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Bundle choice and the Asymmetric Dominance Effect

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Abstract

Bundling of products is being used often in a range of product categories. Only limited research has been done to link findings in the field of context effects to this practice. Studies have been limited to the valuation of bundles, strategic reasons for bundling etc, but few studies have looked at how bundling influences choice from a behavioral perspective.

In this study the applicability of the Asymmetric Dominance effect (or ADE) to bundled products and how this is influenced by mode of thought is investigated. A laboratory experiment was conducted in which subjects where asked to choose a preferred product from either a standard ADE situation, an ADE situation with bundled product, and a control situation with only two products.

The results from this study find solid support for the hypothesis regarding the existence and strength of the ADE effect in a bundle situation. Bundling significantly decreases the strength of the ADE, but the effect is still present.

No support however was found for any effect of mode of thought on the strength of the ADE effect. This is a direct contradiction of previous research. The author concludes that this is likely due to sample size, but also questions the validity of the priming methods used in this study.

1. Introduction

During each day, consumers make multiple decisions regarding consumption, purchase and use of products. In each of these decisions a choice is made. This makes theorizing about the forces underlying these decisions very important, not only for the consumers themselves, but also for policy makers in government, retailers, and manufacturers of products. The consumer is exposed to a magnitude of information, from multiple sources, which have to be sorted and evaluated. Even when these are sorted, the choices that have to be made are not straightforward, with multiple dimensions on which to rate a product and base a decision on. These trade-offs are hard to evaluate and lead to hard choices that have to be made.

The complicated nature of these problems have led to a number of different research streams that take different views of the choice problem. Multiple research fields have sprung up to tackle the issues. From psychology to economics and the relatively new area of behavioral economics. Economics of course has always maintained that humanity acts as if adhering to the capacities and decision making strategies of the "homo economicus". Rational choice theory flowed naturally from economic assumptions that made modeling possible and simplified analyses of markets and behavior.
The extensive use of those assumptions, and their usability and simplicity have led to a blind spot regarding the systematic deviations from rational choice that behavioral economics has tasked itself with unearthing. Only in the latter half of the twentieth century did the behavioral approach become more accepted by mainstream economics and today much research is being done in that field.

In the area of behavioral economics, the idea of contextual influences on economic behavior has gained much traction. Consumers are bombarded with behavioral cues, reference prices and are under the influence of a multitude of perceptual biases. As "cognitive misers" (Fiske & Taylor, 2007), consumers are incapable of full rational decision making. These long neglected aspects of economic life are slowly being integrated into mainstream economics.

A number of robust results have been achieved in the area of context influence on consumer choice. One especially well developed hypothesis is that of the Asymmetric Dominance Effect, which has been shown to be robust in real-life situations (Doyle,

O'Connor, & Reynolds, 1999), and over a large array of different types of choices (Sedikides & Ariely, 1999).
As more and more offerings on the market are differentiated by bundling in complementary products, consumers are faced with choices that include bundles. That this has an effect on choice can be seen for instance in a study by Johnson, Herrmann (M. Johnson & Herrmann, 1999) that showed that consumer valuations of products are influenced by wether they are bundled or not. This indicates a difference between bundled and non-bundled products.

The complexity of relationships between bundled products could very well mean that certain context effects do not have a grip on bundled products the way they influence stand-alone product choice. The ADE, as a robust and well developed context effect example, is the perfect candidate to start investigation of this issue.

A closer look at bundled situations could yield valuable results for managers, as this could suggest otherwise seemingly irrational product strategies, or perhaps bring an end to the seemingly unending practice of price bundling.

As insight were developed regarding the limited rationality of consumers, a separate research track looked into what drives decision making. Taking cues from psychology regarding dual processing systems, numerous researchers (Sloman, 1996; Kahneman & Frederick, 2002) advanced the notion of two modes of cognition (one analytical, one intuitive). Hamilton et al. (Hamilton & Hong, 2007) investigated the effect on the ADE effect of the mode of cognition, and did find an effect.

To further investigate this issue the following problem statement has been developed:

"Are bundled products subjects to the asymmetric dominance effect as stand-alone products are?"

The following research questions have been formulated:
1. Does the ADE hold for bundled products?
2. Is mode of processing a bigger differentiator for bundled products than for stand-alone products?
3. What effect does mode of processing have on choice in a bundle situation?

