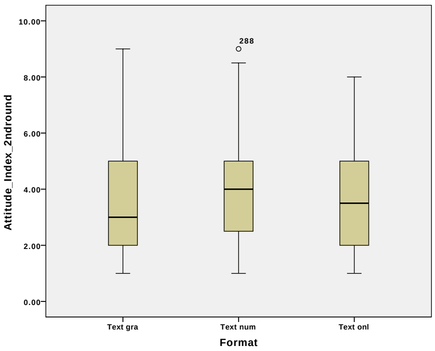
Descriptives

	Format			Statistic	Std. Error
Attitude_Index_2ndround	Text graphical	Mean		3.5051	.18686
		95% Confidence Interval for Mean	Lower Bound	3.1342	
			Upper Bound	3.8759	
		5% Trimmed Mean		3.3718	
		Median		3.0000	
		Variance		3.457	
		Std. Deviation		1.85920	
		Minimum		1.00	
		Maximum		9.00	
		Range		8.00	
		Interquartile Range		3.00	
		Skewness		.937	.243
		Kurtosis		.694	.481

Descriptives

	Format			Statistic	Std. Error
Attitude_Index_2ndround	Text numerical	Mean		3.9245	.18402
		95% Confidence Interval for Mean	Lower Bound	3.5597	
			Upper Bound	4.2894	
		5% Trimmed Mean		3.8428	
		Median		4.0000	
		Variance		3.589	
		Std. Deviation		1.89459	
		Minimum		1.00	
		Maximum		9.00	
		Range		8.00	
		Interquartile Range		2.63	
		Skewness		.481	.235
		Kurtosis		-.150	.465
	Text only	Mean		3.6954	.19795
		95% Confidence Interval for Mean	Lower Bound	3.3019	
			Upper Bound	4.0889	
		5% Trimmed Mean		3.6274	
		Median		3.5000	
		Variance		3.409	
		Std. Deviation		1.84636	
		Minimum		1.00	
		Maximum		8.00	
		Range		7.00	
		Interquartile Range		3.00	
		Skewness		.516	.258
		Kurtosis		-.508	.511

Attitude_Index_2ndround




```
*Testing for an effect of presentation format on attitude index*.
UNIANOVA Attitude_Index_2ndround  BY Format
  /METHOD=SSTYPE(3)
  /INTERCEPT=INCLUDE
  /PRINT=ETASQ OPOWER HOMOGENEITY
  /CRITERIA=ALPHA(0.05)
  /DESIGN=Format.
```

Univariate Analysis of Variance

[DataSet1] \\psf\Home\Documents\Thesis\SPSS files\Amendments SPSS\New Study 3 Data.sav

Between-Subjects Factors

		Value Label	N
Format	G	Text graphical	99
	N	Text numerical	106
	T	Text only	87

Levene's Test of Equality of Error Variances[a]

Dependent Variable: Attitude_Index_2ndround

F	df1	df2	Sig.
.066	2	289	.936

Tests the null hypothesis that the error variance of the dependent variable is equal across groups.

a. Design: Intercept + Format

Tests of Between-Subjects Effects

Dependent Variable:Attitude_Index_2ndround

Source	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared	Noncent. Parameter	Observed Power[b]
Corrected Model	9.051[a]	2	4.525	1.296	.275	.009	2.593	.280
Intercept	3988.666	1	3988.666	1142.644	.000	.798	1142.644	1.000
Format	9.051	2	4.525	1.296	.275	.009	2.593	.280
Error	1008.822	289	3.491					
Total	5045.750	292						
Corrected Total	1017.872	291						

a. R Squared = .009 (Adjusted R Squared = .002)

b. Computed using alpha = 0.05

```
**Effect of presentation format on attitude certainty, 2nd round**.
*Describing means of certain/uncertain by format, second  round*.
EXAMINE VARIABLES=Z_Uncertain  BY Format
  /PLOT=BOXPLOT
  /STATISTICS=DESCRIPTIVES
  /NOTOTAL.
```

Explore

[DataSet1] \\psf\Home\Documents\Thesis\SPSS files\Amendments SPSS\New Study 3 Data.sav

Format

Case Processing Summary

		Cases					
		Valid		Missing		Total	
	Format	N	Percent	N	Percent	N	Percent
Z_Uncertain	Text graphical	99	100.0%	0	.0%	99	100.0%
	Text numerical	107	100.0%	0	.0%	107	100.0%
	Text only	87	100.0%	0	.0%	87	100.0%

Descriptives

	Format			Statistic	Std. Error
Z_Uncertain	Text graphical	Mean		3.31	.170
		95% Confidence Interval for Mean	Lower Bound	2.98	
			Upper Bound	3.65	

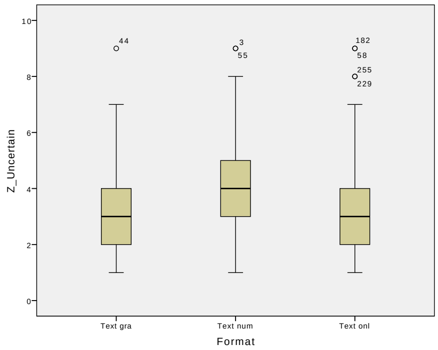
Descriptives

	Format			Statistic	Std. Error
Z_Uncertain	Text graphical	5% Trimmed Mean		3.23	
		Median		3.00	
		Variance		2.850	
		Std. Deviation		1.688	
		Minimum		1	
		Maximum		9	
		Range		8	
		Interquartile Range		2	
		Skewness		.610	.243
		Kurtosis		.254	.481
	Text numerical	Mean		3.90	.198
		95% Confidence Interval for Mean	Lower Bound	3.50	
			Upper Bound	4.29	
		5% Trimmed Mean		3.81	
		Median		4.00	
		Variance		4.206	
		Std. Deviation		2.051	
		Minimum		1	
		Maximum		9	
		Range		8	
		Interquartile Range		2	
		Skewness		.415	.234
		Kurtosis		-.482	.463
	Text only	Mean		3.54	.207
		95% Confidence Interval for Mean	Lower Bound	3.13	
			Upper Bound	3.95	

Descriptives

Format			Statistic	Std. Error
Z_Uncertain	Text only	5% Trimmed Mean	3.41	
		Median	3.00	
		Variance	3.716	
		Std. Deviation	1.928	
		Minimum	1	
		Maximum	9	
		Range	8	
		Interquartile Range	2	
		Skewness	.849	.258
		Kurtosis	.548	.511

Z_Uncertain




```
*Testing for an effect of presentation format on attitude index*.
UNIANOVA Z_Uncertain  BY Format
  /METHOD=SSTYPE(3)
  /INTERCEPT=INCLUDE
  /PRINT=ETASQ OPOWER HOMOGENEITY
  /CRITERIA=ALPHA(0.05)
  /DESIGN=Format.
```

Univariate Analysis of Variance

[DataSet1] \\psf\Home\Documents\Thesis\SPSS files\Amendments SPSS\New Study 3 Data.sav

Between-Subjects Factors

		Value Label	N
Format	G	Text graphical	99
	N	Text numerical	107
	T	Text only	87

Levene's Test of Equality of Error Variances[a]

Dependent Variable:Z_Uncertain

F	df1	df2	Sig.
1.833	2	290	.162

Tests the null hypothesis that the error variance of the dependent variable is equal across groups.

a. Design: Intercept + Format

Tests of Between-Subjects Effects

Dependent Variable:Z_Uncertain

Source	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared	Noncent. Parameter	Observed Power[b]
Corrected Model	17.898[a]	2	8.949	2.484	.085	.017	4.968	.497
Intercept	3735.311	1	3735.311	1036.821	.000	.781	1036.821	1.000
Format	17.898	2	8.949	2.484	.085	.017	4.968	.497
Error	1044.771	290	3.603					
Total	4847.000	293						
Corrected Total	1062.669	292						

a. R Squared = .017 (Adjusted R Squared = .010)

b. Computed using alpha = 0.05

```
*Boxplot Correct recall across formats*.
EXAMINE VARIABLES=Agreed_Z_Correct BY Format
  /PLOT=BOXPLOT
  /STATISTICS=Descriptives
  /NOTOTAL.
```

Explore

```
[DataSet1] \\psf\Home\Documents\Thesis\SPSS files\Amendments SPSS\New Study 3 Data.sav
```

Format

Case Processing Summary

		Cases					
		Valid		Missing		Total	
	Format	N	Percent	N	Percent	N	Percent
Agreed correct count, 2nd part	Text graphical	99	100.0%	0	.0%	99	100.0%
	Text numerical	107	100.0%	0	.0%	107	100.0%
	Text only	87	100.0%	0	.0%	87	100.0%

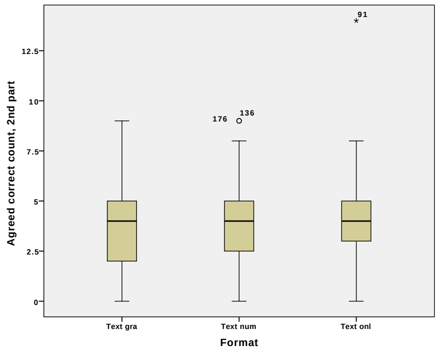
Descriptives

	Format			Statistic	Std. Error
Agreed correct count, 2nd part	Text graphical	Mean		3.68	.202
		95% Confidence Interval for Mean	Lower Bound	3.28	
			Upper Bound	4.08	
		5% Trimmed Mean		3.66	
		Median		4.00	
		Variance		4.037	
		Std. Deviation		2.009	
		Minimum		0	
		Maximum		9	
		Range		9	
		Interquartile Range		3	
		Skewness		-.014	.243
		Kurtosis		-.228	.481
	Text numerical	Mean		3.71	.201
		95% Confidence Interval for Mean	Lower Bound	3.31	
			Upper Bound	4.11	
		5% Trimmed Mean		3.67	
		Median		4.00	
		Variance		4.340	
		Std. Deviation		2.083	
		Minimum		0	
		Maximum		9	
		Range		9	
		Interquartile Range		3	
		Skewness		.172	.234
		Kurtosis		-.197	.463

Descriptives

	Format			Statistic	Std. Error
Agreed correct count, 2nd part	Text only	Mean		3.79	.224
		95% Confidence Interval for Mean	Lower Bound	3.35	
			Upper Bound	4.24	
		5% Trimmed Mean		3.73	
		Median		4.00	
		Variance		4.352	
		Std. Deviation		2.086	
		Minimum		0	
		Maximum		14	
		Range		14	
		Interquartile Range		2	
		Skewness		1.124	.258
		Kurtosis		5.626	.511

Agreed correct count, 2nd part




```
*Boxplot Incorrect recall across formats*.
EXAMINE VARIABLES=Agreed_Z_Incorrect BY Format
  /PLOT=BOXPLOT
  /STATISTICS=DESCRIPTIVES
  /NOTOTAL.
```

Explore

[DataSet1] \\psf\Home\Documents\Thesis\SPSS files\Amendments SPSS\New Study 3 Data.sav

Format

Case Processing Summary

	Format	Valid N	Valid Percent	Missing N	Missing Percent	Total N	Total Percent
Agreed incorrect count, 2nd part	Text graphical	99	100.0%	0	.0%	99	100.0%
	Text numerical	107	100.0%	0	.0%	107	100.0%
	Text only	87	100.0%	0	.0%	87	100.0%

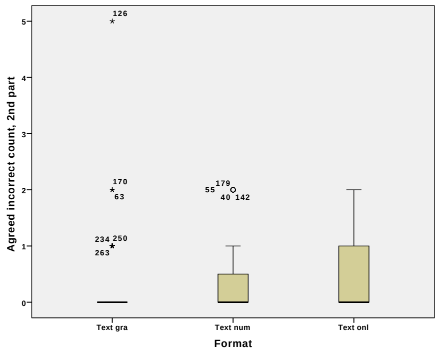
Descriptives

	Format			Statistic	Std. Error
Agreed incorrect count, 2nd part	Text graphical	Mean		.30	.068
		95% Confidence Interval for Mean	Lower Bound	.17	
			Upper Bound	.44	
		5% Trimmed Mean		.21	
		Median		.00	
		Variance		.458	
		Std. Deviation		.677	
		Minimum		0	
		Maximum		5	
		Range		5	
		Interquartile Range		0	
		Skewness		3.976	.243
		Kurtosis		23.195	.481
	Text numerical	Mean		.30	.053
		95% Confidence Interval for Mean	Lower Bound	.19	
			Upper Bound	.41	

Descriptives

	Format			Statistic	Std. Error
Agreed incorrect count, 2nd part	Text numerical	5% Trimmed Mean		.22	
		Median		.00	
		Variance		.306	
		Std. Deviation		.553	
		Minimum		0	
		Maximum		2	
		Range		2	
		Interquartile Range		1	
		Skewness		1.707	.234
		Kurtosis		2.012	.463
	Text only	Mean		.34	.065
		95% Confidence Interval for Mean	Lower Bound	.22	
			Upper Bound	.47	
		5% Trimmed Mean		.27	
		Median		.00	
		Variance		.368	
		Std. Deviation		.607	
		Minimum		0	
		Maximum		2	
		Range		2	
		Interquartile Range		1	
		Skewness		1.582	.258
		Kurtosis		1.424	.511

Agreed incorrect count, 2nd part




```
ONEWAY Agreed_Z_Correct Agreed_Z_Incorrect BY Rc_Format
  /STATISTICS DESCRIPTIVES HOMOGENEITY BROWNFORSYTHE WELCH
  /MISSING ANALYSIS.
```

Oneway

[DataSet1] \\psf\Home\Documents\Thesis\SPSS files\Amendments SPSS\New Study 3 Data.sav

ANOVA

		Sum of Squares	df	Mean Square	F	Sig.
Agreed correct count, 2nd part	Between Groups	.656	2	.328	.077	.926
	Within Groups	1229.951	290	4.241		
	Total	1230.608	292			
Agreed incorrect count, 2nd part	Between Groups	.118	2	.059	.158	.854
	Within Groups	108.994	290	.376		
	Total	109.113	292			

Robust Tests of Equality of Means

		Statistic[a]	df1	df2	Sig.
Agreed correct count, 2nd part	Welch	.077	2	189.983	.926
	Brown-Forsythe	.077	2	284.332	.926
Agreed incorrect count, 2nd part	Welch	.164	2	187.352	.849
	Brown-Forsythe	.157	2	275.880	.855

a. Asymptotically F distributed.

```
MEANS TABLES=I_Estimate_text I_Estimate_Numerical I_Estimate_Graph
  /CELLS MEAN COUNT STDDEV.
```

Means

[DataSet1] \\psf\Home\Documents\Thesis\SPSS files\Amendments SPSS\New Study 3 Data.sav

Case Processing Summary

	Cases					
	Included		Excluded		Total	
	N	Percent	N	Percent	N	Percent
I_Estimate_text	293	100.0%	0	.0%	293	100.0%
I_Estimate_Numerical	293	100.0%	0	.0%	293	100.0%
I_Estimate_Graph	293	100.0%	0	.0%	293	100.0%

Report

	I_Estimate_ text	I_Estimate_ Numerical	I_Estimate_ Graph
Mean	4.27	5.21	6.61
N	293	293	293
Std. Deviation	1.581	1.526	1.457

General Linear Model

[DataSet2] /Users/daniela/Documents/Thesis/SPSS files/Amendments SPSS/New Study 3 Data.sav

Within-Subjects Factors

Measure:I_Estimate

Pres_Format	Dependent Variable
1	I_Estimate_ text
2	I_Estimate_ Numerical
3	I_Estimate_ Graph

Multivariate Tests[c]

Effect		Value	F	Hypothesis df	Error df	Sig.	Partial Eta Squared	Noncent. Parameter	Observed Power[b]
Pres_Format	Pillai's Trace	.625	242.616[a]	2.000	291.000	.000	.625	485.233	1.000
	Wilks' Lambda	.375	242.616[a]	2.000	291.000	.000	.625	485.233	1.000
	Hotelling's Trace	1.667	242.616[a]	2.000	291.000	.000	.625	485.233	1.000
	Roy's Largest Root	1.667	242.616[a]	2.000	291.000	.000	.625	485.233	1.000

a. Exact statistic

b. Computed using alpha =

c. Design: Intercept
Within Subjects Design: Pres_Format

Mauchly's Test of Sphericity[b]

Measure:I_Estimate

Within Subjects Effect	Mauchly's W	Approx. Chi-Square	df	Sig.	Epsilon[a]		
					Greenhouse-Geisser	Huynh-Feldt	Lower-bound
Pres_Format	.989	3.359	2	.186	.989	.995	.500

Tests the null hypothesis that the error covariance matrix of the orthonormalized transformed dependent variables is proportional to an identity matrix.

a. May be used to adjust the degrees of freedom for the averaged tests of significance. Corrected tests are displayed in the Tests of Within-Subjects Effects table.

b. Design: Intercept
Within Subjects Design: Pres_Format

Tests of Within-Subjects Effects

Measure:I_Estimate

Source		Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared	Noncent. Parameter
Pres_Format	Sphericity Assumed	813.586	2	406.793	266.009	.000	.477	532.017

Tests of Within-Subjects Effects

Measure:I_Estimate

Source		Observed Power[a]
Pres_Format	Sphericity Assumed	1.000

a. Computed using alpha =

Tests of Within-Subjects Effects

Measure:I_Estimate

Source		Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared	Noncent. Parameter
Pres_Format	Greenhouse-Geisser	813.586	1.977	411.462	266.009	.000	.477	525.980
	Huynh-Feldt	813.586	1.991	408.692	266.009	.000	.477	529.545
	Lower-bound	813.586	1.000	813.586	266.009	.000	.477	266.009
Error(Pres_Format)	Sphericity Assumed	893.081	584	1.529				
	Greenhouse-Geisser	893.081	577.373	1.547				
	Huynh-Feldt	893.081	581.287	1.536				
	Lower-bound	893.081	292.000	3.058				

Tests of Within-Subjects Effects

Measure:I_Estimate

Source		Observed Power[a]
Pres_Format	Greenhouse-Geisser	1.000
	Huynh-Feldt	1.000
	Lower-bound	1.000

a. Computed using alpha =

Tests of Within-Subjects Contrasts

Measure:I_Estimate

Source	Pres_Format	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared	Noncent. Parameter	Observed Power[a]
Pres_Format	Linear	803.065	1	803.065	475.712	.000	.620	475.712	1.000
	Quadratic	10.521	1	10.521	7.678	.006	.026	7.678	.789
Error(Pres_Format)	Linear	492.935	292	1.688					
	Quadratic	400.146	292	1.370					

a. Computed using alpha =

Tests of Between-Subjects Effects

Measure:I_Estimate
Transformed Variable:Average

Source	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared	Noncent. Parameter	Observed Power[a]
Intercept	25280.769	1	25280.769	6495.000	.000	.957	6495.000	1.000
Error	1136.564	292	3.892					

a. Computed using alpha =

```
*Testing whether differences are significant*.
T-TEST PAIRS=I_Estimate_text I_Estimate_Graph I_Estimate_text WITH I_Estimate_Numerical I_Estimate_Numerical I_Esti
mate_Graph (PAIRED)
  /CRITERIA=CI(.9500)
  /MISSING=ANALYSIS.
```

T-Test

[DataSet1] \\psf\Home\Documents\Thesis\SPSS files\Amendments SPSS\New Study 3 Data.sav

Paired Samples Statistics

		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	I_Estimate_text	4.27	293	1.581	.092
	I_Estimate_Numerical	5.21	293	1.526	.089
Pair 2	I_Estimate_Graph	6.61	293	1.457	.085
	I_Estimate_Numerical	5.21	293	1.526	.089
Pair 3	I_Estimate_text	4.27	293	1.581	.092
	I_Estimate_Graph	6.61	293	1.457	.085

Paired Samples Correlations

		N	Correlation	Sig.
Pair 1	I_Estimate_text & I_Estimate_Numerical	293	.385	.000
Pair 2	I_Estimate_Graph & I_Estimate_Numerical	293	.365	.000
Pair 3	I_Estimate_text & I_Estimate_Graph	293	.270	.000

Paired Samples Test

		Paired Differences					t	df	Sig. (2-tailed)
					95% Confidence Interval of the Difference				
		Mean	Std. Deviation	Std. Error Mean	Lower	Upper			
Pair 1	I_Estimate_text - I_Estimate_Numerical	-.939	1.723	.101	-1.137	-.740	-9.324	292	.000
Pair 2	I_Estimate_Graph - I_Estimate_Numerical	1.403	1.682	.098	1.209	1.596	14.272	292	.000
Pair 3	I_Estimate_text - I_Estimate_Graph	-2.341	1.837	.107	-2.553	-2.130	-21.811	292	.000

```
MEANS TABLES=I_Estimate_text I_Estimate_Numerical I_Estimate_Graph BY Format
  /CELLS MEAN COUNT STDDEV.
```


Means

```
[DataSet1] \\psf\Home\Documents\Thesis\SPSS files\Amendments SPSS\New Study 3 Data.sav
```

Case Processing Summary

	Cases					
	Included		Excluded		Total	
	N	Percent	N	Percent	N	Percent
I_Estimate_text * Format	293	100.0%	0	.0%	293	100.0%
I_Estimate_Numerical * Format	293	100.0%	0	.0%	293	100.0%
I_Estimate_Graph * Format	293	100.0%	0	.0%	293	100.0%

Report

Format		I_Estimate_text	I_Estimate_Numerical	I_Estimate_Graph
Text graphical	**Mean**	3.84	4.78	6.12
	N	99	99	99
	Std. Deviation	1.748	1.669	1.304
Text numerical	**Mean**	4.36	5.29	6.73
	N	107	107	107
	Std. Deviation	1.430	1.408	1.593
Text only	**Mean**	4.64	5.60	7.02
	N	87	87	87
	Std. Deviation	1.455	1.385	1.294
Total	**Mean**	4.27	5.21	6.61
	N	293	293	293
	Std. Deviation	1.581	1.526	1.457

```
*Testing whether format condition to which participants affected their estimate*.
GLM I_Estimate_text I_Estimate_Numerical I_Estimate_Graph BY Format
  /METHOD=SSTYPE(3)
/print=etasq opower
  /INTERCEPT=INCLUDE
  /CRITERIA=ALPHA(.05)
  /DESIGN= Format.
```

General Linear Model

[DataSet1] \\psf\Home\Documents\Thesis\SPSS files\Amendments SPSS\New Study 3 Data.sav

Between-Subjects Factors

		Value Label	N
Format	G	Text graphical	99
	N	Text numerical	107
	T	Text only	87

Multivariate Tests[d]

Effect		Value	F	Hypothesis df	Error df	Sig.	Partial Eta Squared	Noncent. Parameter	Observed Power[b]
Intercept	Pillai's Trace	.965	2654.939[a]	3.000	288.000	.000	.965	7964.818	1.000
	Wilks' Lambda	.035	2654.939[a]	3.000	288.000	.000	.965	7964.818	1.000
	Hotelling's Trace	27.656	2654.939[a]	3.000	288.000	.000	.965	7964.818	1.000
	Roy's Largest Root	27.656	2654.939[a]	3.000	288.000	.000	.965	7964.818	1.000
Format	Pillai's Trace	.094	4.762	6.000	578.000	.000	.047	28.572	.991
	Wilks' Lambda	.906	4.868[a]	6.000	576.000	.000	.048	29.209	.992
	Hotelling's Trace	.104	4.974	6.000	574.000	.000	.049	29.841	.993
	Roy's Largest Root	.104	10.003[c]	3.000	289.000	.000	.094	30.008	.998

a. Exact statistic

b. Computed using alpha = .05

c. The statistic is an upper bound on F that yields a lower bound on the significance level.

d. Design: Intercept + Format

Tests of Between-Subjects Effects

Source	Dependent Variable	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared	Noncent. Parameter
Corrected Model	I_Estimate_text	31.546[a]	2	15.773	6.552	.002	.043	13.104
	I_Estimate_Numerical	32.251[c]	2	16.125	7.216	.001	.047	14.432
	I_Estimate_Graph	40.005[d]	2	20.003	10.008	.000	.065	20.015
Intercept	I_Estimate_text	5333.812	1	5333.812	2215.568	.000	.884	2215.568
	I_Estimate_Numerical	7931.159	1	7931.159	3549.168	.000	.924	3549.168
	I_Estimate_Graph	12764.366	1	12764.366	6386.151	.000	.957	6386.151
Format	I_Estimate_text	31.546	2	15.773	6.552	.002	.043	13.104
	I_Estimate_Numerical	32.251	2	16.125	7.216	.001	.047	14.432
	I_Estimate_Graph	40.005	2	20.003	10.008	.000	.065	20.015
Error	I_Estimate_text	698.153	290	2.407				
	I_Estimate_Numerical	648.049	290	2.235				
	I_Estimate_Graph	579.640	290	1.999				
Total	I_Estimate_text	6071.000	293					
	I_Estimate_Numerical	8628.000	293					
	I_Estimate_Graph	13425.000	293					
Corrected Total	I_Estimate_text	729.700	292					
	I_Estimate_Numerical	680.300	292					
	I_Estimate_Graph	619.645	292					

a. R Squared = .043 (Adjusted R Squared = .037)

c. R Squared = .047 (Adjusted R Squared = .041)

d. R Squared = .065 (Adjusted R Squared = .058)

Tests of Between-Subjects Effects

Source	Dependent Variable	Observed Power[b]
Corrected Model	I_Estimate_text	.907
	I_Estimate_Numerical	.933
	I_Estimate_Graph	.984
Intercept	I_Estimate_text	1.000
	I_Estimate_Numerical	1.000
	I_Estimate_Graph	1.000
Format	I_Estimate_text	.907
	I_Estimate_Numerical	.933
	I_Estimate_Graph	.984
Error	I_Estimate_text	
	I_Estimate_Numerical	
	I_Estimate_Graph	
Total	I_Estimate_text	
	I_Estimate_Numerical	
	I_Estimate_Graph	
Corrected Total	I_Estimate_text	
	I_Estimate_Numerical	
	I_Estimate_Graph	

b. Computed using alpha = .05

```
*Post-hoc testing for which differences are significant*.
T-TEST GROUPS=FORMAT ('T' 'G')
/MISSING=ANALYSIS
VARIABLES=I_Estimate_text I_estimate_numerical I_estimate_graph
```

/CRITERIA=CI(.9500).