2. Background

2.1. The Practice of bundling

Bundling has been a regular occurrence in the marketplace. Bundling can benefit the consumer as well as the company supplying the bundle. It facilitates a reduction in transaction costs for both parties, and can function as a way to differentiate from the competition (Demsetz, 1968) (Dansby, 1984).
There are also game-theoretic reasons for the practice of bundling. If used in a certain way, bundling can be used for price discrimination.

The term bundle was defined by Guiltinan (Guiltinan, 1987) as "the practice of marketing two or more products and/or services in a single package."
However, research into bundling van be traced back as far as Stigler's (Stigler, 1963) paper on "block booking". This was a way for movie distributors to bundle popular movies with not so popular ones, as a way to increase revenue.
The stream of research coming from this initial paper focused mostly on market level strategies and effects, with little to no attention paid to behavior of individual consumers. Some behavioral views on bundling have been researched, but the focus was mainly on within-bundle context. For instance Chakravarti et al.Chakravarti, Krish, & Paul, 2002) looked at the effect representation of elements within the bundle has on the valuation of said bundle. A simple comparison was done between a target and comparison bundle, but no attention was given to context effects between bundles.

2.2. Choice theory, behavioral adjustments & bundle evaluation

A short history on Choice

Although rational choice theory can be traced back to Bernoulli (Stearns, 2000) who drafted the first version of expected utility, The Luce choice model (Luce, 1959) is one of the first models to really describe choice processes and the basis for much of the ideas surrounding that topic during the last century. It incorporates the assumption of

proportionality. This means that a new offering added to the choice set, will take from the original alternatives in that set in proportion to their original shares.
Also, as many of the hypotheses developed on the theme of choice, independence among alternatives is one of the main tenets of this theory. Through this work these assumptions have creeped into a number of models for consumer behavior, and a number of scholars have used it to predict market shares.
However, it has been shown that proportionality fails in certain circumstances (Debreu, 1960; McFadden, 1974), and independence among alternatives was incompatible with some of the more frequently observed patterns of choice between alternatives.
A general assumption replacing proportionality has been the idea of similarity. The basic assumption here is that the introduction of a new product into a choice set will steal relatively more market share from the more similar product in the original choice set. This hypothesis has been put forward by Tversky (Tversky, 1972a)

Context variables and the effect on the valuation of bundled items.

Tversky & Kahneman, in their seminal paper on heuristics and cognitive biases in judging probabilities, brought to light the conjoined ideas of adjustment and anchoring. These mechanisms lead to systematically over or underestimation of probabilities. "Insufficient adjustment" occurs in situations in which a subject is asked to make an estimate of a probability or a computation by starting from an initial position. They showed that different starting points yield different estimates, which are biased towards the initial value. "Anchoring" then, is the act of basing an estimate on an initial value, either suggested (internally or externally), or arrived at through partial computation.

These ideas where shown to be applicable to bundle evaluation. Manjit Yadav's (Yadav, 1994) paper on bundle evaluation explored this relationship. Bundles consist of more than one product, and as such the amount of information available for processing can be quite substantial. This would suggest that consumers look for shortcuts or simplified rules in the evaluation process. Yadav suggest that one way to simplify the decision making process is through the "anchoring and adjustment" heuristic investigated by Tversky and Kahneman.

A number of authors have suggested that this heuristic underlies a great amount of choice processes.

Lopes' (Lopes, 1982) model based on this heuristic was adjusted by Yadav for this specific evaluation process. The evaluation is parsed into three different stages: Scanning (determination of bundle composition, no evaluation), anchor selection (selecting the most important item in the bundle), and anchoring and adjustment (using the initially selected product as a starting point for further evaluation of the bundle, taking other included items into account in order of decreasing importance).

Prior to this paper, it was already suggested that simple additive models based on stated utilities by subjects were insufficient as predictors of bundle valuation, as demonstrated in the case of the valuation of hotel amenities.

The model proposed by Yadav has implications for the prediction of the existence and strength of the asymmetric dominance effect in bundle context which will be discussed in the section on the theoretical framework.

2.3. Context & Decoy effects, the ADE, and its explanations

Decoy effects

Decoy effects are a type of context effect. Context effects occur when subjects make choices from a choice set, and are influenced in this decision by the set of alternatives under consideration, even if some of those items should not rationally have any effect on choice at all (Simonson, 1993). A distinction can be made between asymmetrically dominated, asymmetrically dominating, totally dominated, or totally dominating alternatives. An alternative is dominating when it is at least equal on all the dimensions the alternatives are evaluated on, and superior on at least on of the dimensions.
Asymmetrically dominating or dominated alternatives are dominated by or dominating only a subset of the original choice set. Totally dominated or totally dominating alternatives on the other hand dominate (or are dominated by) the entire set.