T-Test

[DataSet1] \\psf\Home\Documents\Thesis\SPSS files\Amendments SPSS\New Study 3 Data.sav

Group Statistics

	Format	N	Mean	Std. Deviation	Std. Error Mean
I_Estimate_text	Text only	87	4.64	1.455	.156
	Text graphical	99	3.84	1.748	.176
I_Estimate_Numerical	Text only	87	5.60	1.385	.148
	Text graphical	99	4.78	1.669	.168
I_Estimate_Graph	Text only	87	7.02	1.294	.139
	Text graphical	99	6.12	1.304	.131

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means				
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference
I_Estimate_text	Equal variances assumed	3.065	.082	3.388	184	.001	.805	.238
	Equal variances not assumed			3.428	183.476	.001	.805	.235
I_Estimate_Numerical	Equal variances assumed	1.850	.175	3.616	184	.000	.820	.227

Independent Samples Test

		t-test for Equality of Means	
		95% Confidence Interval of the Difference	
		Lower	Upper
I_Estimate_text	Equal variances assumed	.336	1.274
	Equal variances not assumed	.342	1.269
I_Estimate_Numerical	Equal variances assumed	.373	1.267

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means				
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference
I_Estimate_Numerical	Equal variances not assumed			3.660	183.413	.000	.820	.224
I_Estimate_Graph	Equal variances assumed	1.372	.243	4.724	184	.000	.902	.191
	Equal variances not assumed			4.726	181.282	.000	.902	.191

Independent Samples Test

		t-test for Equality of Means	
		95% Confidence Interval of the Difference	
		Lower	Upper
I_Estimate_Numerical	Equal variances not assumed	.378	1.262
I_Estimate_Graph	Equal variances assumed	.525	1.278
	Equal variances not assumed	.525	1.278

```
T-TEST GROUPS=FORMAT ('T' 'N')
/MISSING=ANALYSIS
VARIABLES=I_Estimate_text I_estimate_numerical I_estimate_graph
/CRITERIA=CI(.9500).
```

T-Test

[DataSet1] \\psf\Home\Documents\Thesis\SPSS files\Amendments SPSS\New Study 3 Data.sav

Group Statistics

	Format	N	Mean	Std. Deviation	Std. Error Mean
I_Estimate_text	Text only	87	4.64	1.455	.156
	Text numerical	107	4.36	1.430	.138
I_Estimate_Numerical	Text only	87	5.60	1.385	.148
	Text numerical	107	5.29	1.408	.136
I_Estimate_Graph	Text only	87	7.02	1.294	.139
	Text numerical	107	6.73	1.593	.154

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means				
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference
I_Estimate_text	Equal variances assumed	.242	.623	1.342	192	.181	.279	.208
	Equal variances not assumed			1.340	182.729	.182	.279	.208
I_Estimate_Numerical	Equal variances assumed	.070	.791	1.527	192	.128	.308	.202
	Equal variances not assumed			1.529	185.165	.128	.308	.201
I_Estimate_Graph	Equal variances assumed	3.448	.065	1.389	192	.167	.294	.212
	Equal variances not assumed			1.418	192.000	.158	.294	.207

Independent Samples Test

		t-test for Equality of Means	
		95% Confidence Interval of the Difference	
		Lower	Upper
I_Estimate_text	Equal variances assumed	-.131	.690
	Equal variances not assumed	-.132	.690
I_Estimate_Numerical	Equal variances assumed	-.090	.706
	Equal variances not assumed	-.089	.705
I_Estimate_Graph	Equal variances assumed	-.124	.712
	Equal variances not assumed	-.115	.703

```
T-TEST GROUPS=FORMAT ('N' 'G')
/MISSING=ANALYSIS
VARIABLES=I_Estimate_text I_estimate_numerical I_estimate_graph
/CRITERIA=CI(.9500).
```

T-Test

[DataSet1] \\psf\Home\Documents\Thesis\SPSS files\Amendments SPSS\New Study 3 Data.sav

Group Statistics

	Format	N	Mean	Std. Deviation	Std. Error Mean
I_Estimate_text	Text numerical	107	4.36	1.430	.138
	Text graphical	99	3.84	1.748	.176
I_Estimate_Numerical	Text numerical	107	5.29	1.408	.136
	Text graphical	99	4.78	1.669	.168
I_Estimate_Graph	Text numerical	107	6.73	1.593	.154
	Text graphical	99	6.12	1.304	.131

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means				
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference
I_Estimate_text	Equal variances assumed	2.233	.137	2.372	204	.019	.526	.222
	Equal variances not assumed			2.353	189.706	.020	.526	.224
I_Estimate_Numerical	Equal variances assumed	2.675	.103	2.386	204	.018	.512	.215
	Equal variances not assumed			2.370	192.375	.019	.512	.216
I_Estimate_Graph	Equal variances assumed	.890	.347	2.982	204	.003	.608	.204
	Equal variances not assumed			3.005	201.039	.003	.608	.202

Independent Samples Test

		t-test for Equality of Means	
		95% Confidence Interval of the Difference	
		Lower	Upper
I_Estimate_text	Equal variances assumed	.089	.963
	Equal variances not assumed	.085	.967
I_Estimate_Numerical	Equal variances assumed	.089	.935
	Equal variances not assumed	.086	.938
I_Estimate_Graph	Equal variances assumed	.206	1.010
	Equal variances not assumed	.209	1.007

```
**Estimates of recall, second round**.
*Describing means of estimates across different format conditions*.
MEANS TABLES=Z_Estimate_text Z_Estimate_Numerical Z_Estimate_Graph
  /CELLS MEAN COUNT STDDEV.
```

Means

[DataSet1] \\psf\Home\Documents\Thesis\SPSS files\Amendments SPSS\New Study 3 Data.sav

Case Processing Summary

	Cases					
	Included		Excluded		Total	
	N	Percent	N	Percent	N	Percent
Z_Estimate_Text	293	100.0%	0	.0%	293	100.0%
Z_Estimate_Numerical	293	100.0%	0	.0%	293	100.0%
Z_Estimate_Graph	293	100.0%	0	.0%	293	100.0%

Report

	Z_Estimate_Text	Z_Estimate_Numerical	Z_Estimate_Graph
Mean	3.56	4.51	5.87
N	293	293	293
Std. Deviation	1.497	1.545	1.619

```
*Testing for effect of format on estimate*.
GLM Z_Estimate_text Z_Estimate_Numerical Z_Estimate_Graph
  /WSFACTOR=Pres_Format 3 Polynomial
  /MEASURE=Z_Estimate
  /METHOD=SSTYPE(3)
/print=etasq opower
  /CRITERIA=ALPHA(.05)
  /WSDESIGN=Pres_Format.
```

General Linear Model

[DataSet2] /Users/daniela/Documents/Thesis/SPSS files/Amendments SPSS/New Study 3 Data.sav

Within-Subjects Factors

Measure:Z_Estimate

Pres_Format	Dependent Variable
1	Z_Estimate_Text
2	Z_Estimate_Numerical
3	Z_Estimate_Graph

Multivariate Tests[c]

Effect		Value	F	Hypothesis df	Error df	Sig.	Partial Eta Squared	Noncent. Parameter	Observed Power[b]
Pres_Format	Pillai's Trace	.638	256.236[a]	2.000	291.000	.000	.638	512.472	1.000
	Wilks' Lambda	.362	256.236[a]	2.000	291.000	.000	.638	512.472	1.000
	Hotelling's Trace	1.761	256.236[a]	2.000	291.000	.000	.638	512.472	1.000
	Roy's Largest Root	1.761	256.236[a]	2.000	291.000	.000	.638	512.472	1.000

a. Exact statistic

b. Computed using alpha =

c. Design: Intercept
 Within Subjects Design: Pres_Format

Mauchly's Test of Sphericity[b]

Measure:Z_Estimate

Within Subjects Effect	Mauchly's W	Approx. Chi-Square	df	Sig.	Epsilon[a] Greenhouse-Geisser	Huynh-Feldt	Lower-bound
Pres_Format	.904	29.239	2	.000	.913	.918	.500

Tests the null hypothesis that the error covariance matrix of the orthonormalized transformed dependent variables is proportional to an identity matrix.

a. May be used to adjust the degrees of freedom for the averaged tests of significance. Corrected tests are displayed in the Tests of Within-Subjects Effects table.

b. Design: Intercept
Within Subjects Design: Pres_Format

Tests of Within-Subjects Effects

Measure:Z_Estimate

Source		Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared	Noncent. Parameter
Pres_Format	Sphericity Assumed	785.572	2	392.786	322.886	.000	.525	645.772
	Greenhouse-Geisser	785.572	1.825	430.335	322.886	.000	.525	589.426
	Huynh-Feldt	785.572	1.836	427.784	322.886	.000	.525	592.939
	Lower-bound	785.572	1.000	785.572	322.886	.000	.525	322.886
Error(Pres_Format)	Sphericity Assumed	710.428	584	1.216				
	Greenhouse-Geisser	710.428	533.044	1.333				
	Huynh-Feldt	710.428	536.221	1.325				
	Lower-bound	710.428	292.000	2.433				

Tests of Within-Subjects Effects

Measure:Z_Estimate

Source		Observed Power[a]
Pres_Format	Sphericity Assumed	1.000
	Greenhouse-Geisser	1.000
	Huynh-Feldt	1.000
	Lower-bound	1.000

a. Computed using alpha =

Tests of Within-Subjects Contrasts

Measure:Z_Estimate

Source	Pres_Format	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared	Noncent. Parameter	Observed Power[a]
Pres_Format	Linear	777.517	1	777.517	491.436	.000	.627	491.436	1.000
	Quadratic	8.055	1	8.055	9.467	.002	.031	9.467	.866
Error(Pres_Format)	Linear	461.983	292	1.582					
	Quadratic	248.445	292	.851					

a. Computed using alpha =

Tests of Between-Subjects Effects

Measure:Z_Estimate
Transformed Variable:Average

Source	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared	Noncent. Parameter	Observed Power[a]
Intercept	18984.329	1	18984.329	3940.810	.000	.931	3940.810	1.000
Error	1406.671	292	4.817					

a. Computed using alpha =

```
**Testing whether differences are significant*.
```

```
T-TEST PAIRS=Z_Estimate_text Z_Estimate_Graph Z_Estimate_text WITH Z_Estimate_Numerical Z_Estimate_Numerical Z_Esti
mate_Graph (PAIRED)
  /CRITERIA=CI(.9500)
  /MISSING=ANALYSIS.
```

T-Test

[DataSet1] \\psf\Home\Documents\Thesis\SPSS files\Amendments SPSS\New Study 3 Data.sav

Paired Samples Statistics

		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	Z_Estimate_Text	3.56	293	1.497	.087
	Z_Estimate_Numerical	4.51	293	1.545	.090
Pair 2	Z_Estimate_Graph	5.87	293	1.619	.095
	Z_Estimate_Numerical	4.51	293	1.545	.090
Pair 3	Z_Estimate_Text	3.56	293	1.497	.087
	Z_Estimate_Graph	5.87	293	1.619	.095

Paired Samples Correlations

		N	Correlation	Sig.
Pair 1	Z_Estimate_Text & Z_Estimate_Numerical	293	.521	.000
Pair 2	Z_Estimate_Graph & Z_Estimate_Numerical	293	.619	.000
Pair 3	Z_Estimate_Text & Z_Estimate_Graph	293	.350	.000

Paired Samples Test

		Paired Differences					t	df	Sig. (2-tailed)
					95% Confidence Interval of the Difference				
		Mean	Std. Deviation	Std. Error Mean	Lower	Upper			
Pair 1	Z_Estimate_Text - Z_Estimate_Numerical	-.949	1.490	.087	-1.120	-.777	-10.900	292	.000
Pair 2	Z_Estimate_Graph - Z_Estimate_Numerical	1.355	1.384	.081	1.196	1.514	16.761	292	.000
Pair 3	Z_Estimate_Text - Z_Estimate_Graph	-2.304	1.779	.104	-2.508	-2.099	-22.168	292	.000

```
*Testing whether format condition to which participants affected their estimate*.
GLM Z_Estimate_text Z_Estimate_Numerical Z_Estimate_Graph BY Format
  /METHOD=SSTYPE(3)
/print=etasq opower
  /INTERCEPT=INCLUDE
  /CRITERIA=ALPHA(.05)
  /DESIGN= Format.
```

General Linear Model

[DataSet1] \\psf\Home\Documents\Thesis\SPSS files\Amendments SPSS\New Study 3 Data.sav

Between-Subjects Factors

		Value Label	N
Format	G	Text graphical	99
	N	Text numerical	107
	T	Text only	87

Multivariate Tests[d]

Effect		Value	F	Hypothesis df	Error df	Sig.	Partial Eta Squared	Noncent. Parameter	Observed Power[b]
Intercept	Pillai's Trace	.940	1494.840[a]	3.000	288.000	.000	.940	4484.521	1.000
	Wilks' Lambda	.060	1494.840[a]	3.000	288.000	.000	.940	4484.521	1.000
	Hotelling's Trace	15.571	1494.840[a]	3.000	288.000	.000	.940	4484.521	1.000
	Roy's Largest Root	15.571	1494.840[a]	3.000	288.000	.000	.940	4484.521	1.000
Format	Pillai's Trace	.105	5.322	6.000	578.000	.000	.052	31.933	.996
	Wilks' Lambda	.898	5.313[a]	6.000	576.000	.000	.052	31.876	.996
	Hotelling's Trace	.111	5.303	6.000	574.000	.000	.053	31.819	.996
	Roy's Largest Root	.069	6.689[c]	3.000	289.000	.000	.065	20.067	.974

a. Exact statistic

b. Computed using alpha = .05

c. The statistic is an upper bound on F that yields a lower bound on the significance level.

d. Design: Intercept + Format

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Tests of Between-Subjects Effects

Source	Dependent Variable	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared	Noncent. Parameter
Corrected Model	Z_Estimate_Text	34.600[a]	2	17.300	8.099	.000	.053	16.198
	Z_Estimate_Numerical	40.018[c]	2	20.009	8.829	.000	.057	17.659
	Z_Estimate_Graph	24.656[d]	2	12.328	4.824	.009	.032	9.647
Intercept	Z_Estimate_Text	3720.128	1	3720.128	1741.516	.000	.857	1741.516
	Z_Estimate_Numerical	5999.789	1	5999.789	2647.541	.000	.901	2647.541
	Z_Estimate_Graph	10068.472	1	10068.472	3939.613	.000	.931	3939.613
Format	Z_Estimate_Text	34.600	2	17.300	8.099	.000	.053	16.198
	Z_Estimate_Numerical	40.018	2	20.009	8.829	.000	.057	17.659
	Z_Estimate_Graph	24.656	2	12.328	4.824	.009	.032	9.647
Error	Z_Estimate_Text	619.482	290	2.136				
	Z_Estimate_Numerical	657.190	290	2.266				
	Z_Estimate_Graph	741.153	290	2.556				
Total	Z_Estimate_Text	4374.000	293					
	Z_Estimate_Numerical	6662.000	293					
	Z_Estimate_Graph	10851.000	293					
Corrected Total	Z_Estimate_Text	654.082	292					
	Z_Estimate_Numerical	697.208	292					
	Z_Estimate_Graph	765.809	292					

a. R Squared = .053 (Adjusted R Squared = .046)

c. R Squared = .057 (Adjusted R Squared = .051)

d. R Squared = .032 (Adjusted R Squared = .026)

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Tests of Between-Subjects Effects

Source	Dependent Variable	Observed Power[b]
Corrected Model	Z_Estimate_Text	.957
	Z_Estimate_Numerical	.971
	Z_Estimate_Graph	.796
Intercept	Z_Estimate_Text	1.000
	Z_Estimate_Numerical	1.000
	Z_Estimate_Graph	1.000
Format	Z_Estimate_Text	.957
	Z_Estimate_Numerical	.971
	Z_Estimate_Graph	.796
Error	Z_Estimate_Text	
	Z_Estimate_Numerical	
	Z_Estimate_Graph	
Total	Z_Estimate_Text	
	Z_Estimate_Numerical	
	Z_Estimate_Graph	
Corrected Total	Z_Estimate_Text	
	Z_Estimate_Numerical	
	Z_Estimate_Graph	

b. Computed using alpha = .05

```
*Post-hoc testing for which differences are significant*.
T-TEST GROUPS=FORMAT ('T' 'G')
/MISSING=ANALYSIS
VARIABLES=Z_Estimate_text Z_estimate_numerical Z_estimate_graph
```



```
/CRITERIA=CI(.9500).
```

T-Test

[DataSet1] \\psf\Home\Documents\Thesis\SPSS files\Amendments SPSS\New Study 3 Data.sav

Group Statistics

	Format	N	Mean	Std. Deviation	Std. Error Mean
Z_Estimate_Text	**Text only**	87	3.95	1.293	.139
	Text graphical	99	3.11	1.377	.138
Z_Estimate_Numerical	**Text only**	87	5.08	1.391	.149
	Text graphical	99	4.28	1.635	.164
Z_Estimate_Graph	**Text only**	87	6.26	1.442	.155
	Text graphical	99	5.54	1.560	.157

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means				
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference
Z_Estimate_Text	**Equal variances assumed**	1.450	.230	4.286	184	.000	.843	.197
	Equal variances not assumed			4.303	183.171	.000	.843	.196
Z_Estimate_Numerical	**Equal variances assumed**	1.638	.202	3.557	184	.000	.798	.224

Independent Samples Test

		t-test for Equality of Means 95% Confidence Interval of the Difference Lower	Upper
Z_Estimate_Text	Equal variances assumed	.455	1.231
	Equal variances not assumed	.456	1.229
Z_Estimate_Numerical	Equal variances assumed	.355	1.240

Independent Samples Test

		Levene's Test for Equality of Variances F	Sig.	t-test for Equality of Means t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference
Z_Estimate_Numerical	Equal variances not assumed			3.594	183.816	.000	.798	.222
Z_Estimate_Graph	Equal variances assumed	.722	.397	3.293	184	.001	.729	.221
	Equal variances not assumed			3.310	183.518	.001	.729	.220

Independent Samples Test

		t-test for Equality of Means 95% Confidence Interval of the Difference Lower	Upper
Z_Estimate_Numerical	Equal variances not assumed	.360	1.236
Z_Estimate_Graph	Equal variances assumed	.292	1.166
	Equal variances not assumed	.294	1.164


```
T-TEST GROUPS=FORMAT ('T' 'N')
/MISSING=ANALYSIS
VARIABLES=Z_Estimate_text Z_estimate_numerical Z_estimate_graph
/CRITERIA=CI(.9500).
```

T-Test

[DataSet1] \\psf\Home\Documents\Thesis\SPSS files\Amendments SPSS\New Study 3 Data.sav

Group Statistics

	Format	N	Mean	Std. Deviation	Std. Error Mean
Z_Estimate_Text	**Text only**	**87**	**3.95**	**1.293**	**.139**
	Text numerical	**107**	**3.66**	**1.654**	**.160**
Z_Estimate_Numerical	**Text only**	**87**	**5.08**	**1.391**	**.149**
	Text numerical	**107**	**4.26**	**1.469**	**.142**
Z_Estimate_Graph	**Text only**	**87**	**6.26**	**1.442**	**.155**
	Text numerical	**107**	**5.85**	**1.747**	**.169**

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means				
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference
Z_Estimate_Text	Equal variances assumed	9.732	.002	1.339	192	.182	.290	.217
	Equal variances not assumed			1.373	191.730	.171	.290	.212
Z_Estimate_Numerical	Equal variances assumed	.208	.649	3.954	192	.000	.819	.207
	Equal variances not assumed			3.976	187.544	.000	.819	.206
Z_Estimate_Graph	Equal variances assumed	2.443	.120	1.772	192	.078	.414	.234
	Equal variances not assumed			1.807	191.950	.072	.414	.229

Independent Samples Test

		t-test for Equality of Means	
		95% Confidence Interval of the Difference	
		Lower	Upper
Z_Estimate_Text	Equal variances assumed	-.137	.718
	Equal variances not assumed	-.127	.708
Z_Estimate_Numerical	Equal variances assumed	.410	1.227
	Equal variances not assumed	.413	1.225
Z_Estimate_Graph	Equal variances assumed	-.047	.875
	Equal variances not assumed	-.038	.866


```
T-TEST GROUPS=FORMAT ('N' 'G')
/MISSING=ANALYSIS
VARIABLES=Z_Estimate_text Z_estimate_numerical Z_estimate_graph
/CRITERIA=CI(.9500).
```

T-Test

[DataSet1] \\psf\Home\Documents\Thesis\SPSS files\Amendments SPSS\New Study 3 Data.sav

Group Statistics

	Format	N	Mean	Std. Deviation	Std. Error Mean
Z_Estimate_Text	**Text numerical**	**107**	**3.66**	**1.654**	**.160**
	Text graphical	**99**	**3.11**	**1.377**	**.138**
Z_Estimate_Numerical	**Text numerical**	**107**	**4.26**	**1.469**	**.142**
	Text graphical	**99**	**4.28**	**1.635**	**.164**
Z_Estimate_Graph	**Text numerical**	**107**	**5.85**	**1.747**	**.169**
	Text graphical	**99**	**5.54**	**1.560**	**.157**

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means				
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference
Z_Estimate_Text	Equal variances assumed	4.405	.037	2.594	204	.010	.552	.213
	Equal variances not assumed			2.613	201.807	.010	.552	.211
Z_Estimate_Numerical	Equal variances assumed	.799	.372	-.098	204	.922	-.021	.216
	Equal variances not assumed			-.097	197.278	.923	-.021	.217
Z_Estimate_Graph	Equal variances assumed	.627	.429	1.361	204	.175	.315	.232
	Equal variances not assumed			1.367	203.752	.173	.315	.230

Independent Samples Test

		t-test for Equality of Means	
		95% Confidence Interval of the Difference	
		Lower	Upper
Z_Estimate_Text	Equal variances assumed	.133	.972
	Equal variances not assumed	.136	.969
Z_Estimate_Numerical	Equal variances assumed	-.448	.405
	Equal variances not assumed	-.449	.407
Z_Estimate_Graph	Equal variances assumed	-.141	.772
	Equal variances not assumed	-.139	.770


```
MEANS TABLES=Agreed_Z_Correct Agreed_Z_Incorrect by Time_Condition
  /CELLS MEAN COUNT STDDEV.
```

Means

[DataSet2] /Users/daniela/Documents/Thesis/SPSS files/Amendments SPSS/New Study 3 Data.sav

Case Processing Summary

	Cases					
	Included		Excluded		Total	
	N	Percent	N	Percent	N	Percent
Agreed correct count, 2nd part * Time_condition	293	100.0%	0	.0%	293	100.0%
Agreed incorrect count, 2nd part * Time_condition	293	100.0%	0	.0%	293	100.0%

Report

Time_condition		Agreed correct count, 2nd part	Agreed incorrect count, 2nd part
2 days	**Mean**	4.11	.35
	N	100	100
	Std. Deviation	1.847	.716
12 days	**Mean**	3.78	.22
	N	99	99
	Std. Deviation	1.941	.486
20 days	**Mean**	3.26	.37
	N	94	94
	Std. Deviation	2.290	.604

Report

Time_condition		Agreed correct count, 2nd part	Agreed incorrect count, 2nd part
Total	Mean	3.72	.31
	N	293	293
	Std. Deviation	2.053	.611

```
**Effect of recall period on correct recall**.

GLM Agreed_Z_Correct Agreed_Z_Incorrect BY Time_condition
  /METHOD=SSTYPE(3)
/print=etasq opower
  /INTERCEPT=INCLUDE
  /CRITERIA=ALPHA(.05)
  /DESIGN= Time_condition.
```

General Linear Model

[DataSet1] \\psf\Home\Documents\Thesis\SPSS files\Amendments SPSS\New Study 3 Data.sav

Between-Subjects Factors

		Value Label	N
Time_condition	2	2 days	100
	12	12 days	99
	20	20 days	94

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Multivariate Tests[d]

Effect		Value	F	Hypothesis df	Error df	Sig.	Partial Eta Squared	Noncent. Parameter	Observed Power[b]
Intercept	Pillai's Trace	.793	553.217[a]	2.000	289.000	.000	.793	1106.434	1.000
	Wilks' Lambda	.207	553.217[a]	2.000	289.000	.000	.793	1106.434	1.000
	Hotelling's Trace	3.828	553.217[a]	2.000	289.000	.000	.793	1106.434	1.000
	Roy's Largest Root	3.828	553.217[a]	2.000	289.000	.000	.793	1106.434	1.000
Time_condition	Pillai's Trace	.040	2.990	4.000	580.000	.018	.020	11.958	.797
	Wilks' Lambda	.960	2.986[a]	4.000	578.000	.019	.020	11.943	.797
	Hotelling's Trace	.041	2.982	4.000	576.000	.019	.020	11.927	.796
	Roy's Largest Root	.030	4.388[c]	2.000	290.000	.013	.029	8.775	.755

a. Exact statistic

b. Computed using alpha = .05

c. The statistic is an upper bound on F that yields a lower bound on the significance level.

d. Design: Intercept + Time_condition

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Tests of Between-Subjects Effects

Source	Dependent Variable	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared	Noncent. Parameter
Corrected Model	Agreed correct count, 2nd part	35.834[a]	2	17.917	4.349	.014	.029	8.698
	Agreed incorrect count, 2nd part	1.283[c]	2	.642	1.726	.180	.012	3.452
Intercept	Agreed correct count, 2nd part	4039.408	1	4039.408	980.461	.000	.772	980.461
	Agreed incorrect count, 2nd part	29.025	1	29.025	78.060	.000	.212	78.060
Time_condition	Agreed correct count, 2nd part	35.834	2	17.917	4.349	.014	.029	8.698
	Agreed incorrect count, 2nd part	1.283	2	.642	1.726	.180	.012	3.452
Error	Agreed correct count, 2nd part	1194.773	290	4.120				
	Agreed incorrect count, 2nd part	107.829	290	.372				
Total	Agreed correct count, 2nd part	5293.000	293					
	Agreed incorrect count, 2nd part	138.000	293					
Corrected Total	Agreed correct count, 2nd part	1230.608	292					
	Agreed incorrect count, 2nd part	109.113	292					

a. R Squared = .029 (Adjusted R Squared = .022)

c. R Squared = .012 (Adjusted R Squared = .005)

Tests of Between-Subjects Effects

Source	Dependent Variable	Observed Power[b]
Corrected Model	Agreed correct count, 2nd part	.751
	Agreed incorrect count, 2nd part	.361
Intercept	Agreed correct count, 2nd part	1.000
	Agreed incorrect count, 2nd part	1.000
Time_condition	Agreed correct count, 2nd part	.751
	Agreed incorrect count, 2nd part	.361
Error	Agreed correct count, 2nd part	
	Agreed incorrect count, 2nd part	
Total	Agreed correct count, 2nd part	
	Agreed incorrect count, 2nd part	
Corrected Total	Agreed correct count, 2nd part	
	Agreed incorrect count, 2nd part	

b. Computed using alpha = .05

```
** -------- Post-hoc test for differences in recall of agreed incorrect arguments, 2nd round, per time condition---
--- *.
 T-TEST GROUPS=Time_Condition(2 12)
  /MISSING=ANALYSIS
```

```
/VARIABLES=Agreed_Z_Correct
/CRITERIA=CI(.9500).
```

T-Test

```
[DataSet1] \\psf\Home\Documents\Thesis\SPSS files\Amendments SPSS\New Study 3 Data.sav
```

Group Statistics

	Time_condition	N	Mean	Std. Deviation	Std. Error Mean
Agreed correct count, 2nd part	2 days	100	4.11	1.847	.185
	12 days	99	3.78	1.941	.195

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means			
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference
Agreed correct count, 2nd part	Equal variances assumed	.424	.516	1.237	197	.218	.332
	Equal variances not assumed			1.237	196.306	.218	.332

Independent Samples Test

		t-test for Equality of Means		
			95% Confidence Interval of the Difference	
		Std. Error Difference	Lower	Upper
Agreed correct count, 2nd part	Equal variances assumed	.269	-.197	.862
	Equal variances not assumed	.269	-.198	.862

```
T-TEST GROUPS=Time_Condition(2 20)
/MISSING=ANALYSIS
```



```
/VARIABLES=Agreed_Z_Correct
/CRITERIA=CI(.9500).
```

T-Test

```
[DataSet1] \\psf\Home\Documents\Thesis\SPSS files\Amendments SPSS\New Study 3 Data.sav
```

Group Statistics

	Time_condition	N	Mean	Std. Deviation	Std. Error Mean
Agreed correct count, 2nd part	2 days	100	4.11	1.847	.185
	20 days	94	3.26	2.290	.236

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means			
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference
Agreed correct count, 2nd part	Equal variances assumed	2.353	.127	2.869	192	.005	.855
	Equal variances not assumed			2.850	178.724	.005	.855

Independent Samples Test

		t-test for Equality of Means		
			95% Confidence Interval of the Difference	
		Std. Error Difference	Lower	Upper
Agreed correct count, 2nd part	Equal variances assumed	.298	.267	1.442
	Equal variances not assumed	.300	.263	1.446

```
T-TEST GROUPS=Time_Condition(12 20)
/MISSING=ANALYSIS
```

```
  /VARIABLES=Agreed_Z_Correct
  /CRITERIA=CI(.9500).
```

T-Test

[DataSet1] \\psf\Home\Documents\Thesis\SPSS files\Amendments SPSS\New Study 3 Data.sav

Group Statistics

	Time_condition	N	Mean	Std. Deviation	Std. Error Mean
Agreed correct count, 2nd part	12 days	99	3.78	1.941	.195
	20 days	94	3.26	2.290	.236

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means			
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference
Agreed correct count, 2nd part	Equal variances assumed	.930	.336	1.713	191	.088	.522
	Equal variances not assumed			1.705	182.522	.090	.522

Independent Samples Test

		t-test for Equality of Means		
			95% Confidence Interval of the Difference	
		Std. Error Difference	Lower	Upper
Agreed correct count, 2nd part	Equal variances assumed	.305	-.079	1.124
	Equal variances not assumed	.306	-.082	1.127

```
MEANS TABLES=Agreed_I_Correct Agreed_Z_Correct
  /CELLS MEAN COUNT STDDEV.
```


Means

[DataSet2] /Users/daniela/Documents/Thesis/SPSS files/Amendments SPSS/New Study 3 Data.sav

Case Processing Summary

	Cases					
	Included		Excluded		Total	
	N	Percent	N	Percent	N	Percent
Agreed correct count, 1st part	293	100.0%	0	.0%	293	100.0%
Agreed correct count, 2nd part	293	100.0%	0	.0%	293	100.0%

Report

	Agreed correct count, 1st part	Agreed correct count, 2nd part
Mean	5.70	3.72
N	293	293
Std. Deviation	2.003	2.053

Appendix G: Chapter 5 Materials

Need for Cognition Scale

- I would prefer complex to simple problems.
- I like to have the responsibility of handling a situation that requires a lot of thinking.
- Thinking is not my idea of fun.*
- I would rather do something that requires little thought than something that is sure to challenge my thinking abilities.*
- I try to anticipate and avoid situations where there is likely chance I will have to think in depth about something.*
- I find satisfaction in deliberating hard and for long hours.
- I only think as hard as I have to.*
- I prefer to think about small, daily projects to long-term ones.*
- I like tasks that require little thought once I've learned them.*
- The idea of relying on thought to make my way to the top appeals to me.
- I really enjoy a task that involves coming up with new solutions to problems.
- Learning new ways to think doesn't excite me very much.*

- I prefer my life to be filled with puzzles that I must solve.
- The notion of thinking abstractly is appealing to me.
- I would prefer a task that is intellectual, difficult, and important to one that is somewhat important but does not require much thought.
- I feel relief rather than satisfaction after completing a task that required a lot of mental effort.*
- It's enough for me that something gets the job done; I don't care how or why it works.*
- I usually end up deliberating about issues even when they do not affect me personally.