Decoy effects occur when a “decoy” item is placed in the choice set. This item is called a decoy, as adding this decoy to the set changes the original proportions of choice. This suggests the item influences the way the original alternatives are evaluated.
The effect of the introduction of a decoy item into a choice set has been proven to differ from the result that would show up when the Luce choice model would be correct under all circumstances.

ADE

The decoy effect that is the subject of this study is the "Asymmetric Dominance Effect" or ADE as we will refer to it from now on. The insertion of a decoy item into a choice set will bias the choice that subjects make from this choice set.

In the case of the ADE, the inserted item is an item that is inferior on all dimensions to one of the options, but not inferior on all dimensions to the other option in the two-product choice set. After addition, this product increases the attractiveness and choice probability of the dominating option. This violates one of the main tenets of Luce's choice model (Luce, 1959) namely the minimum condition of regularity and the theory of similarity (where the addition of a product would steal market share from the most similar product) which has been a feature of many alternative consumer behavior models (McFadden, 1980; Tversky, 1972b). Although the assumptions of Luce's model and subsequent alternatives differ substantially, all of them posit that the addition of a new alternative will never lead to the increase of market share of one of the options of the original set. In the case of the ADE this does happen, violating the regularity assumption of Luce's model, while the fact that an increase can be seen in the market share of the most similar option in the original choice set is a violation of similarity. Payne et al. (Huber & Payne, 1982) first described the structural nature of this phenomenon and described the conditions under which it would occur.

Doyle et al. (Doyle et al., 1999) found that the results of experiments on the ADE are robust and hold in more real-life situations. In their study, they show that results in a store setting are not far from pencil and paper experiments. The result has been shown to hold for familiar products, distinguished on meaningful dimensions.

Proposed explanations of the ADE

A number of differing explanations regarding the ADE have been put forward, amongst others by Payne et al. (Huber & Payne, 1982). Their paper does not only shed light on some of the underlying processes, but also gives us clues as to the effect of bundling products on the ADE. First off, they consider combinations of either increasing the range of the attribute on which the competitor is superior (making the dominating option seem less extreme), and increasing the frequency of the attribute on which the option itself is superior (drawing attention to the superiority of the

dominating option) as reasons for the effect. These reasons could be qualified as perceptual.

They consider as well the possibility that subjects might think the decoy is popular, swaying choice towards the dominated option. Their reasoning for this inference on part of the subject is unclear.

Also, they consider the effect from the cost/benefit perspective (which is also discussed later on) The authors refer to a paper on the cost of thinking by Steven M. Shugan (Shugan, 1980). According to that paper and framework, the hypothetical "cost" of deciding between two options, neither of which are dominating, is larger than the cost of deciding between a dominated and dominating option, as the difference in utility is clear in the second case. This framework could be extended to a bundle valuation setting. Here, the "cost of thinking" in deciding between two non-dominating bundles could be equal to the "cost of thinking" when one of the options is dominated. As the difference in utility is harder to calculate when a product exists of multiple sub-products, deciding on the value of the bundle in itself would cost effort, meaning that the relative advantage a dominating pair has on a non-dominating pair could be less, and quite possibly lead to a reduction in the strength of the ADE.

2.4. Expected Effects of bundling: a two-framework view

Given the fact that the ADE exists and is proven for single products, why would bundling products together cause the consumer to dismiss or adapt this strategy? To answer this we can look at what makes a consumer decide on a specific decision strategy.

Conceptual frameworks for contingent decision making

Two broad directions can be found in studies. The first of those constitutes a framework that assumes that consumers make a cost/benefit analysis when deciding on a decision strategy. The other framework centers on the thought that the strategy pursued depends on perception and is mediated by the mode of processing a subject is in. Generally, two modes are distinguished, an analytical mode and an intuitive or heuristic mode.

Cost/benefit Framework

In the cost/benefit framework, computational effort is part of that cost (Bettman & E. Johnson, 1991). In their article on consumer decision making, Bettman et al. say that the degree of information load would be part of the cost of a decision. Adding objects to a decision set then would increase computational load. They review the literature on this subject and conclude that the effect of increased information load on consumers is the subject of intense debate.
Within this framework then, the existence of the ADE in a bundled products situation is uncertain, as the effect of adding more information can't be predicted to go with certainty into any particular direction

In the earlier mentioned paper by Shugan (Shugan, 1980), the author developed a "confusion index". This indicated the difficulty someone would have in evaluating two options. Difficulty increasing factors were, among others, the amount of comparisons of an attribute level between options one would have to make, before reaching a certain confidence level. Sometimes, if the attributes are highly visible to the consumer, it is in the manufacturers interest to clearly state the levels of those attributes, as to facilitate the comparison on many attributes. If this is not the case, not stating as many would be wise as this only goes to clutter the information environment, possibly increasing mental search costs.
It is arguable that a bundle increases the amount of comparisons being made regardless of the actual difference in utility that an added product would make.