Responses on a five-point scale ranging from 1 = *Extremely Uncharacteristic* to 5 = *Extremely Characteristic*. Questions marked with * were reverse coded.

Target: ***Participant***

"There are numerous strategies to try and persuade people to change their behaviour. One of those strategies is the presentation of statistical information to argue for the benefits of a particular behaviour. For example, well known advertisements claim that '9 out of 10 cats prefer Whiskas' or 'Skin Energizer guarantees 50% less wrinkle depth in 30 days!' For each of the questions below please indicate on a scale ranging from 'Very ineffective' to 'Very effective' how effective you think the use of statistics is for other people persuading you to change your behaviour in the following way:"

- To choose a particular medical therapy for the treatment of your chronic back pain
- To keep within the speed limit more often while driving
- To recycle more household waste
- To buy a particular skin moisturiser
- To buy a particular brand of television set
- To buy a car of a particular brand
- To vote in an election for the mayor of the city you live in
- To eat more healthily
- To buy a particular brand of cough drops
- To get a flu jab before flu season
- To buy a particular brand of hairdryer
- To drive more safely
- To volunteer as a magistrate

- To participate in the referendum whether to join the European Union
- To support an initiative to reduce the speed limit on the main road in your town
- To sign a petition for a political candidate you support

Target: ***Other People***

"There are numerous strategies to try and persuade people to change their behaviour. One of those strategies is the presentation of statistical information to argue for the benefits of a particular behaviour. For example, well known advertisements claim that '9 out of 10 cats prefer Whiskas' or 'Skin Energizer guarantees 50% less wrinkle depth in 30 days!' For each of the questions below please indicate on a scale ranging from 'Very ineffective' to 'Very effective' how effective you think the use of statistics is in persuading other people to change their behaviour in the following way:"

- To choose a particular medical therapy for the treatment of their chronic back pain
- To keep within the speed limit more often while driving
- To recycle more household waste
- To buy a particular skin moisturiser
- To buy a particular brand of television set
- To buy a car of a particular brand
- To vote in an election for the mayor of the city they live in
- To eat more healthily
- To buy a particular brand of cough drops
- To get a flu jab before flu season

- To buy a particular brand of hairdryer
- To drive more safely
- To volunteer as a magistrate
- To participate in the referendum whether to join the European Union
- To support an initiative to reduce the speed limit on the main road in their town
- To sign a petition for a political candidate they support

Importance Rating

"We all have to make many decisions during any given period of time. Some of those decisions are more important because they are harder to make than others, or they have more dramatic consequences. For every item on the list below, please indicate on a scale ranging from 'Not at all' to 'Very important' how important you think it is to make the right decision; in other words, consider the impact of the decision, and the impact a wrong decision might have."

- Choosing medical therapy for the treatment of chronic back pain
- Deciding whether to keep within the speed limit more often while driving
- Deciding whether to recycle more household waste
- Choosing which skin moisturiser to buy
- Choosing which brand of television set to buy
- Choosing which brand of car to buy
- Voting in an election for the mayor of the city you live in
- Deciding whether to eat more healthily

- Choosing which brand of cough drops to buy
- Deciding whether to get a flu jab before flu season
- Choosing which brand of hairdryer to buy
- Deciding whether to drive more safely
- Deciding whether to volunteer as a magistrate
- Deciding whether to participate in the referendum whether to join the European Union
- Deciding whether to support an initiative to reduce the speed limit on the main road in town
- Deciding whether to sign a petition for a political candidate you support

Appendix H: Chapter 5 SPSS

Frequencies

```
[DataSet2] \\psf\Home\Documents\Thesis\SPSS files\Amendments SPSS\New Study 4 Data.sav
```

Statistics

Gender

N	Valid	59
	Missing	0

Gender

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Female	38	64.4	64.4	64.4
	Male	21	35.6	35.6	100.0
	Total	59	100.0	100.0	

```
*(b) Age descriptives*.
DESCRIPTIVES VARIABLES=Age
  /STATISTICS=MEAN STDDEV MIN MAX.
```

Descriptives

```
[DataSet2] \\psf\Home\Documents\Thesis\SPSS files\Amendments SPSS\New Study 4 Data.sav
```


Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation
Age	59	18	27	19.07	1.617
Valid N (listwise)	59				

```
GLM
avg_eff_PersTarget_Self  avg_eff_PersTarget_Others BY Sequence
  /WSFACTOR = selfother 2 Polynomial
  /METHOD = SSTYPE(3)
  /EMMEANS = TABLES(OVERALL)
  /EMMEANS = TABLES(Sequence)
  /EMMEANS = TABLES(selfother)
  /EMMEANS = TABLES(Sequence*selfother)
  /PRINT = DESCRIPTIVE ETASQ
  /CRITERIA = ALPHA(.05)
  /WSDESIGN = selfother
  /DESIGN = Sequence .
```

General Linear Model

```
[DataSet2] \\psf\Home\Documents\Thesis\SPSS files\Amendments SPSS\New Study 4 Data.sav
```

Within-Subjects Factors

Measure:MEASURE_1

selfother	Dependent Variable
1	avg_eff_Pers Target_Self
2	avg_eff_Pers Target_Others

Between-Subjects Factors

		Value Label	N
Sequence	1.0	Sct 3: other you, Sct 4: you other	29
	2.0	Sct 3: you other, Sct 4: other you	30

Page 3

Descriptive Statistics

	Sequence	Mean	Std. Deviation	N
avg_eff_PersTarget_Self	Sct 3: other you, Sct 4: you other	3.8190	.54187	29
	Sct 3: you other, Sct 4: other you	3.7146	.68223	30
	Total	3.7659	.61419	59
avg_eff_PersTarget_Others	Sct 3: other you, Sct 4: you other	3.9353	.71563	29
	Sct 3: you other, Sct 4: other you	3.9896	.44712	30
	Total	3.9629	.58987	59

Multivariate Tests [b]

Effect		Value	F	Hypothesis df	Error df	Sig.	Partial Eta Squared
selfother	Pillai's Trace	.165	11.277[a]	1.000	57.000	.001	.165
	Wilks' Lambda	.835	11.277[a]	1.000	57.000	.001	.165
	Hotelling's Trace	.198	11.277[a]	1.000	57.000	.001	.165

a. Exact statistic

b. Design: Intercept + Sequence
Within Subjects Design: selfother

Page 4

Multivariate Tests[b]

Effect		Value	F	Hypothesis df	Error df	Sig.	Partial Eta Squared
selfother	Roy's Largest Root	.198	11.277[a]	1.000	57.000	.001	.165
selfother * Sequence	Pillai's Trace	.031	1.852[a]	1.000	57.000	.179	.031
	Wilks' Lambda	.969	1.852[a]	1.000	57.000	.179	.031
	Hotelling's Trace	.032	1.852[a]	1.000	57.000	.179	.031
	Roy's Largest Root	.032	1.852[a]	1.000	57.000	.179	.031

a. Exact statistic

b. Design: Intercept + Sequence
Within Subjects Design: selfother

Mauchly's Test of Sphericity[b]

Measure:MEASURE_1

Within Subjects Effect	Mauchly's W	Approx. Chi-Square	df	Sig.	Epsilon[a] Greenhouse-Geisser	Huynh-Feldt	Lower-bound
selfother	1.000	.000	0	.	1.000	1.000	1.000

Tests the null hypothesis that the error covariance matrix of the orthonormalized transformed dependent variables is proportional to an identity matrix.

a. May be used to adjust the degrees of freedom for the averaged tests of significance. Corrected tests are displayed in the Tests of Within-Subjects Effects table.

b. Design: Intercept + Sequence
Within Subjects Design: selfother

Tests of Within-Subjects Effects

Measure:MEASURE_1

Source		Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
selfother	Sphericity Assumed	1.129	1	1.129	11.277	.001	.165
	Greenhouse-Geisser	1.129	1.000	1.129	11.277	.001	.165
	Huynh-Feldt	1.129	1.000	1.129	11.277	.001	.165
	Lower-bound	1.129	1.000	1.129	11.277	.001	.165
selfother * Sequence	Sphericity Assumed	.186	1	.186	1.852	.179	.031
	Greenhouse-Geisser	.186	1.000	.186	1.852	.179	.031
	Huynh-Feldt	.186	1.000	.186	1.852	.179	.031
	Lower-bound	.186	1.000	.186	1.852	.179	.031
Error(selfother)	Sphericity Assumed	5.708	57	.100			
	Greenhouse-Geisser	5.708	57.000	.100			
	Huynh-Feldt	5.708	57.000	.100			
	Lower-bound	5.708	57.000	.100			

Tests of Within-Subjects Contrasts

Measure:MEASURE_1

Source	selfother	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
selfother	Linear	1.129	1	1.129	11.277	.001	.165
selfother * Sequence	Linear	.186	1	.186	1.852	.179	.031
Error(selfother)	Linear	5.708	57	.100			

Tests of Between-Subjects Effects

Measure:MEASURE_1
Transformed Variable:Average

Source	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Intercept	1761.857	1	1761.857	2778.193	.000	.980
Sequence	.019	1	.019	.029	.865	.001
Error	36.148	57	.634			

Estimated Marginal Means

1. Grand Mean

Measure:MEASURE_1

Mean	Std. Error	95% Confidence Interval	
		Lower Bound	Upper Bound
3.865	.073	3.718	4.011

2. Sequence

Measure:MEASURE_1

Sequence	Mean	Std. Error	95% Confidence Interval	
			Lower Bound	Upper Bound
Sct 3: other you, Sct 4: you other	3.877	.105	3.668	4.087
Sct 3: you other, Sct 4: other you	3.852	.103	3.646	4.058

3. selfother

Measure:MEASURE_1

selfother	Mean	Std. Error	95% Confidence Interval	
			Lower Bound	Upper Bound
1	3.767	.080	3.606	3.928
2	3.962	.077	3.807	4.117

4. Sequence * selfother

Measure:MEASURE_1

Sequence	selfother	Mean	Std. Error	95% Confidence Interval	
				Lower Bound	Upper Bound
Sct 3: other you, Sct 4: you other	1	3.819	.115	3.589	4.049
	2	3.935	.110	3.714	4.156
Sct 3: you other, Sct 4: other you	1	3.715	.113	3.489	3.940
	2	3.990	.109	3.772	4.207

Descriptives

```
[DataSet2] \\psf\Home\Documents\Thesis\SPSS files\Amendments SPSS\New Study 4 Data.sav
```

Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation
avg_eff_PersTarget_Others	59	2.44	6.00	3.9629	.58987
avg_eff_PersTarget_Self	59	1.56	4.94	3.7659	.61419
Valid N (listwise)	59				

```
*Descriptives*.
DESCRIPTIVES VARIABLES=avg_eff_PersTarget_Others avg_eff_PersTarget_Self
  /STATISTICS=MEAN STDDEV MIN MAX.

*Comparing averages of effectiveness ratings for self / other*.
T-TEST
  PAIRS = avg_eff_PersTarget_Others  WITH avg_eff_PersTarget_Self (PAIRED)
  /CRITERIA = CI(.95)
  /MISSING = ANALYSIS.
```

T-Test

```
[DataSet2] \\psf\Home\Documents\Thesis\SPSS files\Amendments SPSS\New Study 4 Data.sav
```

Paired Samples Statistics

		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	avg_eff_PersTarget_Others	3.9629	59	.58987	.07679
	avg_eff_PersTarget_Self	3.7659	59	.61419	.07996

Paired Samples Correlations

		N	Correlation	Sig.
Pair 1	avg_eff_PersTarget_Others & avg_eff_PersTarget_Self	59	.720	.000

Paired Samples Test

		Paired Differences					t	df	Sig. (2-tailed)
					95% Confidence Interval of the Difference				
		Mean	Std. Deviation	Std. Error Mean	Lower	Upper			
Pair 1	avg_eff_PersTarget_Others - avg_eff_PersTarget_Self	.19703	.45082	.05869	.07955	.31452	3.357	58	.001

Descriptives

```
[DataSet3] /Users/daniela/Documents/Thesis/SPSS files/Amendments SPSS/New Study 4 Data.sav
```

Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation
perc_oth_mt	59	1	6	4.59	1.100
perc_oth_sl	59	2	6	4.42	.932
perc_oth_recyc	59	2	6	4.37	.869
perc_oth_cosm	59	2	6	4.17	1.341
perc_oth_buyTV	59	1	6	3.42	1.235
perc_oth_buyCar	59	1	6	3.86	1.181
perc_oth_mayor	59	1	6	3.81	1.058
perc_oth_healthy	59	1	6	4.36	.996
perc_oth_drops	59	1	6	3.75	1.139
perc_oth_flu	59	2	6	4.20	1.126
perc_oth_hair	59	1	6	3.58	1.192
perc_oth_drive	59	2	6	4.47	1.104
perc_oth_magis	59	1	6	2.92	.952
perc_oth_eu	59	1	6	3.46	1.150
perc_oth_support	59	2	6	4.29	1.001
perc_oth_petit	59	1	6	3.73	1.031
perc_self_mt	59	1	6	4.39	1.145
perc_self_sl	59	2	6	4.51	1.057
perc_self_recyc	59	1	6	4.39	1.017
perc_self_cosm	59	1	6	3.54	1.369
perc_self_buyTV	59	1	5	3.17	1.191

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Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation
perc_self_Car	59	2	6	3.54	1.164
perc_self_mayor	59	1	5	3.27	1.172
perc_self_healthy	59	1	6	4.32	1.238
perc_self_drops	59	1	6	3.64	1.200
perc_self_flu	59	1	6	3.95	1.345
perc_self_hair	59	1	5	3.14	1.252
perc_self_drive	59	1	6	4.46	1.072
perc_self_magis	59	1	6	2.81	1.058
perc_self_eu	59	1	6	3.31	1.207
perc_self_support	59	1	6	4.39	1.067
perc_self_petit	59	1	6	3.42	1.163
Valid N (listwise)	59				

```
*Testing for significant differences between evaluated effectiveness self/other*

*Self / Other comparison for Medical Treatment*.
T-TEST
  PAIRS = perc_oth_mt  WITH perc_self_mt (PAIRED)
  /CRITERIA = CI(.95)
  /MISSING = ANALYSIS.
```

T-Test

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[DataSet2] \\psf\Home\Documents\Thesis\SPSS files\Amendments SPSS\New Study 4 Data.sav

Paired Samples Statistics

		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	perc_oth_mt	4.59	59	1.100	.143
	perc_self_mt	4.39	59	1.145	.149

Paired Samples Correlations

		N	Correlation	Sig.
Pair 1	perc_oth_mt & perc_self_mt	59	.771	.000

Paired Samples Test

		Paired Differences					t	df	Sig. (2-tailed)
					95% Confidence Interval of the Difference				
		Mean	Std. Deviation	Std. Error Mean	Lower	Upper			
Pair 1	perc_oth_mt - perc_self_mt	.203	.761	.099	.005	.402	2.054	58	.045

```
*Self / Other comparison for Observing Speed Limit*.
T-TEST
  PAIRS = perc_oth_sl  WITH perc_self_sl (PAIRED)
  /CRITERIA = CI(.95)
  /MISSING = ANALYSIS.
```


T-Test

[DataSet2] \\psf\Home\Documents\Thesis\SPSS files\Amendments SPSS\New Study 4 Data.sav

Paired Samples Statistics

		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	perc_oth_sl	4.42	59	.932	.121
	perc_self_sl	4.51	59	1.057	.138

Paired Samples Correlations

		N	Correlation	Sig.
Pair 1	perc_oth_sl & perc_self_sl	59	.513	.000

Paired Samples Test

		Paired Differences					t	df	Sig. (2-tailed)
					95% Confidence Interval of the Difference				
		Mean	Std. Deviation	Std. Error Mean	Lower	Upper			
Pair 1	perc_oth_sl - perc_self_sl	-.085	.988	.129	-.342	.173	-.659	58	.512

```
*Self / Other comparison for Recycling More*.
T-TEST
  PAIRS = perc_oth_recyc  WITH perc_self_recyc (PAIRED)
  /CRITERIA = CI(.95)
```

```
  /MISSING = ANALYSIS.
```

T-Test

```
[DataSet2] \\psf\Home\Documents\Thesis\SPSS files\Amendments SPSS\New Study 4 Data.sav
```

Paired Samples Statistics

		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	perc_oth_recyc	4.37	59	.869	.113
	perc_self_recyc	4.39	59	1.017	.132

Paired Samples Correlations

		N	Correlation	Sig.
Pair 1	perc_oth_recyc & perc_self_recyc	59	.613	.000

Paired Samples Test

		Paired Differences					t	df	Sig. (2-tailed)
					95% Confidence Interval of the Difference				
		Mean	Std. Deviation	Std. Error Mean	Lower	Upper			
Pair 1	perc_oth_recyc - perc_self_recyc	-.017	.841	.109	-.236	.202	-.155	58	.877

```
*Self / Other comparison for Buying Cosmetics*.
T-TEST
  PAIRS = perc_oth_cosm WITH perc_self_cosm (PAIRED)
```



```
  /CRITERIA = CI(.95)
  /MISSING = ANALYSIS.
```

T-Test

```
[DataSet2] \\psf\Home\Documents\Thesis\SPSS files\Amendments SPSS\New Study 4 Data.sav
```

Paired Samples Statistics

		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	perc_oth_cosm	4.17	59	1.341	.175
	perc_self_cosm	3.54	59	1.369	.178

Paired Samples Correlations

		N	Correlation	Sig.
Pair 1	perc_oth_cosm & perc_self_cosm	59	.569	.000

Paired Samples Test

		Paired Differences					t	df	Sig. (2-tailed)
					95% Confidence Interval of the Difference				
		Mean	Std. Deviation	Std. Error Mean	Lower	Upper			
Pair 1	perc_oth_cosm - perc_self_cosm	.627	1.258	.164	.299	.955	3.829	58	.000

```
*Self / Other comparison for Buying Brand of TV*.
T-TEST
```

```
  PAIRS = perc_oth_buyTV WITH perc_self_buyTV (PAIRED)
  /CRITERIA = CI(.95)
  /MISSING = ANALYSIS.
```

T-Test

[DataSet2] \\psf\Home\Documents\Thesis\SPSS files\Amendments SPSS\New Study 4 Data.sav

Paired Samples Statistics

		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	perc_oth_buyTV	3.42	59	1.235	.161
	perc_self_buyTV	3.17	59	1.191	.155

Paired Samples Correlations

		N	Correlation	Sig.
Pair 1	perc_oth_buyTV & perc_self_buyTV	59	.689	.000

Paired Samples Test

		Paired Differences					t	df	Sig. (2-tailed)
					95% Confidence Interval of the Difference				
		Mean	Std. Deviation	Std. Error Mean	Lower	Upper			
Pair 1	perc_oth_buyTV - perc_self_buyTV	.254	.958	.125	.005	.504	2.039	58	.046

```
*Self / Other comparison for Voting for Mayor *.
```



```
T-TEST
  PAIRS = perc_oth_mayor WITH perc_self_mayor (PAIRED)
  /CRITERIA = CI(.95)
  /MISSING = ANALYSIS.
```

T-Test

[DataSet2] \\psf\Home\Documents\Thesis\SPSS files\Amendments SPSS\New Study 4 Data.sav

Paired Samples Statistics

		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	perc_oth_mayor	3.81	59	1.058	.138
	perc_self_mayor	3.27	59	1.172	.153

Paired Samples Correlations

		N	Correlation	Sig.
Pair 1	perc_oth_mayor & perc_self_mayor	59	.445	.000

Paired Samples Test

		Paired Differences					t	df	Sig. (2-tailed)
					95% Confidence Interval of the Difference				
		Mean	Std. Deviation	Std. Error Mean	Lower	Upper			
Pair 1	perc_oth_mayor - perc_self_mayor	.542	1.179	.154	.235	.850	3.533	58	.001

```
*Self / Other comparison for Eathing More Healthily*.
T-TEST
  PAIRS = perc_oth_healthy WITH perc_self_healthy(PAIRED)
  /CRITERIA = CI(.95)
  /MISSING = ANALYSIS.
```

T-Test

[DataSet2] \\psf\Home\Documents\Thesis\SPSS files\Amendments SPSS\New Study 4 Data.sav

Paired Samples Statistics

		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	perc_oth_healthy	4.36	59	.996	.130
	perc_self_healthy	4.32	59	1.238	.161

Paired Samples Correlations

		N	Correlation	Sig.
Pair 1	perc_oth_healthy & perc_self_healthy	59	.381	.003

Paired Samples Test

		Paired Differences					t	df	Sig. (2-tailed)
					95% Confidence Interval of the Difference				
		Mean	Std. Deviation	Std. Error Mean	Lower	Upper			
Pair 1	perc_oth_healthy - perc_self_healthy	.034	1.259	.164	-.294	.362	.207	58	.837

```
*Self / Other comparison for Buying Cough Drops*.
T-TEST
  PAIRS = perc_oth_drops WITH perc_self_drops (PAIRED)
  /CRITERIA = CI(.95)
  /MISSING = ANALYSIS.
```

T-Test

[DataSet2] \\psf\Home\Documents\Thesis\SPSS files\Amendments SPSS\New Study 4 Data.sav

Paired Samples Statistics

		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	perc_oth_drops	3.75	59	1.139	.148
	perc_self_drops	3.64	59	1.200	.156

Paired Samples Correlations

		N	Correlation	Sig.
Pair 1	perc_oth_drops & perc_self_drops	59	.652	.000

Paired Samples Test

		Paired Differences					t	df	Sig. (2-tailed)
					95% Confidence Interval of the Difference				
		Mean	Std. Deviation	Std. Error Mean	Lower	Upper			
Pair 1	perc_oth_drops - perc_self_drops	.102	.977	.127	-.153	.356	.799	58	.427

```
*Self / Other comparison for Getting Flu Jab*.
T-TEST
  PAIRS = perc_oth_flu WITH perc_self_flu (PAIRED)
  /CRITERIA = CI(.95)
  /MISSING = ANALYSIS.
```

T-Test

```
[DataSet2] \\psf\Home\Documents\Thesis\SPSS files\Amendments SPSS\New Study 4 Data.sav
```


Paired Samples Statistics

		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	perc_oth_flu	4.20	59	1.126	.147
	perc_self_flu	3.95	59	1.345	.175

Paired Samples Correlations

		N	Correlation	Sig.
Pair 1	perc_oth_flu & perc_self_flu	59	.622	.000

Paired Samples Test

		Paired Differences					t	df	Sig. (2-tailed)
					95% Confidence Interval of the Difference				
		Mean	Std. Deviation	Std. Error Mean	Lower	Upper			
Pair 1	perc_oth_flu - perc_self_flu	.254	1.092	.142	-.030	.539	1.788	58	.079

```
*Self / Other comparison for Buying Car*.
T-TEST
  PAIRS = perc_self_Car  WITH perc_oth_Buycar (PAIRED)
  /CRITERIA = CI(.95)
  /MISSING = ANALYSIS.
```

T-Test

[DataSet2] \\psf\Home\Documents\Thesis\SPSS files\Amendments SPSS\New Study 4 Data.sav

Paired Samples Statistics

		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	perc_self_Car	3.54	59	1.164	.152
	perc_oth_buyCar	3.86	59	1.181	.154

Paired Samples Correlations

		N	Correlation	Sig.
Pair 1	perc_self_Car & perc_oth_buyCar	59	.719	.000

Paired Samples Test

		Paired Differences					t	df	Sig. (2-tailed)
					95% Confidence Interval of the Difference				
		Mean	Std. Deviation	Std. Error Mean	Lower	Upper			
Pair 1	perc_self_Car - perc_oth_buyCar	-.322	.880	.115	-.551	-.093	-2.812	58	.007

```
*Self / Other comparison for buying Hair Dryer*.
T-TEST
  PAIRS = perc_oth_hair  WITH perc_self_hair (PAIRED)
  /CRITERIA = CI(.95)
  /MISSING = ANALYSIS.
```


T-Test

[DataSet2] \\psf\Home\Documents\Thesis\SPSS files\Amendments SPSS\New Study 4 Data.sav

Paired Samples Statistics

		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	perc_oth_hair	3.58	59	1.192	.155
	perc_self_hair	3.14	59	1.252	.163

Paired Samples Correlations

		N	Correlation	Sig.
Pair 1	perc_oth_hair & perc_self_hair	59	.675	.000

Paired Samples Test

		Paired Differences					t	df	Sig. (2-tailed)
					95% Confidence Interval of the Difference				
		Mean	Std. Deviation	Std. Error Mean	Lower	Upper			
Pair 1	perc_oth_hair - perc_self_hair	.441	.987	.129	.183	.698	3.428	58	.001

```
*Self / Other comparison for Driving more carefully*.
T-TEST
  PAIRS = perc_oth_drive  WITH perc_self_drive (PAIRED)
  /CRITERIA = CI(.95)
```

```
  /MISSING = ANALYSIS.
```

T-Test

```
[DataSet2] \\psf\Home\Documents\Thesis\SPSS files\Amendments SPSS\New Study 4 Data.sav
```

Paired Samples Statistics

		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	perc_oth_drive	4.47	59	1.104	.144
	perc_self_drive	4.46	59	1.072	.140

Paired Samples Correlations

		N	Correlation	Sig.
Pair 1	perc_oth_drive & perc_self_drive	59	.673	.000

Paired Samples Test

		Paired Differences					t	df	Sig. (2-tailed)
					95% Confidence Interval of the Difference				
		Mean	Std. Deviation	Std. Error Mean	Lower	Upper			
Pair 1	perc_oth_drive - perc_self_drive	.017	.881	.115	-.213	.246	.148	58	.883

```
*Self / Other comparison for Volunteering for Magistrate*.
T-TEST
  PAIRS = perc_oth_magis  WITH perc_self_magis (PAIRED)
```



```
  /CRITERIA = CI(.95)
  /MISSING = ANALYSIS.
```

T-Test

```
[DataSet2] \\psf\Home\Documents\Thesis\SPSS files\Amendments SPSS\New Study 4 Data.sav
```

Paired Samples Statistics

		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	perc_oth_magis	2.92	59	.952	.124
	perc_self_magis	2.81	59	1.058	.138

Paired Samples Correlations

		N	Correlation	Sig.
Pair 1	perc_oth_magis & perc_self_magis	59	.480	.000

Paired Samples Test

		Paired Differences					t	df	Sig. (2-tailed)
					95% Confidence Interval of the Difference				
		Mean	Std. Deviation	Std. Error Mean	Lower	Upper			
Pair 1	perc_oth_magis - perc_self_magis	.102	1.029	.134	-.166	.370	.759	58	.451

```
*Self / Other comparison for Voting in EU referendum*.
T-TEST
```

```
  PAIRS = perc_oth_eu  WITH perc_self_eu (PAIRED)
  /CRITERIA = CI(.95)
  /MISSING = ANALYSIS.
```

T-Test

```
[DataSet2] \\psf\Home\Documents\Thesis\SPSS files\Amendments SPSS\New Study 4 Data.sav
```

Paired Samples Statistics

		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	perc_oth_eu	3.46	59	1.150	.150
	perc_self_eu	3.31	59	1.207	.157

Paired Samples Correlations

		N	Correlation	Sig.
Pair 1	perc_oth_eu & perc_self_eu	59	.668	.000

Paired Samples Test

		Paired Differences					t	df	Sig. (2-tailed)
					95% Confidence Interval of the Difference				
		Mean	Std. Deviation	Std. Error Mean	Lower	Upper			
Pair 1	perc_oth_eu - perc_self_eu	.153	.962	.125	-.098	.403	1.219	58	.228

```
*Self / Other comparison for Supporting Speed Limit Initiative*.
```



```
T-TEST
  PAIRS = perc_oth_support  WITH perc_self_support (PAIRED)
  /CRITERIA = CI(.95)
  /MISSING = ANALYSIS.
```

T-Test

```
[DataSet2] \\psf\Home\Documents\Thesis\SPSS files\Amendments SPSS\New Study 4 Data.sav
```

Paired Samples Statistics

		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	perc_oth_support	4.29	59	1.001	.130
	perc_self_support	4.39	59	1.067	.139

Paired Samples Correlations

		N	Correlation	Sig.
Pair 1	perc_oth_support & perc_self_support	59	.474	.000

Paired Samples Test

		Paired Differences					t	df	Sig. (2-tailed)
					95% Confidence Interval of the Difference				
		Mean	Std. Deviation	Std. Error Mean	Lower	Upper			
Pair 1	perc_oth_support - perc_self_support	-.102	1.062	.138	-.378	.175	-.736	58	.465

```
T-TEST
  PAIRS = perc_oth_petit  WITH perc_self_petit (PAIRED)
  /CRITERIA = CI(.95)
  /MISSING = ANALYSIS.
```

T-Test

[DataSet2] \\psf\Home\Documents\Thesis\SPSS files\Amendments SPSS\New Study 4 Data.sav

Paired Samples Statistics

		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	perc_oth_petit	3.73	59	1.031	.134
	perc_self_petit	3.42	59	1.163	.151

Paired Samples Correlations

		N	Correlation	Sig.
Pair 1	perc_oth_petit & perc_self_petit	59	.385	.003

Paired Samples Test

		Paired Differences					t	df	Sig. (2-tailed)
					95% Confidence Interval of the Difference				
		Mean	Std. Deviation	Std. Error Mean	Lower	Upper			
Pair 1	perc_oth_petit - perc_self_petit	.305	1.221	.159	-.013	.623	1.919	58	.060


```
*Descriptives for importance variable*.
DESCRIPTIVES VARIABLES=average_imp
  /STATISTICS=MEAN STDDEV VARIANCE MIN MAX.
```

Descriptives

[DataSet2] \\psf\Home\Documents\Thesis\SPSS files\Amendments SPSS\New Study 4 Data.sav

Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation	Variance
average_imp	59	3.00	5.06	4.0826	.51085	.261
Valid N (listwise)	59					

```
DESCRIPTIVES VARIABLES=imp_mt imp_sl imp_recyc imp_cosm imp_tv imp_car imp_mayor imp_healthy
    imp_drops imp_flu imp_hair imp_drive imp_magis imp_eu imp_support imp_petit
  /STATISTICS=MEAN STDDEV MIN MAX.
```

Descriptives

[DataSet2] \\psf\Home\Documents\Thesis\SPSS files\Amendments SPSS\New Study 4 Data.sav

Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation
imp_mt	59	3	6	5.00	.766
imp_sl	59	3	6	5.15	.805
imp_recyc	59	3	6	4.63	.927
imp_cosm	59	1	6	3.12	1.190
imp_tv	59	1	5	3.15	1.080
imp_car	59	1	6	3.83	1.177
imp_mayor	59	1	6	4.07	1.127
imp_healthy	59	2	6	4.83	.931
imp_drops	59	1	6	3.08	1.343
imp_flu	59	2	6	4.29	1.035
imp_hair	59	1	5	2.76	1.150
imp_drive	59	3	6	5.20	.867
imp_magis	59	1	6	3.42	1.054
imp_eu	59	1	6	4.19	1.152
imp_support	59	3	6	4.69	.933
imp_petit	59	1	6	3.90	1.062
Valid N (listwise)	59				

```
CORRELATIONS
  /VARIABLES=average_imp avg_eff_PersTarget_Others avg_eff_PersTarget_Self
  /PRINT=TWOTAIL NOSIG
```



```
  /STATISTICS DESCRIPTIVES
  /MISSING=PAIRWISE.
```

Correlations

[DataSet2] \\psf\Home\Documents\Thesis\SPSS files\Amendments SPSS\New Study 4 Data.sav

Descriptive Statistics

	Mean	Std. Deviation	N
average_imp	4.0826	.51085	59
avg_eff_PersTarget_Others	3.9629	.58987	59
avg_eff_PersTarget_Self	3.7659	.61419	59

Correlations

		average_imp	avg_eff_Pers Target_Others	avg_eff_Pers Target_Self
average_imp	Pearson Correlation	1	.526**	.581**
	Sig. (2-tailed)		.000	.000
	N	59	59	59
avg_eff_PersTarget_Others	Pearson Correlation	.526**	1	.720**
	Sig. (2-tailed)	.000		.000
	N	59	59	59
avg_eff_PersTarget_Self	Pearson Correlation	.581**	.720**	1
	Sig. (2-tailed)	.000	.000	
	N	59	59	59

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

```
*Importance on others and self as target*.
GLM avg_eff_PersTarget_Others avg_eff_PersTarget_Self WITH average_imp
  /METHOD=SSTYPE(3)
  /INTERCEPT=INCLUDE
  /CRITERIA=ALPHA(.05)
  /DESIGN=average_imp.
```

General Linear Model

[DataSet2] \\psf\Home\Documents\Thesis\SPSS files\Amendments SPSS\New Study 4 Data.sav

Multivariate Tests[b]

Effect		Value	F	Hypothesis df	Error df	Sig.
Intercept	Pillai's Trace	.119	3.781[a]	2.000	56.000	.029
	Wilks' Lambda	.881	3.781[a]	2.000	56.000	.029
	Hotelling's Trace	.135	3.781[a]	2.000	56.000	.029
	Roy's Largest Root	.135	3.781[a]	2.000	56.000	.029
average_imp	Pillai's Trace	.362	15.868[a]	2.000	56.000	.000
	Wilks' Lambda	.638	15.868[a]	2.000	56.000	.000
	Hotelling's Trace	.567	15.868[a]	2.000	56.000	.000
	Roy's Largest Root	.567	15.868[a]	2.000	56.000	.000

a. Exact statistic

b. Design: Intercept + average_imp

Tests of Between-Subjects Effects

Source	Dependent Variable	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	avg_eff_PersTarget_Others	5.578[a]	1	5.578	21.773	.000
	avg_eff_PersTarget_Self	7.394[b]	1	7.394	29.092	.000
Intercept	avg_eff_PersTarget_Others	1.971	1	1.971	7.694	.007
	avg_eff_PersTarget_Self	.745	1	.745	2.930	.092
average_imp	avg_eff_PersTarget_Others	5.578	1	5.578	21.773	.000
	avg_eff_PersTarget_Self	7.394	1	7.394	29.092	.000
Error	avg_eff_PersTarget_Others	14.603	57	.256		
	avg_eff_PersTarget_Self	14.486	57	.254		
Total	avg_eff_PersTarget_Others	946.762	59			
	avg_eff_PersTarget_Self	858.613	59			
Corrected Total	avg_eff_PersTarget_Others	20.181	58			
	avg_eff_PersTarget_Self	21.880	58			

a. R Squared = .276 (Adjusted R Squared = .264)

b. R Squared = .338 (Adjusted R Squared = .326)

```
*Descriptives NfC*.
DESCRIPTIVES VARIABLES=NfC_Totalscore
  /STATISTICS=MEAN STDDEV RANGE MIN MAX.
```


Descriptives

```
[DataSet2] \\psf\Home\Documents\Thesis\SPSS files\Amendments SPSS\New Study 4 Data.sav
```

Descriptive Statistics

	N	Range	Minimum	Maximum	Mean	Std. Deviation
NfC_Totalscore	59	55.00	28.00	83.00	58.4915	12.51809
Valid N (listwise)	59					

```
*Correlations NFC score with average perceived effectiveness,*.
*Others as target                                                      *.
CORRELATIONS
  /VARIABLES=NfC_Totalscore avg_eff_PersTarget_Others
  /PRINT=TWOTAIL NOSIG
  /MISSING=PAIRWISE.
```

Correlations

```
[DataSet2] \\psf\Home\Documents\Thesis\SPSS files\Amendments SPSS\New Study 4 Data.sav
```

Correlations

		NfC_ Totalscore	avg_eff_Pers Target_Others
NfC_Totalscore	Pearson Correlation	1	-.111
	Sig. (2-tailed)		.404
	N	59	59
avg_eff_PersTarget_ Others	Pearson Correlation	-.111	1
	Sig. (2-tailed)	.404	
	N	59	59

```
*Correlations NFC score with average perceived effectiveness,*
*Self as target                                                            *.
CORRELATIONS
  /VARIABLES=NfC_Totalscore avg_eff_PersTarget_Self
  /PRINT=TWOTAIL NOSIG
  /MISSING=PAIRWISE.
```

Correlations

[DataSet2] \\psf\Home\Documents\Thesis\SPSS files\Amendments SPSS\New Study 4 Data.sav

Correlations

		NfC_ Totalscore	avg_eff_Pers Target_Self
NfC_Totalscore	Pearson Correlation	1	-.149
	Sig. (2-tailed)		.260
	N	59	59
avg_eff_PersTarget_Self	Pearson Correlation	-.149	1
	Sig. (2-tailed)	.260	
	N	59	59

```
CORRELATIONS
  /VARIABLES=diff_self_other NfC_Totalscore
  /PRINT=TWOTAIL NOSIG
  /MISSING=PAIRWISE.
```

Correlations

[DataSet2] \\psf\Home\Documents\Thesis\SPSS files\Amendments SPSS\New Study 4 Data.sav

Correlations

		diff_self_other	NfC_ Totalscore
diff_self_other	Pearson Correlation	1	.071
	Sig. (2-tailed)		.595
	N	59	59
NfC_Totalscore	Pearson Correlation	.071	1
	Sig. (2-tailed)	.595	
	N	59	59

```
CORRELATIONS
  /VARIABLES=diff_self_other average_imp
  /PRINT=TWOTAIL NOSIG
  /MISSING=PAIRWISE.
```

Correlations

```
[DataSet2] \\psf\Home\Documents\Thesis\SPSS files\Amendments SPSS\New Study 4 Data.sav
```


Correlations

		diff_self_other	average_imp
diff_self_other	Pearson Correlation	1	-.053
	Sig. (2-tailed)		.688
	N	59	59
average_imp	Pearson Correlation	-.053	1
	Sig. (2-tailed)	.688	
	N	59	59

```
FACTOR
  /VARIABLES perc_oth_mt perc_oth_sl perc_oth_recyc perc_oth_cosm perc_oth_buyTV perc_oth_buyCar
    perc_oth_mayor perc_oth_healthy perc_oth_drops perc_oth_flu perc_oth_hair perc_oth_drive
    perc_oth_magis perc_oth_eu perc_oth_support perc_oth_petit
  /MISSING LISTWISE
  /ANALYSIS perc_oth_mt perc_oth_sl perc_oth_recyc perc_oth_cosm perc_oth_buyTV perc_oth_buyCar
    perc_oth_mayor perc_oth_healthy perc_oth_drops perc_oth_flu perc_oth_hair perc_oth_drive
    perc_oth_magis perc_oth_eu perc_oth_support perc_oth_petit
  /PRINT UNIVARIATE CORRELATION KMO EXTRACTION ROTATION FSCORE
  /FORMAT SORT BLANK(.6)
  /PLOT EIGEN ROTATION
  /CRITERIA FACTORS(3) ITERATE(25)
  /EXTRACTION PC
  /CRITERIA ITERATE(25) DELTA(0)
```

```
/ROTATION OBLIMIN
/METHOD=COVARIANCE.
```

Factor Analysis

[DataSet1] \\psf\Home\Documents\Thesis\SPSS files\Amendments SPSS\New Study 4 Data.sav

Descriptive Statistics

	Mean	Std. Deviation	Analysis N
perc_oth_mt	4.59	1.100	59
perc_oth_sl	4.42	.932	59
perc_oth_recyc	4.37	.869	59
perc_oth_cosm	4.17	1.341	59
perc_oth_buyTV	3.42	1.235	59
perc_oth_buyCar	3.86	1.181	59
perc_oth_mayor	3.81	1.058	59
perc_oth_healthy	4.36	.996	59
perc_oth_drops	3.75	1.139	59
perc_oth_flu	4.20	1.126	59
perc_oth_hair	3.58	1.192	59
perc_oth_drive	4.47	1.104	59
perc_oth_magis	2.92	.952	59
perc_oth_eu	3.46	1.150	59

Descriptive Statistics

	Mean	Std. Deviation	Analysis N
perc_oth_support	4.29	1.001	59
perc_oth_petit	3.73	1.031	59

Correlation Matrix

		perc_oth_mt	perc_oth_sl	perc_oth_recyc	perc_oth_cosm	perc_oth_buyTV	perc_oth_buyCar	perc_oth_mayor
Correlation	perc_oth_mt	1.000	.188	.233	.199	.002	.156	.274
	perc_oth_sl	.188	1.000	.568	-.003	-.114	-.010	-.023
	perc_oth_recyc	.233	.568	1.000	-.070	-.037	.050	.227
	perc_oth_cosm	.199	-.003	-.070	1.000	.404	.515	-.002
	perc_oth_buyTV	.002	-.114	-.037	.404	1.000	.619	.180
	perc_oth_buyCar	.156	-.010	.050	.515	.619	1.000	.117
	perc_oth_mayor	.274	-.023	.227	-.002	.180	.117	1.000
	perc_oth_healthy	.166	.410	.601	.199	.015	.071	.211
	perc_oth_drops	.466	.071	.028	.616	.434	.294	.189
	perc_oth_flu	.457	.327	.520	.034	-.088	.008	.192
	perc_oth_hair	.169	-.130	-.045	.585	.686	.657	.182
	perc_oth_drive	.289	.639	.441	.189	.014	.156	.151
	perc_oth_magis	.263	.138	.206	.133	.368	.266	.566
	perc_oth_eu	.286	.186	.206	.072	-.005	.021	.582
	perc_oth_support	.218	.551	.449	.002	.081	.165	.279
	perc_oth_petit	.327	.283	.250	.208	.132	.068	.680

Correlation Matrix

		perc_oth_healthy	perc_oth_drops	perc_oth_flu	perc_oth_hair	perc_oth_drive	perc_oth_magis	perc_oth_eu
Correlation	perc_oth_mt	.166	.466	.457	.169	.289	.263	.286
	perc_oth_sl	.410	.071	.327	-.130	.639	.138	.186
	perc_oth_recyc	.601	.028	.520	-.045	.441	.206	.206
	perc_oth_cosm	.199	.616	.034	.585	.189	.133	.072
	perc_oth_buyTV	.015	.434	-.088	.686	.014	.368	-.005
	perc_oth_buyCar	.071	.294	.008	.657	.156	.266	.021
	perc_oth_mayor	.211	.189	.192	.182	.151	.566	.582
	perc_oth_healthy	1.000	.172	.411	.057	.314	.232	.337
	perc_oth_drops	.172	1.000	.404	.618	.235	.266	.104
	perc_oth_flu	.411	.404	1.000	.104	.379	.225	.220
	perc_oth_hair	.057	.618	.104	1.000	.064	.302	.081
	perc_oth_drive	.314	.235	.379	.064	1.000	.154	.057
	perc_oth_magis	.232	.266	.225	.302	.154	1.000	.635
	perc_oth_eu	.337	.104	.220	.081	.057	.635	1.000
	perc_oth_support	.380	.065	.177	.119	.592	.171	.318
	perc_oth_petit	.347	.307	.390	.143	.357	.538	.572

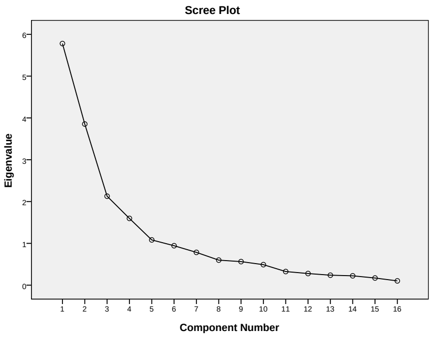
Correlation Matrix

		perc_oth_support	perc_oth_petit
Correlation	perc_oth_mt	.218	.327
	perc_oth_sl	.551	.283
	perc_oth_recyc	.449	.250
	perc_oth_cosm	.002	.208
	perc_oth_buyTV	.081	.132
	perc_oth_buyCar	.165	.068
	perc_oth_mayor	.279	.680
	perc_oth_healthy	.380	.347
	perc_oth_drops	.065	.307
	perc_oth_flu	.177	.390
	perc_oth_hair	.119	.143
	perc_oth_drive	.592	.357
	perc_oth_magis	.171	.538
	perc_oth_eu	.318	.572
	perc_oth_support	1.000	.328
	perc_oth_petit	.328	1.000

KMO and Bartlett's Test[a]

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.652
Bartlett's Test of Sphericity	Approx. Chi-Square	496.297
	df	120
	Sig.	.000

a. Based on correlations



Component Matrix[a]

	Raw			Rescaled		
	Component			Component		
	1	2	3	1	2	3
perc_oth_drops	.822			.722		
perc_oth_hair	.828			.694		
perc_oth_cosm	.845			.630		
perc_oth_petit	.641			.622		
perc_oth_magis	.576			.605		
perc_oth_buyCar						
perc_oth_mt						
perc_oth_healthy						
perc_oth_recyc						
perc_oth_buyTV						
perc_oth_sl						
perc_oth_flu						
perc_oth_support						
perc_oth_mayor			-.650			-.614
perc_oth_eu						
perc_oth_drive						

Extraction Method: Principal Component Analysis.

a. 3 components extracted.

Communalities

	Raw	Rescaled
	Extraction	Extraction
perc_oth_mt	.416	.343
perc_oth_sl	.541	.623
perc_oth_recyc	.404	.535
perc_oth_cosm	1.202	.668
perc_oth_buyTV	1.014	.665
perc_oth_buyCar	.837	.600
perc_oth_mayor	.829	.740
perc_oth_healthy	.418	.422
perc_oth_drops	.787	.607
perc_oth_flu	.632	.499
perc_oth_hair	1.127	.793
perc_oth_drive	.816	.669
perc_oth_magis	.605	.667
perc_oth_eu	.987	.747
perc_oth_support	.426	.425
perc_oth_petit	.721	.678

Extraction Method: Principal Component Analysis.

Total Variance Explained

		Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings[a]
	Component	Total	% of Variance	Cumulative %	Total
Raw	1	5.779	30.160	30.160	5.071
	2	3.854	20.113	50.273	4.110
	3	2.128	11.105	61.377	3.817
Rescaled	1	4.589	28.678	28.678	3.493
	2	3.192	19.951	48.629	3.886
	3	1.901	11.881	60.510	3.403

Extraction Method: Principal Component Analysis.

a. When components are correlated, sums of squared loadings cannot be added to obtain a total variance.

Pattern Matrix[a]

	Raw			Rescaled		
	Component			Component		
	1	2	3	1	2	3
perc_oth_hair	1.048			.879		
perc_oth_cosm	1.102			.822		
perc_oth_buyCar	.923			.781		
perc_oth_buyTV	.958			.776		
perc_oth_drops	.802			.704		
perc_oth_drive		.923			.836	
perc_oth_sl		.763			.819	
perc_oth_recyc		.621			.715	
perc_oth_flu		.754			.670	
perc_oth_support		.602			.602	
perc_oth_healthy						
perc_oth_mt						
perc_oth_mayor			-.927			-.876
perc_oth_eu			-.998			-.868
perc_oth_magis			-.734			-.770
perc_oth_petit			-.705			-.684

Extraction Method: Principal Component Analysis.
Rotation Method: Oblimin with Kaiser Normalization.

a. Rotation converged in 8 iterations.

Structure Matrix

	Raw			Rescaled		
	Component			Component		
	1	2	3	1	2	3
perc_oth_hair	1.055			.885		
perc_oth_cosm	1.075			.802		
perc_oth_buyTV	.963			.780		
perc_oth_buyCar	.914			.774		
perc_oth_drops	.835			.734		
perc_oth_drive		.879			.796	
perc_oth_sl		.714			.766	
perc_oth_recyc		.626			.721	
perc_oth_flu		.788			.700	
perc_oth_support		.641			.640	
perc_oth_healthy		.631			.633	
perc_oth_mt						
perc_oth_mayor			-.909			-.859
perc_oth_eu			-.981			-.853
perc_oth_magis			-.760			-.799
perc_oth_petit			-.802			-.778

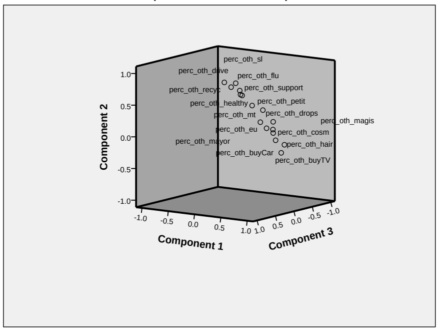
Extraction Method: Principal Component Analysis.
Rotation Method: Oblimin with Kaiser Normalization.

Component Correlation Matrix

Component	1	2	3
1	1.000	.100	-.210
2	.100	1.000	-.304
3	-.210	-.304	1.000

Extraction Method: Principal Component Analysis.
Rotation Method: Oblimin with Kaiser Normalization.

Component Plot in Rotated Space



Component Score Coefficient Matrix[a]

	Component		
	1	2	3
perc_oth_mt	.042	.141	-.067
perc_oth_sl	-.025	.200	.050
perc_oth_recyc	-.022	.149	-.005
perc_oth_cosm	.304	.056	.093
perc_oth_buyTV	.245	-.112	-.072
perc_oth_buyCar	.225	-.013	.012
perc_oth_mayor	-.006	-.031	-.317
perc_oth_healthy	.002	.159	-.035
perc_oth_drops	.186	.088	.000
perc_oth_flu	.000	.233	-.022
perc_oth_hair	.258	-.046	-.035
perc_oth_drive	.027	.286	.088
perc_oth_magis	.032	-.021	-.225
perc_oth_eu	-.038	-.004	-.369
perc_oth_support	-.002	.165	-.029
perc_oth_petit	.007	.068	-.229

Extraction Method: Principal Component Analysis.
Rotation Method: Oblimin with Kaiser Normalization.

a. Coefficients are standardized.

Component Score Covariance Matrix

Component	1	2	3
1	.844	-.041	1.769
2	-.041	1.072	-.314
3	1.769	-.314	2.834

Extraction Method: Principal Component Analysis.
Rotation Method: Oblimin with Kaiser Normalization.

```
FACTOR
  /VARIABLES perc_self_mt perc_self_sl perc_self_recyc perc_self_cosm perc_self_buyTV perc_self_Car
    perc_self_mayor perc_self_healthy perc_self_drops perc_self_flu perc_self_hair perc_self_drive
    perc_self_magis perc_self_eu perc_self_support perc_self_petit
  /MISSING LISTWISE
  /ANALYSIS perc_self_mt perc_self_sl perc_self_recyc perc_self_cosm perc_self_buyTV perc_self_Car
    perc_self_mayor perc_self_healthy perc_self_drops perc_self_flu perc_self_hair perc_self_drive
    perc_self_magis perc_self_eu perc_self_support perc_self_petit
  /PRINT UNIVARIATE CORRELATION KMO EXTRACTION ROTATION FSCORE
  /FORMAT SORT BLANK(.6)
  /PLOT EIGEN ROTATION
  /CRITERIA FACTORS(3) ITERATE(25)
  /EXTRACTION PC
  /CRITERIA ITERATE(25) DELTA(0)
  /ROTATION OBLIMIN
  /METHOD=COVARIANCE.
```


Factor Analysis

```
[DataSet1] \\psf\Home\Documents\Thesis\SPSS files\Amendments SPSS\New Study 4 Data.sav
```

Descriptive Statistics

	Mean	Std. Deviation	Analysis N
perc_self_mt	4.39	1.145	59
perc_self_sl	4.51	1.057	59
perc_self_recyc	4.39	1.017	59
perc_self_cosm	3.54	1.369	59
perc_self_buyTV	3.17	1.191	59
perc_self_Car	3.54	1.164	59
perc_self_mayor	3.27	1.172	59
perc_self_healthy	4.32	1.238	59
perc_self_drops	3.64	1.200	59
perc_self_flu	3.95	1.345	59
perc_self_hair	3.14	1.252	59
perc_self_drive	4.46	1.072	59
perc_self_magis	2.81	1.058	59
perc_self_eu	3.31	1.207	59
perc_self_support	4.39	1.067	59
perc_self_petit	3.42	1.163	59

Correlation Matrix

		perc_self_mt	perc_self_sl	perc_self_recyc	perc_self_cosm	perc_self_buyTV	perc_self_Car	perc_self_mayor
Correlation	perc_self_mt	1.000	.204	.252	.259	.241	.201	.113
	perc_self_sl	.204	1.000	.550	.068	-.138	.038	.193
	perc_self_recyc	.252	.550	1.000	.155	-.013	.139	.170
	perc_self_cosm	.259	.068	.155	1.000	.397	.483	.111
	perc_self_buyTV	.241	-.138	-.013	.397	1.000	.616	.201
	perc_self_Car	.201	.038	.139	.483	.616	1.000	.181
	perc_self_mayor	.113	.193	.170	.111	.201	.181	1.000
	perc_self_healthy	.372	.532	.460	.292	.044	.212	.212
	perc_self_drops	.379	-.072	-.082	.581	.465	.424	.192
	perc_self_flu	.259	.358	.292	.118	.199	.007	.359
	perc_self_hair	.167	-.092	.012	.610	.724	.623	.221
	perc_self_drive	.161	.644	.513	.251	.073	.129	.119
	perc_self_magis	-.024	-.083	.181	.142	.436	.265	.389
	perc_self_eu	-.063	.268	.140	-.091	-.049	-.218	.270
	perc_self_support	.240	.387	.366	.207	.232	.271	.148
	perc_self_petit	.146	.144	.237	.081	.196	.057	.522

Correlation Matrix

		perc_self_healthy	perc_self_drops	perc_self_flu	perc_self_hair	perc_self_drive	perc_self_magis	perc_self_eu
Correlation	perc_self_mt	.372	.379	.259	.167	.161	-.024	-.063
	perc_self_sl	.532	-.072	.358	-.092	.644	-.083	.268
	perc_self_recyc	.460	-.082	.292	.012	.513	.181	.140
	perc_self_cosm	.292	.581	.118	.610	.251	.142	-.091
	perc_self_buyTV	.044	.465	.199	.724	.073	.436	-.049
	perc_self_Car	.212	.424	.007	.623	.129	.265	-.218
	perc_self_mayor	.212	.192	.359	.221	.119	.389	.270
	perc_self_healthy	1.000	.137	.228	.083	.576	-.111	.049
	perc_self_drops	.137	1.000	.245	.492	.075	.150	-.031
	perc_self_flu	.228	.245	1.000	.107	.351	.272	.307
	perc_self_hair	.083	.492	.107	1.000	.146	.423	-.005
	perc_self_drive	.576	.075	.351	.146	1.000	.168	.130
	perc_self_magis	-.111	.150	.272	.423	.168	1.000	.383
	perc_self_eu	.049	-.031	.307	-.005	.130	.383	1.000
	perc_self_support	.321	.218	.122	.205	.459	.249	.093
	perc_self_petit	.035	.147	.433	.315	.146	.556	.459

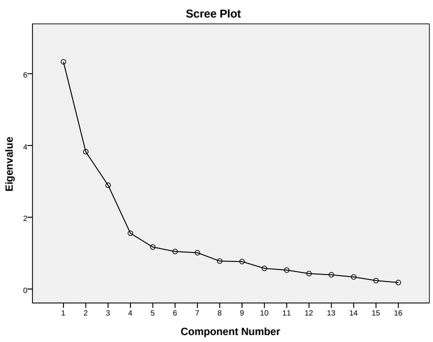
Correlation Matrix

		perc_self_support	perc_self_petit
Correlation	perc_self_mt	.240	.146
	perc_self_sl	.387	.144
	perc_self_recyc	.366	.237
	perc_self_cosm	.207	.081
	perc_self_buyTV	.232	.196
	perc_self_Car	.271	.057
	perc_self_mayor	.148	.522
	perc_self_healthy	.321	.035
	perc_self_drops	.218	.147
	perc_self_flu	.122	.433
	perc_self_hair	.205	.315
	perc_self_drive	.459	.146
	perc_self_magis	.249	.556
	perc_self_eu	.093	.459
	perc_self_support	1.000	.268
	perc_self_petit	.268	1.000

KMO and Bartlett's Test[a]

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.716
Bartlett's Test of Sphericity	Approx. Chi-Square	401.254
	df	120
	Sig.	.000

a. Based on correlations



Component Matrix[a]

	Raw			Rescaled		
	Component			Component		
	1	2	3	1	2	3
perc_self_hair	.907			.724		
perc_self_cosm	.924			.675		
perc_self_buyTV	.787			.660		
perc_self_Car	.728			.625		
perc_self_drops	.749			.624		
perc_self_flu						
perc_self_support						
perc_self_drive						
perc_self_mayor						
perc_self_mt						
perc_self_sl		.728			.689	
perc_self_recyc						
perc_self_magis			.649			.614
perc_self_petit						
perc_self_healthy						
perc_self_eu						

Extraction Method: Principal Component Analysis.

a. 3 components extracted.