This could lead to the following cascade of effects: as consumers are faced with a more complicated decision, the benefit of using the ADE as a decision rule ceases to measure up to the cost of having a less optimal choice. One could argue that the ADE still requires consumers to construct a map of the options available, and increasing the amount of attributes makes that task increasingly costly. The "intuitive" decision rule becomes costly enough to make a more analytical approach more attractive (or better: more cost efficient).

For instance, many instant meals include ingredients. If instead of a meal, this was marketed as a series of ingredients, we would assume that, by bringing forward all the different attributes, the number of comparisons would increase. Thereby increasing the confusion index.

Perceptual Framework

The other framework centers as mentioned on research that suggests that evaluations of options are dependent on not only attributes of the options, but context of the choice (such as other options available and the relations, but also initial endowments and directions of change). Within this frame work very non-rational choices could be seen, which led to the integration of the idea that people have two modes of reasoning, one intuitive and one analytical (Kahneman, 2002)(MacPherson, n.d.)into this framework. Whereas the cost-benefit framework has been more of a continuum of different heuristics, each with it's own cognitive "price", within the perceptual framework there has been a view of two distinct modes of reasoning. A great many variants of dual process models already existed in psychology (Smith & DeCoster, 2000). The model we use is one that distinguishes SYSTEM 1 and SYSTEM 2, originated by Stanovich and West (Stanovich, 2000). The primary or more automatic system is called SYSTEM 1 and gives us intuition based estimates, and impressions. It is closely tied to and influenced by perception. SYSTEM 1 is "cheaper" in terms of cognitive load, easier to address, and quicker.

SYSTEM 1, quick and dirty

A paper on consumer decision making by Bettman, Johnson and Payne (Bettman & E. Johnson, 1991) reviews literature on the subject and states that research by Payne, Lussier and Olshavsky shows that when faced with more complicated (multiple alternative) decision tasks, people tend to use non-compensatory strategies such as elimination by aspects, indicating SYSTEM 1 initiation. However, when faced with more attributes but a steady amount of alternatives, no change in strategies pursued was seen. When faced with a bundle situation then, the strength of the ADE could either remain the same, if bundles are seen as products with more complex attributes, or this could reduce the effect if parts of a bundle are processed separately. Then, the bundle would be seen as a multiple alternative decision task. This all depends on the effect the processing mode of SYSTEM 1 has on the ADE.

Research by Baumeister et al. (Baumeister & Bratslavsky, 1998) has related ego depletion to SYSTEM 1 decision making. Other work in this field has shown cognitive resources to be limited. Depletion, either by self-restrained or by cognitive effort draws from a pool of resources that also provide the "fuel" that fires SYSTEM 1.

SYSTEM 2, analyzing and controlling.

The analytical mode on the other hand, is deliberate and draws on higher cognitive capabilities. We call this SYSTEM 2. SYSTEM 2 is also effortful and more expensive in cognitive terms. According to Kahneman (Kahneman, 2002) this is not a hierarchy of systems per se, but an interaction matrix. SYSTEM 2 processes that are repeatedly executed seem to be incorporated into SYSTEM 1 intuition. Also, whenever there is a judgement to be made, SYSTEM 2 is called upon to evaluate the options. Note that the process of evaluation itself could be done by either systems according to Tversky, using differing or similar heuristics, but SYSTEM 2 is called upon to make the actual decision. This is why SYSTEM 2 is considered a gatekeeper of SYSTEM 1 developed views.

3. Conceptual Framework & Hypotheses

The perceptual focus effect studied in that paper suggests that the ADE can be reversed by adding more, fully dominated, options. This makes the non-dominating option perceptually focal and reverses the effect of the ADE.

This result makes the existence (or better, strength) of the ADE in bundle decision making suspect. The effect would depend on wether subjects view the set of bundles as a simple ADE situation, or if the combination of multiple products would lead participants to view to switch to a more intuitive, perceptual focus based decision.