Communalities

	Raw	Rescaled
	Extraction	Extraction
perc_self_mt	.405	.309
perc_self_sl	.801	.718
perc_self_recyc	.532	.514
perc_self_cosm	1.239	.662
perc_self_buyTV	.973	.685
perc_self_Car	.841	.620
perc_self_mayor	.619	.451
perc_self_healthy	1.096	.715
perc_self_drops	.773	.537
perc_self_flu	.955	.528
perc_self_hair	1.229	.784
perc_self_drive	.720	.627
perc_self_magis	.702	.627
perc_self_eu	.822	.564
perc_self_support	.385	.338
perc_self_petit	.953	.705

Extraction Method: Principal Component Analysis.

Total Variance Explained

	Component	Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings[a]
		Total	% of Variance	Cumulative %	Total
Raw	1	6.330	28.710	28.710	5.467
	2	3.824	17.346	46.056	4.398
	3	2.891	13.113	59.169	4.033
Rescaled	1	4.435	27.721	27.721	3.657
	2	2.795	17.471	45.192	3.421
	3	2.153	13.458	58.650	2.910

Extraction Method: Principal Component Analysis.

a. When components are correlated, sums of squared loadings cannot be added to obtain a total variance.

Pattern Matrix[a]

	Raw			Rescaled		
	Component			Component		
	1	2	3	1	2	3
perc_self_hair	1.068			.853		
perc_self_buyTV	.942			.791		
perc_self_Car	.911			.782		
perc_self_cosm	1.041			.760		
perc_self_drops	.864			.720		
perc_self_healthy		1.045			.844	
perc_self_sl		.878			.831	
perc_self_drive		.831			.775	
perc_self_recyc		.704			.692	
perc_self_support						
perc_self_mt						
perc_self_petit			.959			.825
perc_self_eu			.873			.723
perc_self_magis			.763			.721
perc_self_mayor			.723			.617
perc_self_flu						

Extraction Method: Principal Component Analysis.
Rotation Method: Oblimin with Kaiser Normalization.

a. Rotation converged in 8 iterations.

Structure Matrix

	Raw			Rescaled		
	Component			Component		
	1	2	3	1	2	3
perc_self_hair	1.078			.861		
perc_self_buyTV	.948			.796		
perc_self_Car	.908			.780		
perc_self_cosm	1.062			.776		
perc_self_drops	.877			.730		
perc_self_healthy		1.025			.828	
perc_self_sl		.856			.810	
perc_self_drive		.846			.789	
perc_self_recyc		.714			.702	
perc_self_support						
perc_self_mt						
perc_self_petit			.973			.837
perc_self_magis			.767			.725
perc_self_eu			.838			.694
perc_self_mayor			.763			.651
perc_self_flu			.855			.636

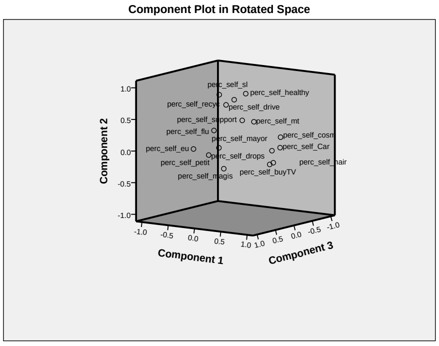
Extraction Method: Principal Component Analysis.
Rotation Method: Oblimin with Kaiser Normalization.

Component Correlation Matrix

Component	1	2	3
1	1.000	.150	.136
2	.150	1.000	.176
3	.136	.176	1.000

Extraction Method: Principal Component Analysis.
Rotation Method: Oblimin with Kaiser Normalization.

Component Plot in Rotated Space



Component Score Coefficient Matrix [a]

	Component		
	1	2	3
perc_self_mt	.074	.143	-.041
perc_self_sl	-.060	.233	.014
perc_self_recyc	-.024	.178	.025
perc_self_cosm	.277	.103	-.099
perc_self_buyTV	.215	-.067	.068
perc_self_Car	.207	.020	-.052
perc_self_mayor	.019	.018	.230
perc_self_healthy	.019	.329	-.095
perc_self_drops	.200	.005	.000
perc_self_flu	-.020	.143	.275
perc_self_hair	.256	-.061	.069
perc_self_drive	-.002	.222	.003
perc_self_magis	.052	-.072	.224
perc_self_eu	-.097	.004	.296
perc_self_support	.041	.132	.023
perc_self_petit	.003	-.017	.308

Extraction Method: Principal Component Analysis.
Rotation Method: Oblimin with Kaiser Normalization.

a. Coefficients are standardized.

Component Score Covariance Matrix

Component	1	2	3
1	1.176	.499	2.156
2	.499	1.079	.611
3	2.156	.611	3.154

Extraction Method: Principal Component Analysis.
Rotation Method: Oblimin with Kaiser Normalization.

```
FACTOR
  /VARIABLES imp_mt imp_sl imp_recyc imp_cosm imp_tv imp_car imp_mayor imp_healthy imp_drops
    imp_flu imp_hair imp_drive imp_magis imp_eu imp_support imp_petit
  /MISSING LISTWISE
  /ANALYSIS imp_mt imp_sl imp_recyc imp_cosm imp_tv imp_car imp_mayor imp_healthy imp_drops imp_flu
    imp_hair imp_drive imp_magis imp_eu imp_support imp_petit
  /PRINT UNIVARIATE CORRELATION KMO EXTRACTION ROTATION FSCORE
  /FORMAT SORT BLANK(.6)
  /PLOT EIGEN ROTATION
  /CRITERIA FACTORS(3) ITERATE(25)
  /EXTRACTION PC
  /CRITERIA ITERATE(25) DELTA(0)
  /ROTATION OBLIMIN
  /METHOD=COVARIANCE.
```

Factor Analysis

```
[DataSet1] \\psf\Home\Documents\Thesis\SPSS files\Amendments SPSS\New Study 4 Data.sav
```

Descriptive Statistics

	Mean	Std. Deviation	Analysis N
imp_mt	5.00	.766	59
imp_sl	5.15	.805	59
imp_recyc	4.63	.927	59
imp_cosm	3.12	1.190	59
imp_tv	3.15	1.080	59
imp_car	3.83	1.177	59
imp_mayor	4.07	1.127	59
imp_healthy	4.83	.931	59
imp_drops	3.08	1.343	59
imp_flu	4.29	1.035	59
imp_hair	2.76	1.150	59
imp_drive	5.20	.867	59
imp_magis	3.42	1.054	59
imp_eu	4.19	1.152	59
imp_support	4.69	.933	59
imp_petit	3.90	1.062	59

Correlation Matrix

		imp_mt	imp_sl	imp_recyc	imp_cosm	imp_tv	imp_car	imp_mayor	imp_healthy	imp_drops	imp_flu
Correlation	imp_mt	1.000	.280	.097	.227	.104	.383	.200	.266	.168	.218
	imp_sl	.280	1.000	.424	.161	.032	.155	.178	.449	.147	.195
	imp_recyc	.097	.424	1.000	-.162	.023	.210	.322	.525	.081	.348
	imp_cosm	.227	.161	-.162	1.000	.670	.532	-.070	.205	.555	-.196
	imp_tv	.104	.032	.023	.670	1.000	.658	.076	.198	.585	.037
	imp_car	.383	.155	.210	.532	.658	1.000	.087	.304	.304	-.058
	imp_mayor	.200	.178	.322	-.070	.076	.087	1.000	.142	.110	.323
	imp_healthy	.266	.449	.525	.205	.198	.304	.142	1.000	.191	.248
	imp_drops	.168	.147	.081	.555	.585	.304	.110	.191	1.000	.143
	imp_flu	.218	.195	.348	-.196	.037	-.058	.323	.248	.143	1.000
	imp_hair	.000	.040	.029	.638	.682	.454	-.001	.107	.471	-.086
	imp_drive	.208	.721	.504	.076	.114	.119	.162	.556	.252	.318
	imp_magis	-.128	.004	.076	-.137	.033	-.080	.425	.039	.035	.266
	imp_eu	.156	.043	.373	-.255	-.134	.011	.468	.159	-.122	.388
	imp_support	.265	.522	.405	-.013	.047	.015	.331	.336	.241	.325
	imp_petit	.106	.139	.294	-.277	-.092	-.055	.726	.157	-.030	.357

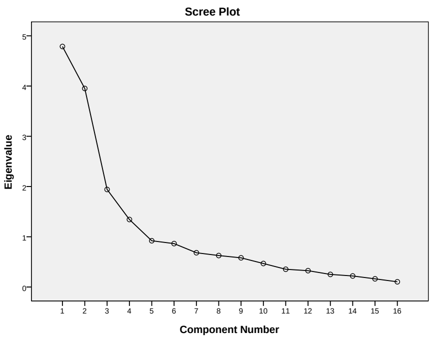
Correlation Matrix

		imp_hair	imp_drive	imp_magis	imp_eu	imp_support	imp_petit
Correlation	imp_mt	.000	.208	-.128	.156	.265	.106
	imp_sl	.040	.721	.004	.043	.522	.139
	imp_recyc	.029	.504	.076	.373	.405	.294
	imp_cosm	.638	.076	-.137	-.255	-.013	-.277
	imp_tv	.682	.114	.033	-.134	.047	-.092
	imp_car	.454	.119	-.080	.011	.015	-.055
	imp_mayor	-.001	.162	.425	.468	.331	.726
	imp_healthy	.107	.556	.039	.159	.336	.157
	imp_drops	.471	.252	.035	-.122	.241	-.030
	imp_flu	-.086	.318	.266	.388	.325	.357
	imp_hair	1.000	.101	.084	-.018	.044	-.105
	imp_drive	.101	1.000	.055	.082	.590	.023
	imp_magis	.084	.055	1.000	.374	.029	.517
	imp_eu	-.018	.082	.374	1.000	.118	.481
	imp_support	.044	.590	.029	.118	1.000	.125
	imp_petit	-.105	.023	.517	.481	.125	1.000

KMO and Bartlett's Test[a]

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.679
Bartlett's Test of Sphericity	Approx. Chi-Square	438.005
	df	120
	Sig.	.000

a. Based on correlations



Component Matrix[a]

	Raw			Rescaled		
	Component			Component		
	1	2	3	1	2	3
imp_tv	.927			.859		
imp_cosm	.994			.835		
imp_drops	1.030			.767		
imp_hair	.872			.759		
imp_car	.840			.714		
imp_mt						
imp_mayor		.870			.772	
imp_petit		.812			.765	
imp_eu		.804			.698	
imp_flu		.665			.642	
imp_recyc		.580			.626	
imp_magis						
imp_drive			.556			.642
imp_sl						
imp_support						
imp_healthy						

Extraction Method: Principal Component Analysis.

a. 3 components extracted.

Communalities

	Raw	Rescaled
	Extraction	Extraction
imp_mt	.115	.197
imp_sl	.375	.578
imp_recyc	.481	.560
imp_cosm	1.109	.783
imp_tv	.924	.792
imp_car	.711	.513
imp_mayor	.882	.694
imp_healthy	.456	.526
imp_drops	1.069	.593
imp_flu	.457	.427
imp_hair	.879	.665
imp_drive	.538	.717
imp_magis	.607	.547
imp_eu	.757	.570
imp_support	.486	.559
imp_petit	.833	.739

Extraction Method: Principal Component Analysis.

Total Variance Explained

	Component	Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings[a]
		Total	% of Variance	Cumulative %	Total
Raw	1	4.787	27.229	27.229	4.675
	2	3.952	22.476	49.706	3.529
	3	1.941	11.042	60.747	3.118
Rescaled	1	3.625	22.657	22.657	3.418
	2	3.701	23.130	45.788	3.000
	3	2.133	13.333	59.121	3.611

Extraction Method: Principal Component Analysis.

a. When components are correlated, sums of squared loadings cannot be added to obtain a total variance.

Pattern Matrix[a]

	Raw			Rescaled		
	Component			Component		
	1	2	3	1	2	3
imp_tv	.970			.899		
imp_cosm	1.008			.847		
imp_hair	.955			.831		
imp_drops	.962			.717		
imp_car	.809			.688		
imp_petit		.901			.849	
imp_mayor		.898			.797	
imp_magis		.803			.762	
imp_eu		.829			.720	
imp_drive			.748			.863
imp_sl			.627			.778
imp_support			.700			.750
imp_healthy			.647			.694
imp_recyc			.629			.679
imp_flu						
imp_mt						

Extraction Method: Principal Component Analysis.
Rotation Method: Oblimin with Kaiser Normalization.

a. Rotation converged in 6 iterations.

Structure Matrix

	Raw			Rescaled		
	Component			Component		
	1	2	3	1	2	3
imp_tv	.959			.888		
imp_cosm	1.022			.858		
imp_hair	.925			.804		
imp_drops	1.001			.746		
imp_car	.831			.706		
imp_petit		.910			.857	
imp_mayor		.920			.816	
imp_eu		.858			.745	
imp_magis		.747			.709	
imp_flu						
imp_drive			.728			.840
imp_sl			.607			.753
imp_support			.696			.746
imp_healthy			.665			.714
imp_recyc			.659			.711
imp_mt						

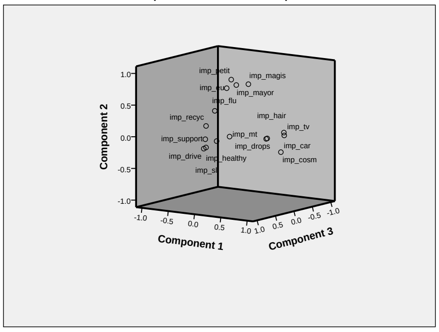
Extraction Method: Principal Component Analysis.
Rotation Method: Oblimin with Kaiser Normalization.

Component Correlation Matrix

Component	1	2	3
1	1.000	-.074	.159
2	-.074	1.000	.217
3	.159	.217	1.000

Extraction Method: Principal Component Analysis.
Rotation Method: Oblimin with Kaiser Normalization.

Component Plot in Rotated Space



Component Score Coefficient Matrix[a]

	Component		
	1	2	3
imp_mt	.018	-.001	.082
imp_sl	-.007	-.035	.189
imp_recyc	-.020	.040	.212
imp_cosm	.262	-.081	-.016
imp_tv	.232	.030	-.029
imp_car	.209	.008	.052
imp_mayor	.035	.309	.029
imp_healthy	.019	-.016	.222
imp_drops	.282	.011	.114
imp_flu	-.024	.123	.157
imp_hair	.245	.047	-.076
imp_drive	-.007	-.043	.242
imp_magis	.033	.268	-.110
imp_eu	-.026	.291	.016
imp_support	-.015	-.013	.242
imp_petit	-.010	.294	-.020

Extraction Method: Principal Component Analysis.
Rotation Method: Oblimin with Kaiser Normalization.

a. Coefficients are standardized.

Component Score Covariance Matrix

Component	1	2	3
1	1.190	.103	2.147
2	.103	1.036	.228
3	2.147	.228	3.184

Extraction Method: Principal Component Analysis.
Rotation Method: Oblimin with Kaiser Normalization.

Appendix I: Chapter 6 SPSS

```
***===============================*****.
*** PARTICIPANTS              *****.
***===============================*****.

*Descriptives participants age*.
DESCRIPTIVES VARIABLES=Age
  /STATISTICS=MEAN STDDEV MIN MAX.
```

Descriptives

[DataSet3] \\psf\Home\Documents\Thesis\SPSS files\Amendments SPSS\New Study 5 Data 180609.sav

Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation
Age	91	18	29	19.26	1.837
Valid N (listwise)	91				

```
*Descriptives participants gender*.
FREQUENCIES VARIABLES=Gender
  /ORDER=ANALYSIS.
```

Frequencies

[DataSet3] \\psf\Home\Documents\Thesis\SPSS files\Amendments SPSS\New Study 5 Data 180609.sav

Statistics

Gender

N	Valid	91
	Missing	0

Gender

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Female	70	76.9	76.9	76.9
	Male	21	23.1	23.1	100.0
	Total	91	100.0	100.0	

```
*Descriptives participants subject*.
FREQUENCIES VARIABLES=Group_Identifier
  /ORDER=ANALYSIS.
```

Frequencies

[DataSet3] \\psf\Home\Documents\Thesis\SPSS files\Amendments SPSS\New Study 5 Data 180609.sav

Statistics

Group_Identifier

N	Valid	91
	Missing	0

Group_Identifier

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Non-Psychology	23	25.3	25.3	25.3
	Psychology	68	74.7	74.7	100.0
	Total	91	100.0	100.0	

```
***===============================*****.
*** TESTING HYPOTHESES                        *****.
***===============================*****.

*Comparing evaluations of criteria between groups*.

*Testing whether evaluations of Graph Only format differ between groups P and NP*.
T-TEST GROUPS=Group_Identifier('E' 'P')
  /MISSING=ANALYSIS
  /VARIABLES=Graph_reliab Graph_easy Graph_object Graph_help Graph_confid Graph_trust Graph_diff
  /CRITERIA=CI(.9500).
```

T-Test

```
[DataSet3] \\psf\Home\Documents\Thesis\SPSS files\Amendments SPSS\New Study 5 Data 180609.sav
```


Group Statistics

	Group_Identifier	N	Mean	Std. Deviation	Std. Error Mean
Graph_reliab	Non-Psychology	22	1.45	.510	.109
	Psychology	67	1.36	.513	.063
Graph_easy	Non-Psychology	22	1.23	.429	.091
	Psychology	66	1.20	.437	.054
Graph_object	Non-Psychology	21	1.52	.602	.131
	Psychology	66	1.64	.715	.088
Graph_help	Non-Psychology	22	1.50	.598	.127
	Psychology	67	1.37	.573	.070
Graph_confid	Non-Psychology	22	1.64	.658	.140
	Psychology	66	1.44	.611	.075
Graph_trust	Non-Psychology	22	1.64	.492	.105
	Psychology	66	1.47	.561	.069
Graph_diff	Non-Psychology	22	2.59	.666	.142
	Psychology	64	2.55	.733	.092

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means				
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference
Graph_reliab	Equal variances assumed	.355	.553	.765	87	.446	.096	.126
	Equal variances not assumed			.768	36.059	.448	.096	.125
Graph_easy	Equal variances assumed	.176	.676	.283	86	.778	.030	.107
	Equal variances not assumed			.286	36.663	.777	.030	.106
Graph_object	Equal variances assumed	1.393	.241	-.651	85	.517	-.113	.173
	Equal variances not assumed			-.712	39.586	.481	-.113	.158
Graph_help	Equal variances assumed	.486	.487	.892	87	.375	.127	.142
	Equal variances not assumed			.873	34.590	.389	.127	.145
Graph_confid	Equal variances assumed	.239	.626	1.285	86	.202	.197	.153
	Equal variances not assumed			1.238	33.899	.224	.197	.159
Graph_trust	Equal variances assumed	2.299	.133	1.243	86	.217	.167	.134
	Equal variances not assumed			1.327	40.631	.192	.167	.126

Independent Samples Test

		t-test for Equality of Means	
		95% Confidence Interval of the Difference	
		Lower	Upper
Graph_reliab	Equal variances assumed	-.154	.347
	Equal variances not assumed	-.158	.351
Graph_easy	Equal variances assumed	-.183	.243
	Equal variances not assumed	-.185	.245
Graph_object	Equal variances assumed	-.456	.231
	Equal variances not assumed	-.432	.207
Graph_help	Equal variances assumed	-.156	.410
	Equal variances not assumed	-.168	.422
Graph_confid	Equal variances assumed	-.108	.502
	Equal variances not assumed	-.127	.520
Graph_trust	Equal variances assumed	-.100	.433
	Equal variances not assumed	-.087	.420

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means				
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference
Graph_diff	Equal variances assumed	.509	.478	.249	84	.804	.044	.177
	Equal variances not assumed			.261	39.826	.796	.044	.169

Independent Samples Test

		t-test for Equality of Means	
		95% Confidence Interval of the Difference	
		Lower	Upper
Graph_diff	Equal variances assumed	-.308	.396
	Equal variances not assumed	-.298	.386

```
*Testing whether evaluations of Text Numerical format differ between groups P and NP*.
T-TEST GROUPS=Group_Identifier('E' 'P')
  /MISSING=ANALYSIS
  /VARIABLES=Numbers_reliab Numbers_easy Numbers_object Numbers_help Numbers_confid Numbers_trust Numbers_diff
  /CRITERIA=CI(.9500).
```

T-Test

[DataSet3] \\psf\Home\Documents\Thesis\SPSS files\Amendments SPSS\New Study 5 Data 180609.sav

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Group Statistics

	Group_Identifier	N	Mean	Std. Deviation	Std. Error Mean
Numbers_reliab	Non-Psychology	22	1.32	.477	.102
	Psychology	67	1.52	.503	.061
Numbers_easy	Non-Psychology	22	1.86	.560	.119
	Psychology	66	1.82	.552	.068
Numbers_object	Non-Psychology	20	1.50	.688	.154
	Psychology	63	1.56	.562	.071
Numbers_help	Non-Psychology	21	1.67	.577	.126
	Psychology	67	1.67	.561	.069
Numbers_confid	Non-Psychology	22	1.64	.492	.105
	Psychology	66	1.67	.564	.069
Numbers_trust	Non-Psychology	22	1.41	.503	.107
	Psychology	67	1.51	.587	.072
Numbers_diff	Non-Psychology	22	2.41	.590	.126
	Psychology	63	2.25	.595	.075

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Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means				
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference
Numbers_reliab	Equal variances assumed	9.192	.003	-1.672	87	.098	-.204	.122
	Equal variances not assumed			-1.719	37.580	.094	-.204	.119
Numbers_easy	Equal variances assumed	.105	.747	.333	86	.740	.045	.136
	Equal variances not assumed			.331	35.597	.743	.045	.137
Numbers_object	Equal variances assumed	1.662	.201	-.365	81	.716	-.056	.152
	Equal variances not assumed			-.328	27.505	.745	-.056	.169
Numbers_help	Equal variances assumed	.012	.913	-.035	86	.972	-.005	.141
	Equal variances not assumed			-.035	32.723	.973	-.005	.143
Numbers_confid	Equal variances assumed	.601	.440	-.225	86	.823	-.030	.135
	Equal variances not assumed			-.241	40.853	.811	-.030	.126
Numbers_trust	Equal variances assumed	1.840	.178	-.705	87	.483	-.098	.140
	Equal variances not assumed			-.762	41.335	.450	-.098	.129

Independent Samples Test

		t-test for Equality of Means	
		95% Confidence Interval of the Difference	
		Lower	Upper
Numbers_reliab	Equal variances assumed	-.447	.039
	Equal variances not assumed	-.445	.036
Numbers_easy	Equal variances assumed	-.226	.317
	Equal variances not assumed	-.233	.324
Numbers_object	Equal variances assumed	-.359	.248
	Equal variances not assumed	-.403	.292
Numbers_help	Equal variances assumed	-.286	.276
	Equal variances not assumed	-.297	.287
Numbers_confid	Equal variances assumed	-.298	.238
	Equal variances not assumed	-.284	.224
Numbers_trust	Equal variances assumed	-.376	.179
	Equal variances not assumed	-.359	.162

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means				
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference
Numbers_diff	Equal variances assumed	.293	.590	1.055	83	.294	.155	.147
	Equal variances not assumed			1.059	36.957	.296	.155	.146

Independent Samples Test

		t-test for Equality of Means	
		95% Confidence Interval of the Difference	
		Lower	Upper
Numbers_diff	Equal variances assumed	-.137	.448
	Equal variances not assumed	-.142	.452

```
*Testing whether evaluations of Text Only format differ between groups P and NP*.
T-TEST GROUPS=Group_Identifier('E' 'P')
  /MISSING=ANALYSIS
  /VARIABLES=Text_reliab Text_easy Text_object Text_help Text_confid Text_trust Text_diff
  /CRITERIA=CI(.9500).
```

T-Test

[DataSet3] \\psf\Home\Documents\Thesis\SPSS files\Amendments SPSS\New Study 5 Data 180609.sav

Group Statistics

	Group_Identifier	N	Mean	Std. Deviation	Std. Error Mean
Text_reliab	Non-Psychology	21	2.29	.644	.140
	Psychology	67	2.10	.677	.083
Text_easy	Non-Psychology	22	1.64	.727	.155
	Psychology	67	1.82	.757	.093
Text_object	Non-Psychology	20	2.45	.605	.135
	Psychology	62	2.23	.612	.078
Text_help	Non-Psychology	22	2.09	.750	.160
	Psychology	64	1.98	.678	.085
Text_confid	Non-Psychology	22	2.00	.617	.132
	Psychology	65	2.02	.673	.083
Text_trust	Non-Psychology	20	2.15	.587	.131
	Psychology	64	2.16	.541	.068
Text_diff	Non-Psychology	22	2.09	.750	.160
	Psychology	63	2.17	.730	.092

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means				
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference
Text_reliab	Equal variances assumed	.120	.729	1.082	86	.282	.181	.167
	Equal variances not assumed			1.112	35.009	.274	.181	.163
Text_easy	Equal variances assumed	.000	.994	-1.001	87	.319	-.185	.184
	Equal variances not assumed			-1.023	37.143	.313	-.185	.180
Text_object	Equal variances assumed	.373	.543	1.429	80	.157	.224	.157
	Equal variances not assumed			1.437	32.514	.160	.224	.156
Text_help	Equal variances assumed	.952	.332	.618	84	.538	.107	.172
	Equal variances not assumed			.589	33.577	.560	.107	.181
Text_confid	Equal variances assumed	.558	.457	-.095	85	.925	-.015	.163
	Equal variances not assumed			-.099	39.216	.922	-.015	.156
Text_trust	Equal variances assumed	.096	.758	-.044	82	.965	-.006	.141
	Equal variances not assumed			-.042	29.786	.967	-.006	.148

Independent Samples Test

		t-test for Equality of Means	
		95% Confidence Interval of the Difference	
		Lower	Upper
Text_reliab	Equal variances assumed	-.152	.514
	Equal variances not assumed	-.150	.512
Text_easy	Equal variances assumed	-.551	.182
	Equal variances not assumed	-.550	.181
Text_object	Equal variances assumed	-.088	.536
	Equal variances not assumed	-.093	.542
Text_help	Equal variances assumed	-.236	.449
	Equal variances not assumed	-.262	.475
Text_confid	Equal variances assumed	-.339	.308
	Equal variances not assumed	-.331	.300
Text_trust	Equal variances assumed	-.288	.275
	Equal variances not assumed	-.308	.295

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means				
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference
Text_diff	Equal variances assumed	.054	.817	-.460	83	.647	-.084	.182
	Equal variances not assumed			-.454	35.875	.653	-.084	.185

Independent Samples Test

		t-test for Equality of Means	
		95% Confidence Interval of the Difference	
		Lower	Upper
Text_diff	Equal variances assumed	-.446	.279
	Equal variances not assumed	-.458	.291

```
*Descriptives and chi square for mentions between the two groups*.
CROSSTABS
  /TABLES=P_overall P_reliab P_easy P_object P_help P_confid P_trust P_diff BY Group_Identifier
  /FORMAT=AVALUE TABLES
  /STATISTICS=CHISQ
  /CELLS=COUNT ROW COLUMN
  /COUNT ROUND CELL.
```


Crosstabs

[DataSet3] \\psf\Home\Documents\Thesis\SPSS files\Amendments SPSS\New Study 5 Data 180609.sav

Case Processing Summary

	Cases					
	Valid		Missing		Total	
	N	Percent	N	Percent	N	Percent
P_overall * Group_Identifier	91	100.0%	0	.0%	91	100.0%
P_reliab * Group_Identifier	91	100.0%	0	.0%	91	100.0%
P_easy * Group_Identifier	91	100.0%	0	.0%	91	100.0%
P_object * Group_Identifier	91	100.0%	0	.0%	91	100.0%
P_help * Group_Identifier	91	100.0%	0	.0%	91	100.0%
P_confid * Group_Identifier	91	100.0%	0	.0%	91	100.0%
P_trust * Group_Identifier	91	100.0%	0	.0%	91	100.0%
P_diff * Group_Identifier	91	100.0%	0	.0%	91	100.0%

P_overall * Group_Identifier

Crosstab

			Group_Identifier		Total
			Non-Psychology	Psychology	
P_overall	Graph only	Count	13	49	62
		% within P_overall	21.0%	79.0%	100.0%
		% within Group_Identifier	56.5%	72.1%	68.1%
	Text numerical	Count	6	8	14
		% within P_overall	42.9%	57.1%	100.0%
		% within Group_Identifier	26.1%	11.8%	15.4%
	Text only	Count	4	11	15
		% within P_overall	26.7%	73.3%	100.0%
		% within Group_Identifier	17.4%	16.2%	16.5%
Total		Count	23	68	91
		% within P_overall	25.3%	74.7%	100.0%
		% within Group_Identifier	100.0%	100.0%	100.0%

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	2.916[a]	2	.233
Likelihood Ratio	2.694	2	.260
N of Valid Cases	91		

a. 2 cells (33.3%) have expected count less than 5. The minimum expected count is 3.54.