However, for the purpose of this study, bundles consist of two products with one of those products the same for each of the bundles. This should simplify bundle evaluation. The expectation is that the ADE will hold for this specific bundle situation.

H1: *Adding an asymmetrically dominated bundle to a choice situation where a choice has to be made between two non-dominating bundles (all bundles consisting of a CORE product that differs among the bundles and an ADD product that is the same among the different bundles) the will lead to a higher choice share for the now dominating option compared to the two product situation.*

As mentioned earlier, Shugan's paper on cost of thinking (Shugan, 1980) gives us reasons to believe that the ADE will in fact be less prominent in bundled situations.

In their paper on perceptual focus effects, Hamilton et al. (Hamilton & Hong, 2007) compel participants of their study into the analytical mode (They claim this can be done by letting participants in the survey justify their choices, or by letting them solve specific mathematical equations, as was done before by Simonson (Simonson, 1989) and find that the perceptual focus effect they studied was indeed a function of the mode of processing.
As mentioned before, the perceptual focus effect studied in that paper suggests that the ADE can be reversed by adding more, fully dominated, options. This result could indicate that the strength of the ADE in bundle decision making is lessened. The effect would depend on wether subjects view the set of bundles as a simple ADE situation, or if the combination of multiple products would lead participants to view to switch to a more intuitive, perceptual focus based decision.

Here then is the link with Yadav's work on bundle valuation (Yadav, 1994). As bundle valuation is done through the anchoring and adjustment mechanic, this would suggest a view of a bundle as a single entity, with a corresponding value, which is derived through the mentioned chain of anchoring and adjustment.

Time might be a mediating factor here. This is because the way bundles are evaluated according to Yadav is through a process. This process is not free and immediate. Requiring an immediate response from subjects could disturb this process, and lead to incomplete valuations, in turn leading to obscuring of the dominance relationship and thereby reduction of the ADE.

The process could also imply that by evaluating the bundle, subjects are already primed into SYSTEM 2 thinking when they start to evaluate the relationships between bundles.
This could have two effects: The cognitive load already put on subjects by bundle valuation could lead to failing of system 2 and the subjects falling back on simple and cheap SYSTEM 1 valuation. This would seem to imply a strengthening of the ADE as the correcting role of SYSTEM 2 could be compromised.
On the other hand, if the bundles are not that complex, and valuation comes cheaply in terms of cognitive resources, the process could prime subjects into SYSTEM 2 thinking and lead to a recognition of the irrelevance of the dominated option, and a lessening of the ADE.

From the discussion above we can conclude that the strength of the ADE will probably differ in a bundled situation from an unbundled situation. The degree of variation within a bundle (what type of products are bundled, similar or dissimilar, substitutes or compliments) should mediate wether bundles are viewed as discreet options, or somehow consisting as multiple options. In the perceptual framework, this could lead to the activation of either the perceptual focus effect or the ADE.

The setup used in this study consists of bundles that comprise two products. Of those two products, only one will differ across bundles. This should focus subjects on the similarity of the offerings, and reduce the strength of the asymmetric dominance effect. The bundle should be "cheap" enough to evaluate without deep SYSTEM 2 analyses. Perhaps resulting in priming subjects into SYSTEM 2 and reducing the ADE through careful evaluation of the options.

H2: *An ADE situation where the choice options are bundles consisting of a CORE product and an ADD that is the same among the options, will lead to a lower choice share for the dominating option, compared to a standard ADE situation consisting of just the CORE products.*

In the paper mentioned earlier by Hamilton et al. (Hamilton & Hong, 2007) they prime participants of their study and find that the perceptual focus effect they studied was indeed a function of the mode of processing.
Specifically, subjects using an analytical mode of processing were expected to be less influenced by the addition of that dominated option. A recent, seemingly more robust study found that intuitively thinking subjects (primed through way of depletion) were more likely to be persuaded by the dominated option (Pocheptsova, Amir, & Dhar, 2009).

Bundle choice situations are also expected to be a function of mode of processing.

H3: *The effect of adding three equal products to each of the choices in the standard ADE situation on the choice share of the dominating option will be moderated by mode of processing.*

Kahneman (Kahneman, 2002) mentions in his Nobel prize lecture that dominance relations are detected by SYSTEM 2. One would expect that noticing the dominance relationship between two options would be a prerequisite of the ADE. In this way,

even though SYSTEM 2 analysis would seem to more likely reduce the ADE by pointing to the irrelevance of the option that is dominated, it could in fact increase the ADE by pointing out the dominance relationship. This would seem more likely in a bundle setting, as the dominating of one option would be more difficult to see, due to the larger amount of attributes involved, perhaps giving more weight to a small advantage. However, some experimental studies have shown an effect in the opposite direction with normal, non-bundled settings ((Hamilton & Hong, 2007)(Pocheptsova et al., 2009)).