P_reliab * Group_Identifier

Crosstab

			Group_Identifier		Total
			Non-Psychology	Psychology	
P_reliab	Graph only	Count	9	41	50
		% within P_reliab	18.0%	82.0%	100.0%
		% within Group_Identifier	39.1%	60.3%	54.9%
	Text numerical	Count	14	23	37
		% within P_reliab	37.8%	62.2%	100.0%
		% within Group_Identifier	60.9%	33.8%	40.7%
	Text only	Count	0	4	4
		% within P_reliab	.0%	100.0%	100.0%
		% within Group_Identifier	.0%	5.9%	4.4%
Total		Count	23	68	91
		% within P_reliab	25.3%	74.7%	100.0%
		% within Group_Identifier	100.0%	100.0%	100.0%

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	5.846[a]	2	.054
Likelihood Ratio	6.670	2	.036
N of Valid Cases	91		

a. 2 cells (33.3%) have expected count less than 5. The minimum expected count is 1.01.

P_easy * Group_Identifier

Crosstab

			Group_Identifier		
			Non-Psychology	Psychology	Total
P_easy	Graph only	Count	14	49	63
		% within P_easy	22.2%	77.8%	100.0%
		% within Group_Identifier	60.9%	72.1%	69.2%
	Text numerical	Count	5	8	13
		% within P_easy	38.5%	61.5%	100.0%
		% within Group_Identifier	21.7%	11.8%	14.3%
	Text only	Count	4	11	15
		% within P_easy	26.7%	73.3%	100.0%
		% within Group_Identifier	17.4%	16.2%	16.5%

Crosstab

		Group_Identifier		
		Non-Psychology	Psychology	Total
Total	Count	23	68	91
	% within P_easy	25.3%	74.7%	100.0%
	% within Group_Identifier	100.0%	100.0%	100.0%

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	1.523[a]	2	.467
Likelihood Ratio	1.427	2	.490
N of Valid Cases	91		

a. 2 cells (33.3%) have expected count less than 5. The minimum expected count is 3.29.

P_object * Group_Identifier

Crosstab

			Group_Identifier		
			Non-Psychology	Psychology	Total
P_object	Graph only	Count	12	38	50
		% within P_object	24.0%	76.0%	100.0%
		% within Group_Identifier	52.2%	55.9%	54.9%
	Text numerical	Count	9	24	33
		% within P_object	27.3%	72.7%	100.0%
		% within Group_Identifier	39.1%	35.3%	36.3%
	Text only	Count	2	6	8
		% within P_object	25.0%	75.0%	100.0%
		% within Group_Identifier	8.7%	8.8%	8.8%
Total		Count	23	68	91
		% within P_object	25.3%	74.7%	100.0%
		% within Group_Identifier	100.0%	100.0%	100.0%

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	.113[a]	2	.945
Likelihood Ratio	.112	2	.945
N of Valid Cases	91		

a. 1 cells (16.7%) have expected count less than 5. The minimum expected count is 2.02.

P_help * Group_Identifier

Crosstab

			Group_Identifier		
			Non-Psychology	Psychology	Total
P_help	Graph only	Count	16	42	58
		% within P_help	27.6%	72.4%	100.0%
		% within Group_Identifier	69.6%	61.8%	63.7%
	Text numerical	Count	6	18	24
		% within P_help	25.0%	75.0%	100.0%
		% within Group_Identifier	26.1%	26.5%	26.4%
	Text only	Count	1	8	9
		% within P_help	11.1%	88.9%	100.0%
		% within Group_Identifier	4.3%	11.8%	9.9%
Total		Count	23	68	91
		% within P_help	25.3%	74.7%	100.0%
		% within Group_Identifier	100.0%	100.0%	100.0%

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	1.121[a]	2	.571
Likelihood Ratio	1.295	2	.523
N of Valid Cases	91		

a. 1 cells (16.7%) have expected count less than 5. The minimum expected count is 2.27.

P_confid * Group_Identifier

Crosstab

			Group_Identifier		
			Non-Psychology	Psychology	Total
P_confid	Graph only	Count	11	43	54
		% within P_confid	20.4%	79.6%	100.0%
		% within Group_Identifier	47.8%	63.2%	59.3%
	Text numerical	Count	9	16	25
		% within P_confid	36.0%	64.0%	100.0%
		% within Group_Identifier	39.1%	23.5%	27.5%
	Text only	Count	3	9	12
		% within P_confid	25.0%	75.0%	100.0%
		% within Group_Identifier	13.0%	13.2%	13.2%

Crosstab

		Group_Identifier		
		Non-Psychology	Psychology	Total
Total	Count	23	68	91
	% within P_confid	25.3%	74.7%	100.0%
	% within Group_Identifier	100.0%	100.0%	100.0%

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	2.211[a]	2	.331
Likelihood Ratio	2.130	2	.345
N of Valid Cases	91		

a. 1 cells (16.7%) have expected count less than 5. The minimum expected count is 3.03.

P_trust * Group_Identifier

Crosstab

			Group_Identifier		
			Non-Psychology	Psychology	Total
P_trust	Graph only	Count	12	43	55
		% within P_trust	21.8%	78.2%	100.0%
		% within Group_Identifier	52.2%	63.2%	60.4%
	Text numerical	Count	11	22	33
		% within P_trust	33.3%	66.7%	100.0%
		% within Group_Identifier	47.8%	32.4%	36.3%
	Text only	Count	0	3	3
		% within P_trust	.0%	100.0%	100.0%
		% within Group_Identifier	.0%	4.4%	3.3%
Total		Count	23	68	91
		% within P_trust	25.3%	74.7%	100.0%
		% within Group_Identifier	100.0%	100.0%	100.0%

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	2.497[a]	2	.287
Likelihood Ratio	3.175	2	.204
N of Valid Cases	91		

a. 2 cells (33.3%) have expected count less than 5. The minimum expected count is .76.

P_diff * Group_Identifier

Crosstab

			Group_Identifier		
			Non-Psychology	Psychology	Total
P_diff	Graph only	Count	2	12	14
		% within P_diff	14.3%	85.7%	100.0%
		% within Group_Identifier	8.7%	17.6%	15.4%
	Text numerical	Count	6	17	23
		% within P_diff	26.1%	73.9%	100.0%
		% within Group_Identifier	26.1%	25.0%	25.3%
	Text only	Count	15	39	54
		% within P_diff	27.8%	72.2%	100.0%
		% within Group_Identifier	65.2%	57.4%	59.3%
Total		Count	23	68	91
		% within P_diff	25.3%	74.7%	100.0%
		% within Group_Identifier	100.0%	100.0%	100.0%

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	1.082[a]	2	.582
Likelihood Ratio	1.194	2	.550
N of Valid Cases	91		

a. 1 cells (16.7%) have expected count less than 5. The minimum expected count is 3.54.

```
*Comparing evaluations of criteria for two groups combined*.

*Descriptives evaluations of Graph Only format across combined two groups*.
DESCRIPTIVES VARIABLES=Graph_reliab Graph_easy Graph_object Graph_help Graph_confid Graph_trust
    Graph_diff
  /STATISTICS=MEAN STDDEV MIN MAX.
```

Descriptives

[DataSet3] \\psf\Home\Documents\Thesis\SPSS files\Amendments SPSS\New Study 5 Data 180609.sav

Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation
Graph_reliab	89	1	3	1.38	.511
Graph_easy	88	1	3	1.20	.433
Graph_object	87	1	3	1.61	.688
Graph_help	89	1	3	1.40	.578
Graph_confid	88	1	3	1.49	.625
Graph_trust	88	1	3	1.51	.547
Graph_diff	86	1	3	2.56	.713
Valid N (listwise)	81				

```
*Descriptives evaluations of Text Numerical format across combined two groups*.
DESCRIPTIVES VARIABLES=Numbers_reliab Numbers_easy Numbers_object Numbers_help Numbers_confid
    Numbers_trust Numbers_diff
  /STATISTICS=MEAN STDDEV MIN MAX.
```

Descriptives

[DataSet3] \\psf\Home\Documents\Thesis\SPSS files\Amendments SPSS\New Study 5 Data 180609.sav

Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation
Numbers_reliab	89	1	2	1.47	.502
Numbers_easy	88	1	3	1.83	.551
Numbers_object	83	1	3	1.54	.591
Numbers_help	88	1	3	1.67	.562
Numbers_confid	88	1	3	1.66	.544
Numbers_trust	89	1	3	1.48	.566
Numbers_diff	85	1	3	2.29	.594
Valid N (listwise)	80				

```
*Descriptives evaluations of Text Only format across combined two groups*.
DESCRIPTIVES VARIABLES=Text_reliab Text_easy Text_object Text_help Text_confid Text_trust Text_diff
  /STATISTICS=MEAN STDDEV MIN MAX.
```

Descriptives

```
[DataSet3] \\psf\Home\Documents\Thesis\SPSS files\Amendments SPSS\New Study 5 Data 180609.sav
```


Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation
Text_reliab	88	1	3	2.15	.670
Text_easy	89	1	3	1.78	.750
Text_object	82	1	3	2.28	.614
Text_help	86	1	3	2.01	.694
Text_confid	87	1	3	2.01	.656
Text_trust	84	1	3	2.15	.549
Text_diff	85	1	3	2.15	.732
Valid N (listwise)	76				

```
*Testing whether evaluations of formats differ significantly for criterion "Reliable"*.
T-TEST PAIRS=Graph_reliab Numbers_reliab Text_reliab WITH Numbers_reliab Text_reliab Graph_reliab (PAIRED)
  /CRITERIA=CI(.9500)
  /MISSING=ANALYSIS.
```

T-Test

```
[DataSet3] \\psf\Home\Documents\Thesis\SPSS files\Amendments SPSS\New Study 5 Data 180609.sav
```

Paired Samples Statistics

		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	Graph_reliab	1.39	88	.513	.055
	Numbers_reliab	1.47	88	.502	.053
Pair 2	Numbers_reliab	1.48	88	.502	.054
	Text_reliab	2.15	88	.670	.071
Pair 3	Text_reliab	2.16	87	.663	.071
	Graph_reliab	1.39	87	.514	.055

Paired Samples Correlations

		N	Correlation	Sig.
Pair 1	Graph_reliab & Numbers_reliab	88	.052	.632
Pair 2	Numbers_reliab & Text_reliab	88	-.178	.098
Pair 3	Text_reliab & Graph_reliab	87	.018	.868

Paired Samples Test

		Paired Differences					t	df	Sig. (2-tailed)
					95% Confidence Interval of the Difference				
		Mean	Std. Deviation	Std. Error Mean	Lower	Upper			
Pair 1	Graph_reliab - Numbers_reliab	-.080	.698	.074	-.228	.068	-1.068	87	.288
Pair 2	Numbers_reliab - Text_reliab	-.670	.906	.097	-.862	-.478	-6.940	87	.000
Pair 3	Text_reliab - Graph_reliab	.770	.831	.089	.593	.947	8.643	86	.000

```
*Testing whether evaluations of formats differ significantly for criterion "Easy to understand"*.
T-TEST PAIRS=Graph_easy Numbers_easy Text_easy WITH Numbers_easy Text_easy Graph_easy (PAIRED)
  /CRITERIA=CI(.9500)
  /MISSING=ANALYSIS.
```

T-Test

```
[DataSet3] \\psf\Home\Documents\Thesis\SPSS files\Amendments SPSS\New Study 5 Data 180609.sav
```

Paired Samples Statistics

		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	Graph_easy	1.20	86	.429	.046
	Numbers_easy	1.83	86	.557	.060
Pair 2	Numbers_easy	1.83	88	.551	.059
	Text_easy	1.78	88	.750	.080
Pair 3	Text_easy	1.78	87	.754	.081
	Graph_easy	1.21	87	.435	.047

Paired Samples Correlations

		N	Correlation	Sig.
Pair 1	Graph_easy & Numbers_easy	86	-.149	.170
Pair 2	Numbers_easy & Text_easy	88	-.090	.404
Pair 3	Text_easy & Graph_easy	87	-.073	.499

Paired Samples Test

		Paired Differences					t	df	Sig. (2-tailed)
					95% Confidence Interval of the Difference				
		Mean	Std. Deviation	Std. Error Mean	Lower	Upper			
Pair 1	Graph_easy - Numbers_easy	-.628	.752	.081	-.789	-.467	-7.741	85	.000
Pair 2	Numbers_easy - Text_easy	.045	.970	.103	-.160	.251	.440	87	.661
Pair 3	Text_easy - Graph_easy	.575	.897	.096	.383	.766	5.973	86	.000

```
*Testing whether evaluations of formats differ significantly for criterion "Objective"*.
T-TEST PAIRS=Graph_object Numbers_object Text_object WITH Numbers_object Text_object Graph_object (PAIRED)
  /CRITERIA=CI(.9500)
  /MISSING=ANALYSIS.
```

T-Test

```
[DataSet3] \\psf\Home\Documents\Thesis\SPSS files\Amendments SPSS\New Study 5 Data 180609.sav
```

Paired Samples Statistics

		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	Graph_object	1.57	82	.648	.072
	Numbers_object	1.54	82	.592	.065
Pair 2	Numbers_object	1.54	81	.593	.066
	Text_object	2.27	81	.613	.068
Pair 3	Text_object	2.26	80	.611	.068
	Graph_object	1.56	80	.633	.071

Paired Samples Correlations

		N	Correlation	Sig.
Pair 1	Graph_object & Numbers_object	82	-.007	.950
Pair 2	Numbers_object & Text_object	81	-.136	.226
Pair 3	Text_object & Graph_object	80	-.190	.091

Paired Samples Test

		Paired Differences					t	df	Sig. (2-tailed)
					95% Confidence Interval of the Difference				
		Mean	Std. Deviation	Std. Error Mean	Lower	Upper			
Pair 1	Graph_object - Numbers_object	.037	.881	.097	-.157	.230	.376	81	.708
Pair 2	Numbers_object - Text_object	-.728	.908	.101	-.929	-.528	-7.216	80	.000
Pair 3	Text_object - Graph_object	.700	.960	.107	.486	.914	6.522	79	.000

```
*Testing whether evaluations of formats differ significantly for criterion "Helpful"*.
T-TEST PAIRS=Graph_help Numbers_help Text_help WITH Numbers_help Text_help Graph_help (PAIRED)
  /CRITERIA=CI(.9500)
  /MISSING=ANALYSIS.
```

T-Test

```
[DataSet3] \\psf\Home\Documents\Thesis\SPSS files\Amendments SPSS\New Study 5 Data 180609.sav
```

Paired Samples Statistics

		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	Graph_help	1.39	87	.578	.062
	Numbers_help	1.67	87	.564	.060
Pair 2	Numbers_help	1.67	85	.565	.061
	Text_help	2.01	85	.699	.076
Pair 3	Text_help	2.02	85	.690	.075
	Graph_help	1.38	85	.556	.060

Paired Samples Correlations

		N	Correlation	Sig.
Pair 1	Graph_help & Numbers_help	87	.119	.272
Pair 2	Numbers_help & Text_help	85	-.081	.463
Pair 3	Text_help & Graph_help	85	.039	.725

Paired Samples Test

		Paired Differences					t	df	Sig. (2-tailed)
					95% Confidence Interval of the Difference				
		Mean	Std. Deviation	Std. Error Mean	Lower	Upper			
Pair 1	Graph_help - Numbers_help	-.276	.758	.081	-.437	-.114	-3.396	86	.001
Pair 2	Numbers_help - Text_help	-.341	.933	.101	-.542	-.140	-3.372	84	.001
Pair 3	Text_help - Graph_help	.647	.869	.094	.460	.834	6.866	84	.000

```
*Testing whether evaluations of formats differ significantly for criterion "Giving Confidence"*.
T-TEST PAIRS=Graph_confid Numbers_confid Text_confid WITH Numbers_confid Text_confid Graph_confid (PAIRED)
  /CRITERIA=CI(.9500)
  /MISSING=ANALYSIS.
```

T-Test

```
[DataSet3] \\psf\Home\Documents\Thesis\SPSS files\Amendments SPSS\New Study 5 Data 180609.sav
```

Paired Samples Statistics

		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	Graph_confid	1.49	87	.626	.067
	Numbers_confid	1.66	87	.546	.059
Pair 2	Numbers_confid	1.66	86	.545	.059
	Text_confid	2.00	86	.651	.070
Pair 3	Text_confid	2.00	86	.651	.070
	Graph_confid	1.49	86	.628	.068

Paired Samples Correlations

		N	Correlation	Sig.
Pair 1	Graph_confid & Numbers_confid	87	.096	.376
Pair 2	Numbers_confid & Text_confid	86	-.166	.127
Pair 3	Text_confid & Graph_confid	86	.202	.063

Paired Samples Test

		Paired Differences					t	df	Sig. (2-tailed)
					95% Confidence Interval of the Difference				
		Mean	Std. Deviation	Std. Error Mean	Lower	Upper			
Pair 1	Graph_confid - Numbers_confid	-.161	.791	.085	-.329	.008	-1.899	86	.061
Pair 2	Numbers_confid - Text_confid	-.337	.915	.099	-.533	-.141	-3.416	85	.001
Pair 3	Text_confid - Graph_confid	.512	.808	.087	.338	.685	5.872	85	.000

```
*Testing whether evaluations of formats differ significantly for criterion "Trust"*.
T-TEST PAIRS=Graph_trust Numbers_trust Text_trust WITH Numbers_trust Text_trust Graph_trust (PAIRED)
  /CRITERIA=CI(.9500)
  /MISSING=ANALYSIS.
```

T-Test

```
[DataSet3] \\psf\Home\Documents\Thesis\SPSS files\Amendments SPSS\New Study 5 Data 180609.sav
```

Paired Samples Statistics

		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	Graph_trust	1.51	88	.547	.058
	Numbers_trust	1.48	88	.567	.060
Pair 2	Numbers_trust	1.49	84	.570	.062
	Text_trust	2.15	84	.549	.060
Pair 3	Text_trust	2.16	83	.552	.061
	Graph_trust	1.48	83	.526	.058

Paired Samples Correlations

		N	Correlation	Sig.
Pair 1	Graph_trust & Numbers_trust	88	.205	.055
Pair 2	Numbers_trust & Text_trust	84	-.090	.414
Pair 3	Text_trust & Graph_trust	83	.031	.782

Paired Samples Test

		Paired Differences					t	df	Sig. (2-tailed)
					95% Confidence Interval of the Difference				
		Mean	Std. Deviation	Std. Error Mean	Lower	Upper			
Pair 1	Graph_trust - Numbers_trust	.034	.702	.075	-.115	.183	.455	87	.650
Pair 2	Numbers_trust - Text_trust	-.667	.826	.090	-.846	-.487	-7.395	83	.000
Pair 3	Text_trust - Graph_trust	.675	.751	.082	.511	.839	8.188	82	.000

```
*Testing whether evaluations of formats differ significantly for criterion "Difficult"*.
T-TEST PAIRS=Graph_diff Numbers_diff Text_diff WITH Numbers_diff Text_diff Graph_diff (PAIRED)
  /CRITERIA=CI(.9500)
  /MISSING=ANALYSIS.
```

T-Test

```
[DataSet3] \\psf\Home\Documents\Thesis\SPSS files\Amendments SPSS\New Study 5 Data 180609.sav
```

Paired Samples Statistics

		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	Graph_diff	2.54	82	.723	.080
	Numbers_diff	2.28	82	.594	.066
Pair 2	Numbers_diff	2.33	83	.565	.062
	Text_diff	2.16	83	.724	.079
Pair 3	Text_diff	2.13	82	.733	.081
	Graph_diff	2.56	82	.704	.078

Paired Samples Correlations

		N	Correlation	Sig.
Pair 1	Graph_diff & Numbers_diff	82	-.039	.731
Pair 2	Numbers_diff & Text_diff	83	.023	.837
Pair 3	Text_diff & Graph_diff	82	-.028	.803

Paired Samples Test

		Paired Differences					t	df	Sig. (2-tailed)
					95% Confidence Interval of the Difference				
		Mean	Std. Deviation	Std. Error Mean	Lower	Upper			
Pair 1	Graph_diff - Numbers_diff	.256	.953	.105	.047	.466	2.432	81	.017
Pair 2	Numbers_diff - Text_diff	.169	.908	.100	-.030	.367	1.692	82	.094
Pair 3	Text_diff - Graph_diff	-.427	1.031	.114	-.653	-.200	-3.750	81	.000

```
*Descriptives and chi square for mentions for two groups combined*.
NPAR TEST
  /CHISQUARE=P_overall P_reliab P_easy P_object P_help P_confid P_trust P_diff
  /EXPECTED=EQUAL
  /MISSING ANALYSIS.
```

NPar Tests

[DataSet3] \\psf\Home\Documents\Thesis\SPSS files\Amendments SPSS\New Study 5 Data 180609.sav

Chi-Square Test

Frequencies

P_overall

	Observed N	Expected N	Residual
Graph only	62	30.3	31.7
Text numerical	14	30.3	-16.3
Text only	15	30.3	-15.3
Total	91		

P_reliab

	Observed N	Expected N	Residual
Graph only	50	30.3	19.7
Text numerical	37	30.3	6.7
Text only	4	30.3	-26.3
Total	91		

P_easy

	Observed N	Expected N	Residual
Graph only	63	30.3	32.7
Text numerical	13	30.3	-17.3
Text only	15	30.3	-15.3
Total	91		

P_object

	Observed N	Expected N	Residual
Graph only	50	30.3	19.7
Text numerical	33	30.3	2.7
Text only	8	30.3	-22.3
Total	91		

P_help

	Observed N	Expected N	Residual
Graph only	58	30.3	27.7
Text numerical	24	30.3	-6.3
Text only	9	30.3	-21.3
Total	91		

P_confid

	Observed N	Expected N	Residual
Graph only	54	30.3	23.7
Text numerical	25	30.3	-5.3
Text only	12	30.3	-18.3
Total	91		

P_trust

	Observed N	Expected N	Residual
Graph only	55	30.3	24.7
Text numerical	33	30.3	2.7
Text only	3	30.3	-27.3
Total	91		

P_diff

	Observed N	Expected N	Residual
Graph only	14	30.3	-16.3
Text numerical	23	30.3	-7.3
Text only	54	30.3	23.7
Total	91		

Test Statistics

	P_overall	P_reliab	P_easy	P_object	P_help	P_confid	P_trust	P_diff
Chi-square	49.604[a]	37.077[a]	52.835[a]	29.429[a]	41.560[a]	30.484[a]	44.923[a]	29.033[a]
df	2	2	2	2	2	2	2	2
Asymp. Sig.	.000	.000	.000	.000	.000	.000	.000	.000

a. 0 cells (.0%) have expected frequencies less than 5. The minimum expected cell frequency is 30.3.

```
*Post-hoc for differences found with Chi square*.

NPAR TESTS
  /CHISQUARE=P_Object (1,2)
```



```
  /EXPECTED=EQUAL
  /MISSING ANALYSIS.
```

NPar Tests

```
[DataSet3] \\psf\Home\Documents\Thesis\SPSS files\Amendments SPSS\New Study 5 Data 180609.sav
```

Chi-Square Test

Frequencies

	P_object			
	Category	Observed N	Expected N	Residual
1	Graph only	50	41.5	8.5
2	Text numerical	33	41.5	-8.5
Total		83		

Test Statistics

	P_object
Chi-square	3.482[a]
df	1
Asymp. Sig.	.062

a. 0 cells (.0%) have expected frequencies less than 5. The minimum expected cell frequency is 41.5.

```
NPAR TESTS
  /CHISQUARE=P_Object (2,3)
  /EXPECTED=EQUAL
  /MISSING ANALYSIS.
```

NPar Tests

```
[DataSet3] \\psf\Home\Documents\Thesis\SPSS files\Amendments SPSS\New Study 5 Data 180609.sav
```

Chi-Square Test

Frequencies

	P_object			
	Category	Observed N	Expected N	Residual
1	Text numerical	33	20.5	12.5
2	Text only	8	20.5	-12.5
Total		41		

Test Statistics

	P_object
Chi-square	15.244[a]
df	1
Asymp. Sig.	.000

a. 0 cells (.0%) have expected frequencies less than 5. The minimum expected cell frequency is 20.5.

```
NPAR TESTS
  /CHISQUARE=P_Reliab(1,2)
  /EXPECTED=EQUAL
  /MISSING ANALYSIS.
```

NPar Tests

```
[DataSet3] \\psf\Home\Documents\Thesis\SPSS files\Amendments SPSS\New Study 5 Data 180609.sav
```

Chi-Square Test

Frequencies

	P_reliab			
	Category	Observed N	Expected N	Residual
1	Graph only	50	43.5	6.5
2	Text numerical	37	43.5	-6.5
Total		87		

Test Statistics

	P_reliab
Chi-square	1.943[a]
df	1
Asymp. Sig.	.163

a. 0 cells (.0%) have expected frequencies less than 5. The minimum expected cell frequency is 43.5.

```
NPAR TESTS
  /CHISQUARE=P_Reliab (2,3)
  /EXPECTED=EQUAL
  /MISSING ANALYSIS.
```

NPar Tests

```
[DataSet3] \\psf\Home\Documents\Thesis\SPSS files\Amendments SPSS\New Study 5 Data 180609.sav
```


Chi-Square Test

Frequencies

	P_reliab			
	Category	Observed N	Expected N	Residual
1	Text numerical	37	20.5	16.5
2	Text only	4	20.5	-16.5
Total		41		

Test Statistics

	P_reliab
Chi-square	26.561[a]
df	1
Asymp. Sig.	.000

a. 0 cells (.0%) have expected frequencies less than 5. The minimum expected cell frequency is 20.5.

```
NPAR TESTS
  /CHISQUARE=P_Easy (1,2)
  /EXPECTED=EQUAL
  /MISSING ANALYSIS.
```

NPar Tests

```
[DataSet3] \\psf\Home\Documents\Thesis\SPSS files\Amendments SPSS\New Study 5 Data 180609.sav
```

Chi-Square Test

Frequencies

	P_easy			
	Category	Observed N	Expected N	Residual
1	Graph only	63	38.0	25.0
2	Text numerical	13	38.0	-25.0
Total		76		

Test Statistics

	P_easy
Chi-square	32.895[a]
df	1
Asymp. Sig.	.000

a. 0 cells (.0%) have expected frequencies less than 5. The minimum expected cell frequency is 38.0.

```
NPAR TESTS
  /CHISQUARE=P_Easy (2,3)
```



```
  /EXPECTED=EQUAL
  /MISSING ANALYSIS.
```

NPar Tests

```
[DataSet3] \\psf\Home\Documents\Thesis\SPSS files\Amendments SPSS\New Study 5 Data 180609.sav
```

Chi-Square Test

Frequencies

	P_easy			
	Category	Observed N	Expected N	Residual
1	Text numerical	13	14.0	-1.0
2	Text only	15	14.0	1.0
Total		28		

Test Statistics

	P_easy
Chi-square	.143[a]
df	1
Asymp. Sig.	.705

a. 0 cells (.0%) have expected frequencies less than 5. The minimum expected cell frequency is 14.0.

```
NPAR TESTS
  /CHISQUARE=P_help (1,2)
  /EXPECTED=EQUAL
  /MISSING ANALYSIS.
```

NPar Tests

```
[DataSet3] \\psf\Home\Documents\Thesis\SPSS files\Amendments SPSS\New Study 5 Data 180609.sav
```

Chi-Square Test

Frequencies

	P_help			
	Category	Observed N	Expected N	Residual
1	Graph only	58	41.0	17.0
2	Text numerical	24	41.0	-17.0
Total		82		

Test Statistics

	P_help
Chi-square	14.098[a]
df	1
Asymp. Sig.	.000

a. 0 cells (.0%) have expected frequencies less than 5. The minimum expected cell frequency is 41.0.

```
NPAR TESTS
  /CHISQUARE=P_help (2,3)
  /EXPECTED=EQUAL
  /MISSING ANALYSIS.
```

NPar Tests

```
[DataSet3] \\psf\Home\Documents\Thesis\SPSS files\Amendments SPSS\New Study 5 Data 180609.sav
```

Chi-Square Test

Frequencies

	P_help			
	Category	Observed N	Expected N	Residual
1	Text numerical	24	16.5	7.5
2	Text only	9	16.5	-7.5
Total		33		

Test Statistics

	P_help
Chi-square	6.818[a]
df	1
Asymp. Sig.	.009

a. 0 cells (.0%) have expected frequencies less than 5. The minimum expected cell frequency is 16.5.

```
NPAR TESTS
  /CHISQUARE=P_Confid (1,2)
  /EXPECTED=EQUAL
  /MISSING ANALYSIS.
```

NPar Tests

```
[DataSet3] \\psf\Home\Documents\Thesis\SPSS files\Amendments SPSS\New Study 5 Data 180609.sav
```


Chi-Square Test

Frequencies

	P_confid			
	Category	Observed N	Expected N	Residual
1	Graph only	54	39.5	14.5
2	Text numerical	25	39.5	-14.5
Total		79		

Test Statistics

	P_confid
Chi-square	10.646[a]
df	1
Asymp. Sig.	.001

a. 0 cells (.0%) have expected frequencies less than 5. The minimum expected cell frequency is 39.5.

```
NPAR TESTS
  /CHISQUARE=P_Confid (2,3)
  /EXPECTED=EQUAL
  /MISSING ANALYSIS.
```

NPar Tests

```
[DataSet3] \\psf\Home\Documents\Thesis\SPSS files\Amendments SPSS\New Study 5 Data 180609.sav
```

Chi-Square Test

Frequencies

	P_confid			
	Category	Observed N	Expected N	Residual
1	Text numerical	25	18.5	6.5
2	Text only	12	18.5	-6.5
Total		37		

Test Statistics

	P_confid
Chi-square	4.568[a]
df	1
Asymp. Sig.	.033

a. 0 cells (.0%) have expected frequencies less than 5. The minimum expected cell frequency is 18.5.

```
NPAR TESTS
  /CHISQUARE=P_trust (1,2)
```



```
  /EXPECTED=EQUAL
  /MISSING ANALYSIS.
```

NPar Tests

```
[DataSet3] \\psf\Home\Documents\Thesis\SPSS files\Amendments SPSS\New Study 5 Data 180609.sav
```

Chi-Square Test

Frequencies

	P_trust			
	Category	Observed N	Expected N	Residual
1	Graph only	55	44.0	11.0
2	Text numerical	33	44.0	-11.0
Total		88		

Test Statistics

	P_trust
Chi-square	5.500[a]
df	1
Asymp. Sig.	.019

a. 0 cells (.0%) have expected frequencies less than 5. The minimum expected cell frequency is 44.0.

```
NPAR TESTS
  /CHISQUARE=P_trust (2,3)
  /EXPECTED=EQUAL
  /MISSING ANALYSIS.
```

NPar Tests

```
[DataSet3] \\psf\Home\Documents\Thesis\SPSS files\Amendments SPSS\New Study 5 Data 180609.sav
```

Chi-Square Test

Frequencies

	P_trust			
	Category	Observed N	Expected N	Residual
1	Text numerical	33	18.0	15.0
2	Text only	3	18.0	-15.0
Total		36		

Test Statistics

	P_trust
Chi-square	25.000[a]
df	1
Asymp. Sig.	.000

a. 0 cells (.0%) have expected frequencies less than 5. The minimum expected cell frequency is 18.0.

```
NPAR TESTS
  /CHISQUARE=P_diff (1,2)
  /EXPECTED=EQUAL
  /MISSING ANALYSIS.
```

NPar Tests

```
[DataSet3] \\psf\Home\Documents\Thesis\SPSS files\Amendments SPSS\New Study 5 Data 180609.sav
```

Chi-Square Test

Frequencies

	P_diff			
	Category	Observed N	Expected N	Residual
1	Graph only	14	18.5	-4.5
2	Text numerical	23	18.5	4.5
Total		37		

Test Statistics

	P_diff
Chi-square	2.189[a]
df	1
Asymp. Sig.	.139

a. 0 cells (.0%) have expected frequencies less than 5. The minimum expected cell frequency is 18.5.

```
NPAR TESTS
  /CHISQUARE=P_diff (2,3)
  /EXPECTED=EQUAL
  /MISSING ANALYSIS.
```

NPar Tests

```
[DataSet3] \\psf\Home\Documents\Thesis\SPSS files\Amendments SPSS\New Study 5 Data 180609.sav
```


Chi-Square Test

Frequencies

	P_diff			
	Category	Observed N	Expected N	Residual
1	Text numerical	23	38.5	-15.5
2	Text only	54	38.5	15.5
Total		77		

Test Statistics

	P_diff
Chi-square	12.481[a]
df	1
Asymp. Sig.	.000

a. 0 cells (.0%) have expected frequencies less than 5. The minimum expected cell frequency is 38.5.

```
NPAR TESTS
  /CHISQUARE=P_Overall(1,2)
  /EXPECTED=EQUAL
  /MISSING ANALYSIS.
```

NPar Tests

```
[DataSet3] \\psf\Home\Documents\Thesis\SPSS files\Amendments SPSS\New Study 5 Data 180609.sav
```

Chi-Square Test

Frequencies

	P_overall			
	Category	Observed N	Expected N	Residual
1	Graph only	62	38.0	24.0
2	Text numerical	14	38.0	-24.0
Total		76		

Test Statistics

	P_overall
Chi-square	30.316[a]
df	1
Asymp. Sig.	.000

a. 0 cells (.0%) have expected frequencies less than 5. The minimum expected cell frequency is 38.0.

```
NPAR TESTS
  /CHISQUARE=P_Overall (2,3)
```



```
  /EXPECTED=EQUAL
  /MISSING ANALYSIS.
```

NPar Tests

```
[DataSet3] \\psf\Home\Documents\Thesis\SPSS files\Amendments SPSS\New Study 5 Data 180609.sav
```

Chi-Square Test

Frequencies

	P_overall			
	Category	Observed N	Expected N	Residual
1	Text numerical	14	14.5	-.5
2	Text only	15	14.5	.5
Total		29		

Test Statistics

	P_overall
Chi-square	.034[a]
df	1
Asymp. Sig.	.853

a. 0 cells (.0%) have expected frequencies less than 5. The minimum expected cell frequency is 14.5.

Appendix J: Chapter 7 Materials

Questions in the *Text Only* Condition

Car Scenario

Participants were presented with the information listed below. Every item was followed by the question 'You are planning to buy a new car. Given the above information, which one would you choose?'

1. There are three brands of cars. Brand A has a low fuel consumption; brand B provides medium fuel consumption and brand C is shown to have the highest consumption of all three.

2. When cars are compared on defect rate per 10,000 hours of use, brand F is found to be less defective than brand D, and brand E is less defective than brand F.

3. When comparing three brands of cars in terms of resale value after two years, brand K retains the highest value, brand J retains the lowest value and brand L falls between the two other brands.

4. Safety tests were conducted with three brands of cars to find out what the chances are of passengers escaping an accident without serious injuries. Brand M has the safest built of the three. Brand N is slightly less safe than brand M but is still safer than brand O.

5. Three brands of cars were compared on comfort ratings from previous owners. Brand G receives medium ratings. Brand H reports comparably low comfort whereas brand I is rated the most comfortable of the three.

TV Scenario

Participants were presented with the information listed below. Every item was followed by the question 'You are planning to buy a new television set. Given the above information, which one would you choose?'

1. When comparing prices of three brands of television sets, brand A is more expensive than brand B, and brand B is more expensive than brand C.

2. Consumers who bought either of the three brands D, E or F of television sets in the past were asked for their satisfaction. Those who bought brand E valued their satisfaction the lowest, brand D received a medium rating and brand F the highest of the three.

3. Out of three brands of television sets, brand G has the longest lifespan, followed by brand H, and brand I has the shortest lifespan.

4. Three brands of television sets are compared in terms of average hours of use before the first defect. Brand K runs for the longest time, Brand L takes a shorter time, and brand J presents with the shortest time of the three.

5. In a survey on three brands of television sets, participants where asked which product they would recommend to friends. They gave the fewest recommendations to brand N, brand M was recommended by more participants than brand N and brand O was recommended more often than brand M.

Law Scenario

Participants were presented with the information listed below. Every item was followed by the question 'Within a referendum, you are asked to vote for one of three pro-environmental laws. Given the above information, which one would you vote for?'

1. Law D will take the shortest time to be fully implemented, law E will take a year longer to be implemented and law F will take longer than the other two laws.
2. Of the three laws, law N will result in the lowest prevention of industrial waste per year. Law M will prevent a higher amount of waste than N whereas law O will prevent in higher savings than the other two laws.
3. Law I will increase the overall recycling rate of household waste by a medium increase. Law G will result in a smaller increase whereas law H will result in the highest increase of the three.
4. In a recent survey with NGO (non governmental organisation) members, law L received the lowest agreement from the members, law K received a higher agreement and law J received the highest agreement of all three laws.
5. When assessed for their potential cost savings, Law B is predicted to result in low savings. Law A will result in more cost savings than B, and C in more savings than B and A.

Questions in the *Text Numerical* Condition

Car scenario

Participants were presented with the information listed below. Every item was followed by the question 'You are planning to buy a new car. Given the above information, which one would you choose?'

1. There are three brands of cars. Brand A has a low fuel consumption of 42mpg; brand B provides medium fuel consumption of 35.7 mpg and brand C is shown to have the highest consumption of all three of 28.9 mpg.

2. When cars are compared on defect rate per 10,000 hours of use, brand F with 15 defects is found to be less defective than brand D with 22 defects, and brand E with 9 defects is less defective than brand F.

3. When comparing three brands of cars in terms of resale value after two years, brand K retains the highest value with 86%, brand J retains the lowest value with 60% and brand L falls between the two other brands with 75%.

4. Safety tests were conducted with three brands of cars to find out what the chances are of passengers escaping an accident without serious injuries. Brand M has the safest built of the three with 70%. Brand N with 50% is slightly less safe than brand M but is still safer than brand O with 30%.

5. Three brands of cars were compared on comfort ratings from previous owners. Brand G receives medium ratings of 7 out of 10. Brand H reports comparably low comfort of 4 out of 10 whereas brand I is rated the most comfortable of the three with ratings of 9 out of 10.

TV scenario

Participants were presented with the information listed below. Every item was followed by the question 'You are planning to buy a new television set. Given the above information, which one would you choose?'

1. When comparing prices of three brands of television sets, at £1,200 brand A is more expensive than brand B at £1,000, and brand B is more expensive than brand C at £900.

2. Consumers who bought either of the three brands D, E or F of television sets in the past were asked for their satisfaction. Those who bought brand E valued their satisfaction the lowest with ratings of 10 out 20, brand D received a medium rating of 13 out of 20 and brand F the highest of the three with ratings of 17 out of 20.

3. Out of three brands of television sets, brand G has the longest lifespan of 12 years, followed by brand H with 8 years, and brand I has the shortest lifespan with 5 years.

4. Three brands of television sets are compared in terms of average hours of use before the first defect. Brand K runs for the longest time with 5,400 hours, Brand L takes a shorter time with 4,100 hours, and brand J presents with the shortest time of the three with 2,900 hours.

5. In a survey on three brands of television sets, participants where asked which product they would recommend to friends. They gave the fewest recommendations to brand N with 55%, with 77% brand M was recommended by more participants than brand N and with 84% brand O was recommended more often than brand M.

Law scenario

Participants were presented with the information listed below. Every item was followed by the question ‘Within a referendum, you are asked to vote for one of three pro-environmental laws. Given the above information, which one would you vote for?’

1. With 2 years, Law D will take the shortest time to be fully implemented, law E will take a year longer to be implemented with 3 years and law F will take longer than the other two laws with 5 years.

2. Of the three laws, law N will result in the lowest prevention of industrial waste per year at 200 tons. At 320 tons, law M will prevent a higher amount of waste than N whereas law O will prevent in higher savings than the other two laws at 400 tons.

3. Law I will increase the overall recycling rate of household waste by a medium increase of 10%. Law G will result in a smaller increase of 7% whereas law H will result in the highest increase of the three with 12%.

4. In a recent survey with NGO (non governmental organisation) members, law L received the lowest agreement from the members with 50%, law K received a higher agreement at 60% and law J received the highest agreement of all three laws at 80%.

5. When assessed for their potential cost savings, Law B is predicted to result in low savings of £120 Mio. With £170 Mio. law A will result in more cost savings than B, and C in more savings than B and A with £200 Mio.

Questions in the *Text Graphical* Condition

Car scenario

Participants were presented with the information listed below. Every item was followed by the question ‘You are planning to buy a new car. Given the above information, which one would you choose?’

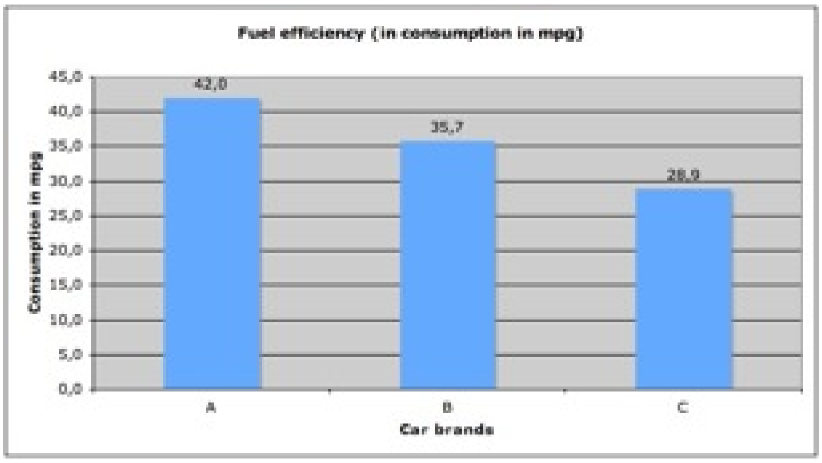


Figure 1: Car scenario, item 1.

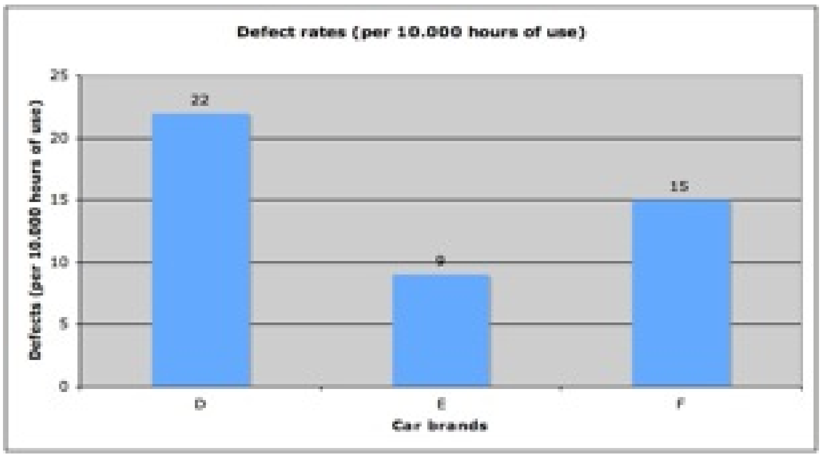


Figure 2: Car scenario, item 2.

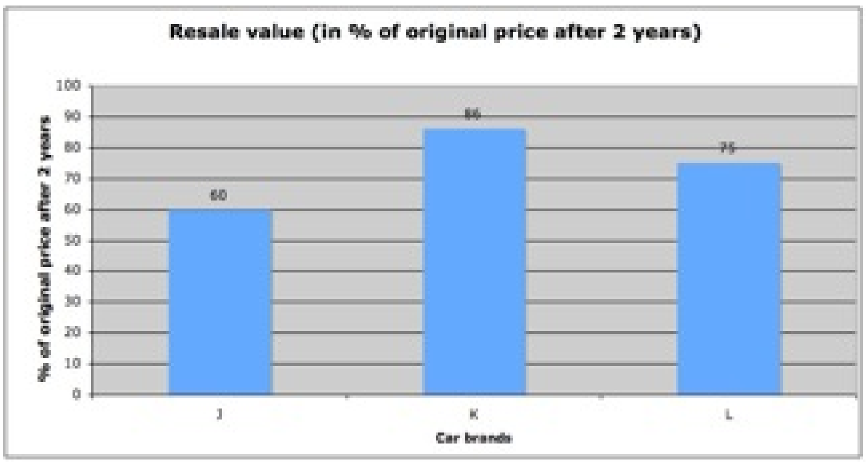


Figure 3: Car scenario, item 3.

Figure 4: Car scenario, item 4.

Figure 5: Car scenario, item 5.

TV scenario

Participants were presented with the information listed below. Every item was followed by the question 'You are planning to buy a new television set. Given the above information, which one would you choose?'

Figure 6: TV scenario, item 1.

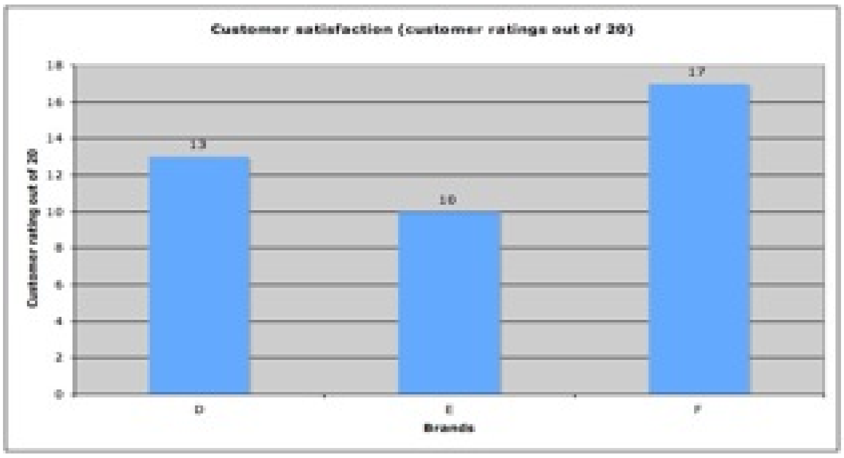


Figure 7: TV scenario, item 2.

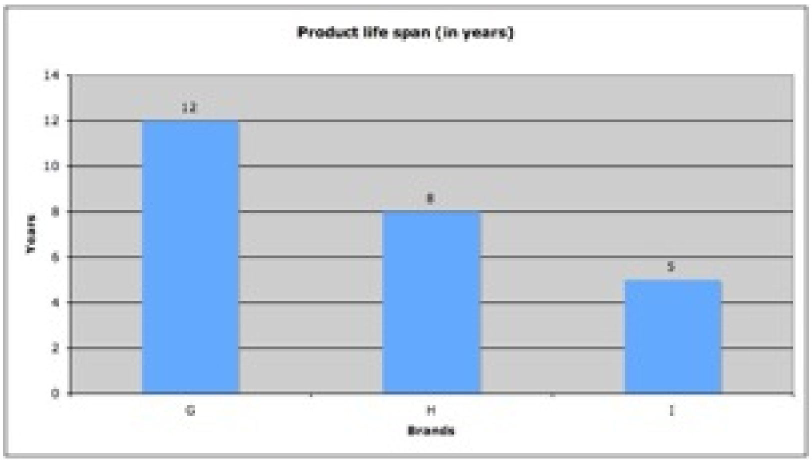


Figure 8: TV scenario, item 3.

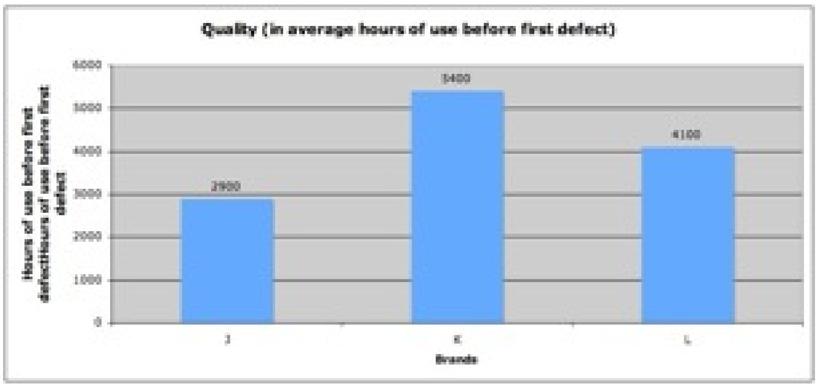


Figure 9: TV scenario, item 4.

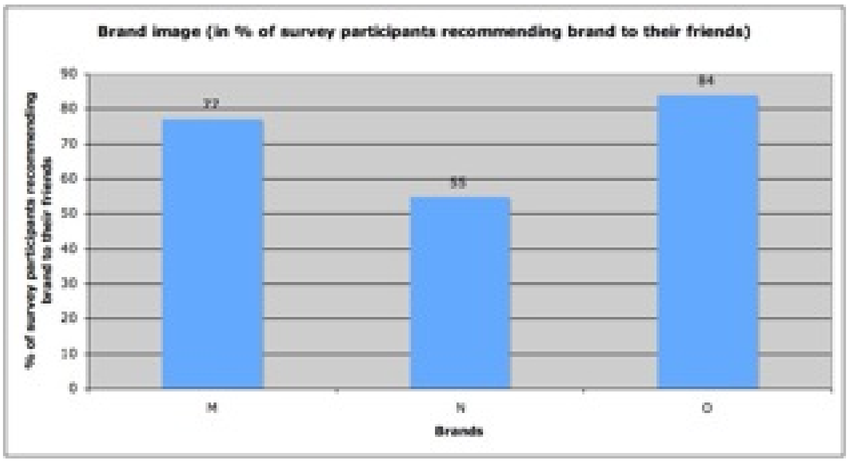


Figure 10: TV scenario, item 5.

Law scenario

Participants were presented with the information listed below. Every item was ollowed by the question 'Within a referendum, you are asked to vote for one of three pro-environmental laws. Given the above information, which one would you vote for?'

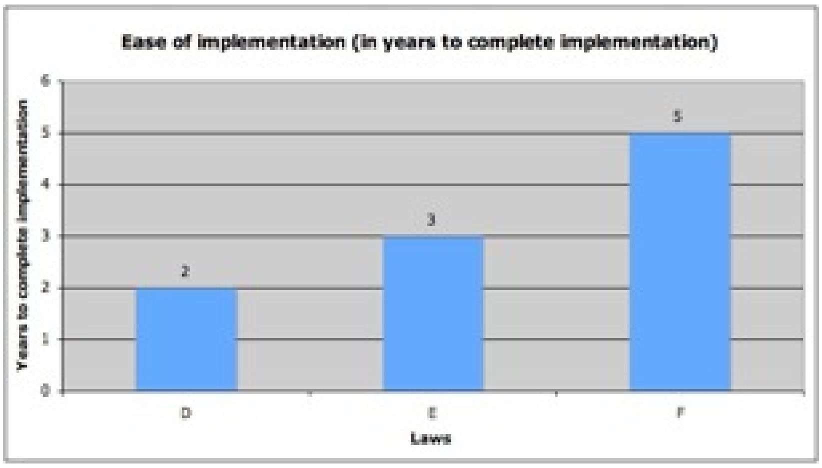


Figure 11: Law scenario, item 1.

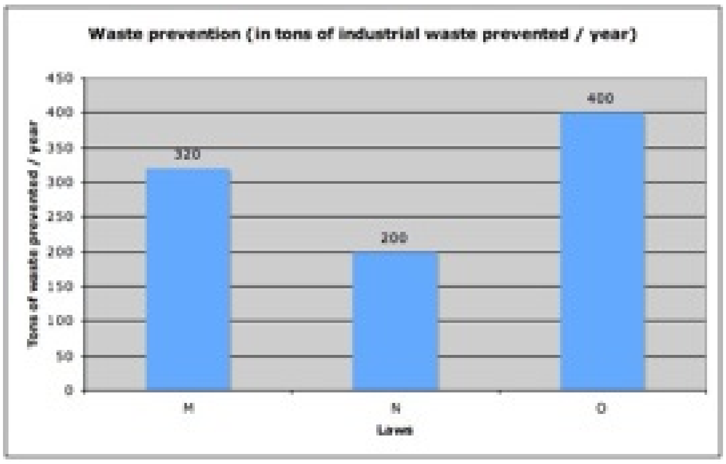


Figure 12: Law scenario, item 2.

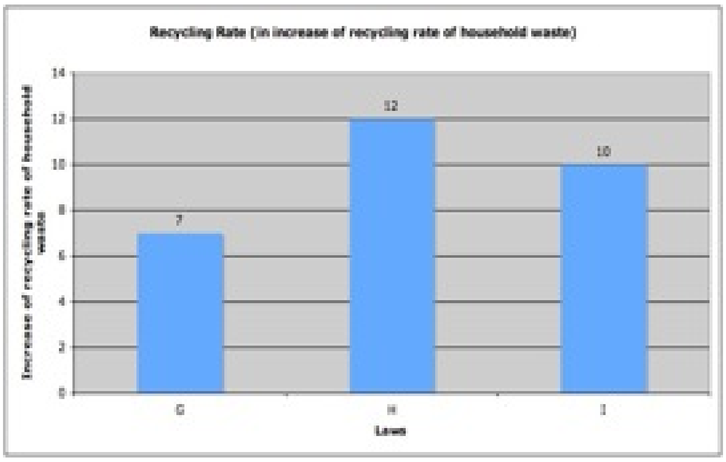


Figure 13: Law scenario, item 3.

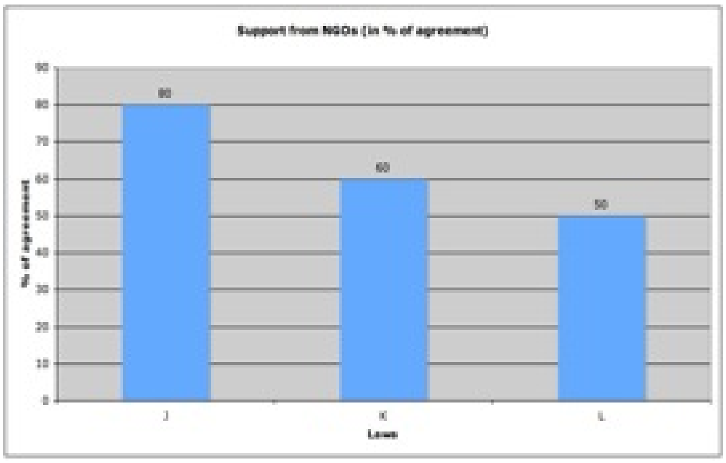


Figure 14: Law scenario, item 4.

Desirability Questions

Car Scenario

You are buying a new car. By doing some research you have narrowed down your search to a handful of options. For each of the following five criteria please rate how desirable these are for the car you want to buy. Please consider only how desirable each criterion is for you personally:

- That the car has the lowest fuel consumption of all available choices
- That the car has the lowest defect rate of all available choices

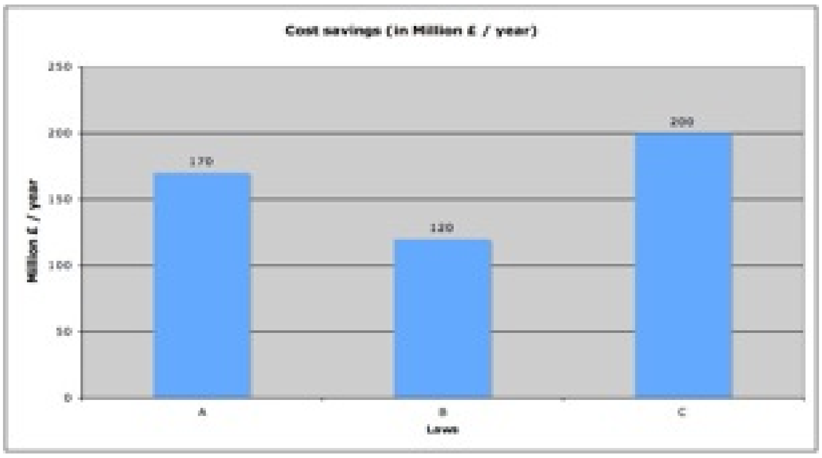


Figure 15: Law scenario, item 5.

- That the car has the highest resale value (in % of original value, after two years) of all available choices
- That the car has the best safety features (in terms of probability of surviving a serious accident) of all available choices
- That the car has the highest comfort (as expressed by comfort ratings of existing customers) of all available choices

TV Scenario

You are buying a new TV. By doing some research you have narrowed down your search to a handful of options. For each of the following five criteria please rate how desirable these are for the TV you want to buy. Please consider only how desirable each criterion is for you personally:

- That the TV has the lowest price of all available choices
- That the TV receives the highest customer satisfaction ratings of all available choices
- That the TV has the longest product life span (in years) of all available choices

- That the TV has the highest quality (in terms of hours of use before first defect) of all available choices
- That the TV has the best brand image (in terms of number of survey participants recommending it to their friends) of all available choices

Law Scenario

You are asked to choose one of several pro-environmental laws presented in a referendum. By doing some research you have narrowed down your search to a handful of options. For each of the following five criteria please rate how desirable these are for a law you would vote for. Please consider only how desirable each criterion is for you personally:

- That the law is the easiest to implement of all available choices
- That the law prevents the highest amount of waste (in terms of industrial waste prevented per year) of all available choices
- That the law will lead to the highest recycling rate (in terms of an increased recycling rate of household waste) of all available choices
- That the law has the most support of non-governmental organisations (NGOs; in terms of percentage of agreement) of all available choices
- That the law will lead to the highest cost savings (in terms of million pounds/year) of all available choices

Appendix K: Chapter 7 SPSS

```
***==================================*****.
*** DESCRIPTIVES
***==================================*****.
*Age*.
DESCRIPTIVES VARIABLES=Age
  /STATISTICS=MEAN STDDEV MIN MAX KURTOSIS SKEWNESS.
```

Descriptives

```
[DataSet4] \\psf\Home\Documents\Thesis\SPSS files\Amendments SPSS\New Study 6 Data 141010.sav
```

Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation	Skewness		Kurtosis	
	Statistic	Statistic	Statistic	Statistic	Statistic	Statistic	Std. Error	Statistic	Std. Error
Age	91	18	29	19.26	1.837	2.933	.253	11.089	.500
Valid N (listwise)	91								

```
*Gender*.
FREQUENCIES VARIABLES=Gender
  /ORDER=ANALYSIS.
```

Frequencies

```
[DataSet4] \\psf\Home\Documents\Thesis\SPSS files\Amendments SPSS\New Study 6 Data 141010.sav
```


Statistics

Gender

N	Valid	91
	Missing	0

Gender

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Female	70	76.9	76.9	76.9
	Male	21	23.1	23.1	100.0
	Total	91	100.0	100.0	

```
***==================================*****.
*** HYPOTHESES
***==================================*****.
*Testing whether there is a correlation between difficulty and accuracy*.
CORRELATIONS
  /VARIABLES=Avdifftotal Avacctotal
  /PRINT=ONETAIL NOSIG
  /MISSING=PAIRWISE.
```

Correlations

```
[DataSet4] \\psf\Home\Documents\Thesis\SPSS files\Amendments SPSS\New Study 6 Data 141010.sav
```

Correlations

		Avdifftotal	Avacctotal
Avdifftotal	Pearson Correlation	1	-.429**
	Sig. (1-tailed)		.000
	N	91	91
Avacctotal	Pearson Correlation	-.429**	1
	Sig. (1-tailed)	.000	
	N	91	91

**. Correlation is significant at the 0.01 level (1-tailed).

```
*Testing whether there is a correlation between difficulty and confidence*.
CORRELATIONS
  /VARIABLES=Avdifftotal Avcontotal
  /PRINT=ONETAIL NOSIG
  /MISSING=PAIRWISE.
```

Correlations

[DataSet4] \\psf\Home\Documents\Thesis\SPSS files\Amendments SPSS\New Study 6 Data 141010.sav

Correlations

		Avdifftotal	Avcontotal
Avdifftotal	Pearson Correlation	1	-.844**
	Sig. (1-tailed)		.000
	N	91	91
Avcontotal	Pearson Correlation	-.844**	1
	Sig. (1-tailed)	.000	
	N	91	91

**. Correlation is significant at the 0.01 level (1-tailed).

```
*Determining number of undesired cases that are excluded*.
FREQUENCIES VARIABLES=rc_car_fuel rc_car_defect rc_car_resale rc_car_safe rc_car_comfort rc_tv_life
    rc_tv_customer rc_tv_quality rc_tv_brand rc_tv_price rc_law_ease rc_law_ngo rc_law_waste
    rc_law_recycle rc_law_cost
  /ORDER=ANALYSIS.
```

Frequencies

[DataSet4] \\psf\Home\Documents\Thesis\SPSS files\Amendments SPSS\New Study 6 Data 141010.sav

Statistics

		rc_car_fuel	rc_car_defect	rc_car_resale	rc_car_safe	rc_car_ comfort	rc_tv_life	rc_tv_ customer	rc_tv_quality	rc_tv_brand
N	Valid	91	91	91	91	91	91	91	91	91
	Missing	0	0	0	0	0	0	0	0	0

Statistics

		rc_tv_price	rc_law_ease	rc_law_ngo	rc_law_waste	rc_law_recycle	rc_law_cost
N	Valid	91	91	91	91	91	91
	Missing	0	0	0	0	0	0

Frequency Table

rc_car_fuel

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Desirable	84	92.3	92.3	92.3
	Undesirable	7	7.7	7.7	100.0
	Total	91	100.0	100.0	

rc_car_defect

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Desirable	76	83.5	83.5	83.5
	Undesirable	15	16.5	16.5	100.0
	Total	91	100.0	100.0	

rc_car_resale

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Desirable	83	91.2	91.2	91.2
	Undesirable	8	8.8	8.8	100.0
	Total	91	100.0	100.0	

rc_car_safe

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Desirable	85	93.4	93.4	93.4
	Undesirable	6	6.6	6.6	100.0
	Total	91	100.0	100.0	

rc_car_comfort

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Desirable	88	96.7	96.7	96.7
	Undesirable	3	3.3	3.3	100.0
	Total	91	100.0	100.0	

rc_tv_life

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Desirable	86	94.5	94.5	94.5
	Undesirable	5	5.5	5.5	100.0
	Total	91	100.0	100.0	

rc_tv_customer

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Desirable	87	95.6	95.6	95.6
	Undesirable	4	4.4	4.4	100.0
	Total	91	100.0	100.0	

rc_tv_quality

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Desirable	89	97.8	97.8	97.8
	Undesirable	2	2.2	2.2	100.0
	Total	91	100.0	100.0	

rc_tv_brand

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Desirable	78	85.7	85.7	85.7
	Undesirable	13	14.3	14.3	100.0
	Total	91	100.0	100.0	

rc_tv_price

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Desirable	82	90.1	90.1	90.1
	Undesirable	9	9.9	9.9	100.0
	Total	91	100.0	100.0	

rc_law_ease

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Desirable	75	82.4	82.4	82.4
	Undesirable	16	17.6	17.6	100.0
	Total	91	100.0	100.0	

rc_law_ngo

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Desirable	77	84.6	84.6	84.6
	Undesirable	14	15.4	15.4	100.0
	Total	91	100.0	100.0	

rc_law_waste

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Desirable	86	94.5	94.5	94.5
	Undesirable	5	5.5	5.5	100.0
	Total	91	100.0	100.0	

rc_law_recycle

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Desirable	87	95.6	95.6	95.6
	Undesirable	4	4.4	4.4	100.0
	Total	91	100.0	100.0	

rc_law_cost

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Desirable	87	95.6	95.6	95.6
	Undesirable	4	4.4	4.4	100.0
	Total	91	100.0	100.0	

```
***================================================*****.
*** TESTING  HYPOTHESES (ON DESIRABLE ITEMS ONLY)         *****.
***================================================*****.

*Describes new overall confidence scores*.
EXAMINE VARIABLES = New_Avcontext New_Avconnum New_Avcongra
  /STATISTICS DESCRIPTIVES
  /CINTERVAL 95
/Plot=BOXPLOT
  /MISSING LISTWISE
  /NOTOTAL.
```

Explore

[DataSet4] \\psf\Home\Documents\Thesis\SPSS files\Amendments SPSS\New Study 6 Data 141010.sav

Case Processing Summary

	Cases					
	Valid		Missing		Total	
	N	Percent	N	Percent	N	Percent
New_Avcontext	91	100.0%	0	.0%	91	100.0%
New_Avconnum	91	100.0%	0	.0%	91	100.0%
New_Avcongra	91	100.0%	0	.0%	91	100.0%

Descriptives

			Statistic	Std. Error
New_Avcontext	Mean		8.0187	.18237
	95% Confidence Interval for Mean	Lower Bound	7.6564	
		Upper Bound	8.3811	
	5% Trimmed Mean		8.1864	
	Median		8.3077	
	Variance		3.027	
	Std. Deviation		1.73972	
	Minimum		.00	
	Maximum		10.00	
	Range		10.00	
	Interquartile Range		2.26	
	Skewness		-1.604	.253
	Kurtosis		4.344	.500

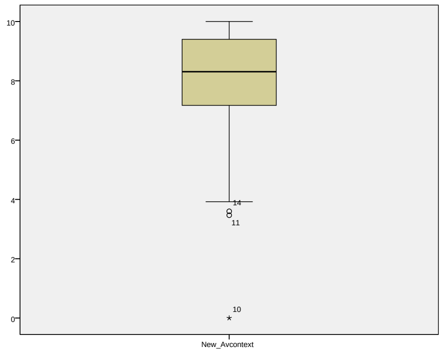
Descriptives

			Statistic	Std. Error
New_Avconnum	Mean		8.0133	.17891
	95% Confidence Interval for Mean	Lower Bound	7.6579	
		Upper Bound	8.3687	
	5% Trimmed Mean		8.1505	
	Median		8.3333	
	Variance		2.913	
	Std. Deviation		1.70668	
	Minimum		.67	
	Maximum		10.00	
	Range		9.33	
	Interquartile Range		2.29	
	Skewness		-1.380	.253
	Kurtosis		2.899	.500
New_Avcongra	Mean		7.9914	.17763
	95% Confidence Interval for Mean	Lower Bound	7.6385	
		Upper Bound	8.3443	

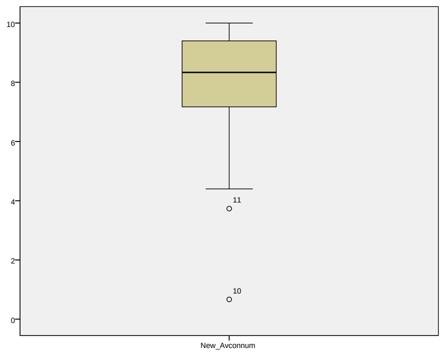
Descriptives

		Statistic	Std. Error
New_Avcongra	5% Trimmed Mean	8.1371	
	Median	8.3333	
	Variance	2.871	
	Std. Deviation	1.69449	
	Minimum	.67	
	Maximum	10.00	
	Range	9.33	
	Interquartile Range	2.07	
	Skewness	-1.405	.253
	Kurtosis	3.103	.500

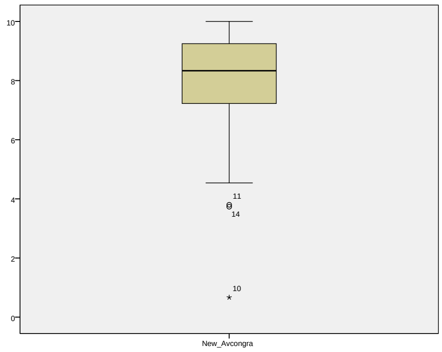
New_Avcontext



New_Avconnum



New_Avcongra




```
*Tests for an effect of format on (new) confidence scores*.
GLM New_Avcontext New_Avconnum New_Avcongra
  /WSFACTOR=Format 3 Polynomial
  /METHOD=SSTYPE(3)
  /CRITERIA=ALPHA(.05)
/Print=ETASQ OPOWER
  /WSDESIGN=Format.
```

General Linear Model

```
[DataSet4] \\psf\Home\Documents\Thesis\SPSS files\Amendments SPSS\New Study 6 Data 141010.sav
```

Within-Subjects Factors

Measure:MEASURE_1

Format	Dependent Variable
1	New_ Avcontext
2	New_Avconnum
3	New_Avcongra

Multivariate Tests[c]

Effect		Value	F	Hypothesis df	Error df	Sig.	Partial Eta Squared	Noncent. Parameter	Observed Power[b]
Format	Pillai's Trace	.003	.147[a]	2.000	89.000	.863	.003	.294	.072
	Wilks' Lambda	.997	.147[a]	2.000	89.000	.863	.003	.294	.072
	Hotelling's Trace	.003	.147[a]	2.000	89.000	.863	.003	.294	.072
	Roy's Largest Root	.003	.147[a]	2.000	89.000	.863	.003	.294	.072

a. Exact statistic

b. Computed using alpha = .05

c. Design: Intercept
Within Subjects Design: Format

Mauchly's Test of Sphericity[b]

Measure:MEASURE_1

Within Subjects Effect	Mauchly's W	Approx. Chi-Square	df	Sig.	Epsilon[a] Greenhouse-Geisser	Epsilon[a] Huynh-Feldt	Epsilon[a] Lower-bound
Format	.900	9.408	2	.009	.909	.927	.500

Tests the null hypothesis that the error covariance matrix of the orthonormalized transformed dependent variables is proportional to an identity matrix.

a. May be used to adjust the degrees of freedom for the averaged tests of significance. Corrected tests are displayed in the Tests of Within-Subjects Effects table.

b. Design: Intercept
Within Subjects Design: Format

Tests of Within-Subjects Effects

Measure:MEASURE_1

Source		Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared	Noncent. Parameter	Observed Power[a]
Format	Sphericity Assumed	.038	2	.019	.144	.866	.002	.288	.072
	Greenhouse-Geisser	.038	1.818	.021	.144	.846	.002	.262	.071
	Huynh-Feldt	.038	1.853	.021	.144	.850	.002	.267	.071
	Lower-bound	.038	1.000	.038	.144	.705	.002	.144	.066
Error(Format)	Sphericity Assumed	23.869	180	.133					
	Greenhouse-Geisser	23.869	163.590	.146					
	Huynh-Feldt	23.869	166.776	.143					
	Lower-bound	23.869	90.000	.265					

a. Computed using alpha = .05

Tests of Within-Subjects Contrasts

Measure:MEASURE_1

Source	Format	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared	Noncent. Parameter	Observed Power[a]
Format	Linear	.034	1	.034	.298	.587	.003	.298	.084
	Quadratic	.004	1	.004	.027	.869	.000	.027	.053
Error(Format)	Linear	10.320	90	.115					
	Quadratic	13.549	90	.151					

a. Computed using alpha = .05

Tests of Between-Subjects Effects

Measure:MEASURE_1
Transformed Variable:Average

Source	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared	Noncent. Parameter	Observed Power[a]
Intercept	17506.082	1	17506.082	2048.585	.000	.958	2048.585	1.000
Error	769.091	90	8.545					

a. Computed using alpha = .05

```
*Describes new overall accuracy scores*.
EXAMINE VARIABLES = New_Avacctext New_Avaccnum New_Avaccgra
  /STATISTICS DESCRIPTIVES
  /CINTERVAL 95
/Plot=BOXPLOT
  /MISSING LISTWISE
  /NOTOTAL.
```


Explore

[DataSet4] \\psf\Home\Documents\Thesis\SPSS files\Amendments SPSS\New Study 6 Data 141010.sav

Case Processing Summary

	Cases					
	Valid		Missing		Total	
	N	Percent	N	Percent	N	Percent
New_Avacctext	91	100.0%	0	.0%	91	100.0%
New_Avaccnum	91	100.0%	0	.0%	91	100.0%
New_Avaccgra	91	100.0%	0	.0%	91	100.0%

Descriptives

			Statistic	Std. Error
New_Avacctext	Mean		.8339	.01988
	95% Confidence Interval for Mean	Lower Bound	.7944	
		Upper Bound	.8734	

Descriptives

			Statistic	Std. Error
New_Avacctext	5% Trimmed Mean		.8534	
	Median		.9286	
	Variance		.036	
	Std. Deviation		.18962	
	Minimum		.25	
	Maximum		1.00	
	Range		.75	
	Interquartile Range		.23	
	Skewness		-1.416	.253
	Kurtosis		1.281	.500
New_Avaccnum	Mean		.8359	.01840
	95% Confidence Interval for Mean	Lower Bound	.7994	
		Upper Bound	.8725	

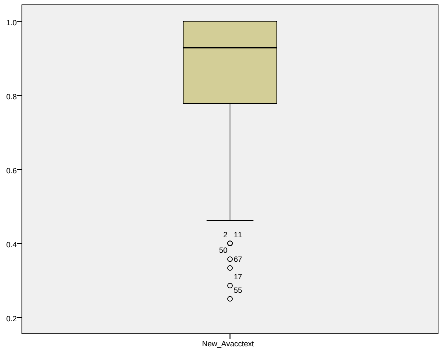
Descriptives

			Statistic	Std. Error
New_Avaccnum	5% Trimmed Mean		.8544	
	Median		.8667	
	Variance		.031	
	Std. Deviation		.17550	
	Minimum		.27	
	Maximum		1.00	
	Range		.73	
	Interquartile Range		.18	
	Skewness		-1.459	.253
	Kurtosis		1.860	.500
New_Avaccgra	Mean		.8166	.01748
	95% Confidence Interval for Mean	Lower Bound	.7819	
		Upper Bound	.8513	

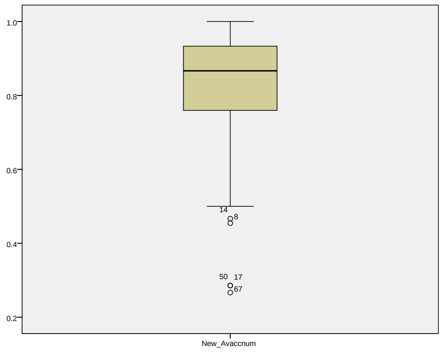
Descriptives

		Statistic	Std. Error
New_Avaccgra	5% Trimmed Mean	.8340	
	Median	.8667	
	Variance	.028	
	Std. Deviation	.16672	
	Minimum	.21	
	Maximum	1.00	
	Range	.79	
	Interquartile Range	.16	
	Skewness	-1.625	.253
	Kurtosis	2.845	.500

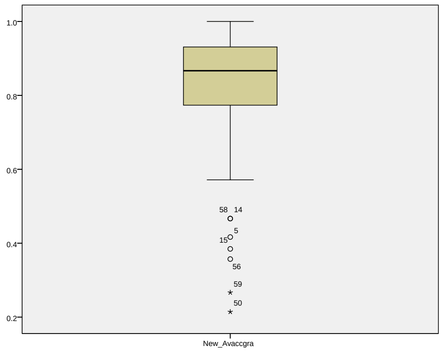
New_Avacctext



New_Avaccnum



New_Avaccgra




```
*Tests for an effect of format on (new) accuracy sub scores*.
GLM New_Avacctext New_Avaccnum New_Avaccgra
  /WSFACTOR=Format 3 Polynomial
  /METHOD=SSTYPE(3)
/Print=ETASQ OPOWER
  /CRITERIA=ALPHA(.05)
  /WSDESIGN=Format.
```

General Linear Model

[DataSet4] \\psf\Home\Documents\Thesis\SPSS files\Amendments SPSS\New Study 6 Data 141010.sav

Within-Subjects Factors

Measure:MEASURE_1

Format	Dependent Variable
1	New_ Avacctext
2	New_Avaccnum
3	New_Avaccgra

Multivariate Tests[c]

Effect		Value	F	Hypothesis df	Error df	Sig.	Partial Eta Squared	Noncent. Parameter	Observed Power[b]
Format	Pillai's Trace	.015	.676[a]	2.000	89.000	.511	.015	1.351	.160
	Wilks' Lambda	.985	.676[a]	2.000	89.000	.511	.015	1.351	.160
	Hotelling's Trace	.015	.676[a]	2.000	89.000	.511	.015	1.351	.160
	Roy's Largest Root	.015	.676[a]	2.000	89.000	.511	.015	1.351	.160

a. Exact statistic

b. Computed using alpha = .05

c. Design: Intercept
Within Subjects Design: Format

Mauchly's Test of Sphericity[b]

Measure:MEASURE_1

Within Subjects Effect	Mauchly's W	Approx. Chi-Square	df	Sig.	Epsilon[a]		
					Greenhouse-Geisser	Huynh-Feldt	Lower-bound
Format	.660	36.930	2	.000	.746	.756	.500

Tests the null hypothesis that the error covariance matrix of the orthonormalized transformed dependent variables is proportional to an identity matrix.

a. May be used to adjust the degrees of freedom for the averaged tests of significance. Corrected tests are displayed in the Tests of Within-Subjects Effects table.

b. Design: Intercept
Within Subjects Design: Format

Tests of Within-Subjects Effects

Measure:MEASURE_1

Source		Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared	Noncent. Parameter	Observed Power[a]
Format	Sphericity Assumed	.021	2	.010	1.014	.365	.011	2.029	.225
	Greenhouse-Geisser	.021	1.493	.014	1.014	.346	.011	1.514	.198
	Huynh-Feldt	.021	1.512	.014	1.014	.347	.011	1.534	.199
	Lower-bound	.021	1.000	.021	1.014	.317	.011	1.014	.169
Error(Format)	Sphericity Assumed	1.829	180	.010					
	Greenhouse-Geisser	1.829	134.366	.014					
	Huynh-Feldt	1.829	136.117	.013					
	Lower-bound	1.829	90.000	.020					

a. Computed using alpha = .05

Tests of Within-Subjects Contrasts

Measure:MEASURE_1

Source	Format	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared	Noncent. Parameter	Observed Power[a]
Format	Linear	.014	1	.014	.998	.320	.011	.998	.167
	Quadratic	.007	1	.007	1.047	.309	.012	1.047	.173
Error(Format)	Linear	1.234	90	.014					
	Quadratic	.595	90	.007					

a. Computed using alpha = .05

Tests of Between-Subjects Effects

Measure:MEASURE_1
Transformed Variable:Average

Source	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared	Noncent. Parameter	Observed Power[a]
Intercept	187.537	1	187.537	2526.298	.000	.966	2526.298	1.000
Error	6.681	90	.074					

a. Computed using alpha = .05

```
*Describes overall difficulty scores*.
EXAMINE VARIABLES = New_Avdifftext New_Avdiffnum New_Avdiffgra
  /STATISTICS DESCRIPTIVES
/Plot=BOXPLOT
  /CINTERVAL 95
  /MISSING LISTWISE
  /NOTOTAL.
```


Explore

```
[DataSet4] \\psf\Home\Documents\Thesis\SPSS files\Amendments SPSS\New Study 6 Data 141010.sav
```

Case Processing Summary

	Cases					
	Valid		Missing		Total	
	N	Percent	N	Percent	N	Percent
New_Avdifftext	91	100.0%	0	.0%	91	100.0%
New_Avdiffnum	91	100.0%	0	.0%	91	100.0%
New_Avdiffgra	91	100.0%	0	.0%	91	100.0%

Descriptives

			Statistic	Std. Error
New_Avdifftext	Mean		2.0494	.08734
	95% Confidence Interval for Mean	Lower Bound	1.8758	
		Upper Bound	2.2229	

Descriptives

			Statistic	Std. Error
New_Avdifftext	5% Trimmed Mean		1.9810	
	Median		1.9286	
	Variance		.694	
	Std. Deviation		.83318	
	Minimum		1.00	
	Maximum		6.00	
	Range		5.00	
	Interquartile Range		1.17	
	Skewness		1.614	.253
	Kurtosis		4.733	.500
New_Avdiffnum	Mean		2.0621	.08797
	95% Confidence Interval for Mean	Lower Bound	1.8873	
		Upper Bound	2.2368	

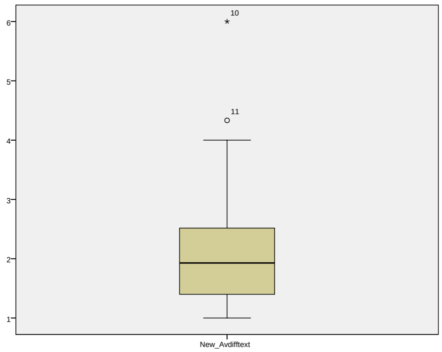
Descriptives

			Statistic	Std. Error
New_Avdiffnum	5% Trimmed Mean		1.9887	
	Median		1.9286	
	Variance		.704	
	Std. Deviation		.83916	
	Minimum		1.00	
	Maximum		5.67	
	Range		4.67	
	Interquartile Range		1.04	
	Skewness		1.460	.253
	Kurtosis		3.118	.500
New_Avdiffgra	Mean		2.0141	.08517
	95% Confidence Interval for Mean	Lower Bound	1.8449	
		Upper Bound	2.1833	

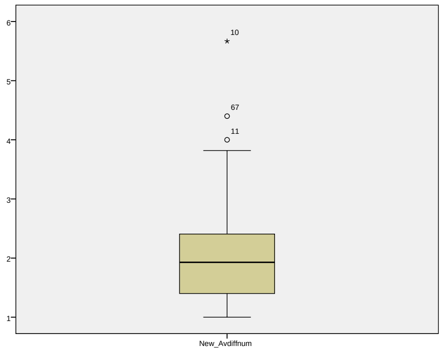
Descriptives

		Statistic	Std. Error
New_Avdiffgra	5% Trimmed Mean	1.9551	
	Median	1.8667	
	Variance	.660	
	Std. Deviation	.81250	
	Minimum	1.00	
	Maximum	5.67	
	Range	4.67	
	Interquartile Range	1.20	
	Skewness	1.306	.253
	Kurtosis	3.281	.500

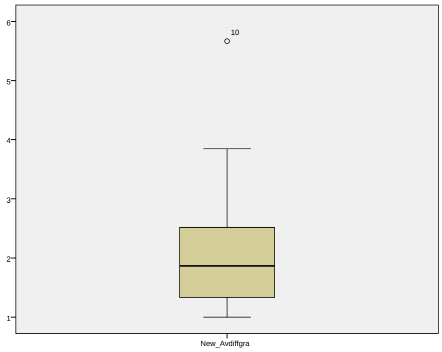
New_Avdifftext



New_Avdiffnum



New_Avdiffgra




```
*Tests for an effect of format on (new) difficulty sub scores*.
GLM New_Avdifftext New_Avdiffnum New_Avdiffgra
  /WSFACTOR=Format 3 Polynomial
/Print=ETASQ OPOWER
  /METHOD=SSTYPE(3)
  /CRITERIA=ALPHA(.05)
  /WSDESIGN=Format.
```

General Linear Model

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```

Within-Subjects Factors

Measure:MEASURE_1

Format	Dependent Variable
1	New_Avdifftext
2	New_Avdiffnum
3	New_Avdiffgra

Multivariate Tests[c]

Effect		Value	F	Hypothesis df	Error df	Sig.	Partial Eta Squared	Noncent. Parameter	Observed Power[b]
Format	Pillai's Trace	.019	.869[a]	2.000	89.000	.423	.019	1.738	.195
	Wilks' Lambda	.981	.869[a]	2.000	89.000	.423	.019	1.738	.195
	Hotelling's Trace	.020	.869[a]	2.000	89.000	.423	.019	1.738	.195
	Roy's Largest Root	.020	.869[a]	2.000	89.000	.423	.019	1.738	.195

a. Exact statistic

b. Computed using alpha = .05

c. Design: Intercept
Within Subjects Design: Format

Mauchly's Test of Sphericity[b]

Measure:MEASURE_1

Within Subjects Effect	Mauchly's W	Approx. Chi-Square	df	Sig.	Epsilon[a] Greenhouse-Geisser	Huynh-Feldt	Lower-bound
Format	.961	3.514	2	.173	.963	.983	.500

Tests the null hypothesis that the error covariance matrix of the orthonormalized transformed dependent variables is proportional to an identity matrix.

a. May be used to adjust the degrees of freedom for the averaged tests of significance. Corrected tests are displayed in the Tests of Within-Subjects Effects table.

b. Design: Intercept
Within Subjects Design: Format

Tests of Within-Subjects Effects

Measure:MEASURE_1

Source		Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared	Noncent. Parameter	Observed Power[a]
Format	Sphericity Assumed	.112	2	.056	1.004	.368	.011	2.009	.223
	Greenhouse-Geisser	.112	1.925	.058	1.004	.366	.011	1.934	.219
	Huynh-Feldt	.112	1.967	.057	1.004	.367	.011	1.975	.221
	Lower-bound	.112	1.000	.112	1.004	.319	.011	1.004	.168
Error(Format)	Sphericity Assumed	10.068	180	.056					
	Greenhouse-Geisser	10.068	173.292	.058					
	Huynh-Feldt	10.068	177.004	.057					
	Lower-bound	10.068	90.000	.112					

a. Computed using alpha = .05

Tests of Within-Subjects Contrasts

Measure:MEASURE_1

Source	Format	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared	Noncent. Parameter	Observed Power[a]
Format	Linear	.057	1	.057	.905	.344	.010	.905	.156
	Quadratic	.056	1	.056	1.130	.291	.012	1.130	.183
Error(Format)	Linear	5.623	90	.062					
	Quadratic	4.445	90	.049					

a. Computed using alpha = .05

Tests of Between-Subjects Effects

Measure:MEASURE_1
Transformed Variable:Average

Source	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared	Noncent. Parameter	Observed Power[a]
Intercept	1138.166	1	1138.166	584.679	.000	.867	584.679	1.000
Error	175.199	90	1.947					

a. Computed using alpha = .05

```
*Discussion*.
DESCRIPTIVES VARIABLES=New_Avdifftotal
  /STATISTICS=MEAN STDDEV MIN MAX KURTOSIS SKEWNESS.
```

Descriptives

```
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```


Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation	Skewness		Kurtosis	
	Statistic	Statistic	Statistic	Statistic	Statistic	Statistic	Std. Error	Statistic	Std. Error
New_Avdifftotal	91	1.00	5.78	2.0418	.80553	1.509	.253	4.053	.500
Valid N (listwise)	91								

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