In a paper on resources and decision making, Masicampo and Baumeister (Masicampo, 2008) characterize the results by Simonson (1989) as follows: "(...) work by Simonson suggests that the attraction effect serves as a tiebreaker when thorough, effortful analysis fails to produce a clear preference. Thus, the attraction effect is greatest when analytical system 2 processes (i.e. heuristic processes, ed.) fail and the decision making process defers to System 1."

The remark by Mascimpo and Baumeister then has no empirical basis although it seems a likely conclusion. The addition of an asymmetrically dominated option should have no effect on choice, and careful analytical thought should prevent this addition from having an effect. The effect therefore would probably be more noticeable among subjects using System 1 to evaluate the options. This leads us to Hypothesis 3a and 3b.

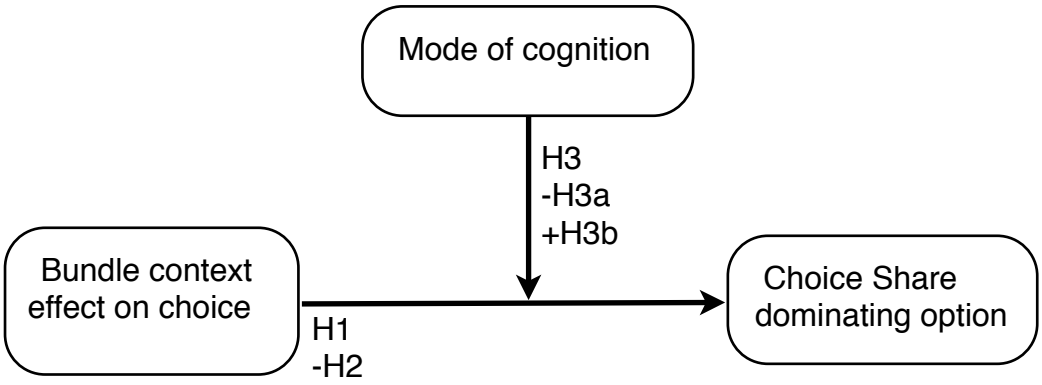
H3a: *Among subjects primed for an analytical mode of processing there will be a lower choice share for the dominating option than for either intuitively- or non-primed subjects.*

Hamilton's (Hamilton & Hong, 2007) study showed increased choice share for the dominating option in intuitively primed subjects. In the bundled situation that will be studied, the situation will be similar enough that that relationship will hold, leading us to hypothesis 3b

H3b: *Among subjects primed for an intuitive mode of processing there will be a higher choice share for the dominating option than for either analytically or non-primed subjects.*

The formulated hypotheses can be summarized in the following conceptual framework.

Figure 1: Conceptual framework



4. Methodology

When selecting products to be bundled a number of problems had to be solved. First of all, a combination of a product and a bundled second product had to be found that could significantly be defined on the same two attribute scales, in order to create a clear and unambiguous ADE situation. Secondly, a scale had to be selected to convey the position of a product on a certain attribute range.
Also, product categories could possibly be of influence on the effects that were going to be researched, so a selection of product categories needed to be made.
Three product categories were chosen with each a CORE product and a ADD product. The ADD product would be presented as a bundled in product, and have the same attribute value in each CORE/ADD combination.

Pre-test Methodology

A web survey was carried out to see if the chosen scale for non-monetary attributes (a 1 to five star graphical rating, and a very low/low/medium/high/very high scale) would be clear for subjects, and if there would be a significant difference between bundle and ADE situations.

The following product categories, CORE, ADD and attribute scales were used:

Product Category	CORE	ADD	Attribute 1	Attribute 2
Video Games	Game Video-game	Video Game	Price	Fun
Component Meal (wereldgerecht)	Meal	Vegetable Mix	Price	Taste
Magazine	Magazine	Novel	Literary Quality	Entertainment Value

For every product category there were two situations: a bundle-ADE situation, and a standard ADE situation. Products were differentiated only on their position on a certain attribute. For instance, the magazine ADE situation consisted of Magazine A (high entertainment value, two star literary quality), Magazine B (medium entertainment value, one star literary quality), and Magazine C (very low entertainment value, 5 star literary quality).
Subjects consisted mainly of friends, with facebook, twitter, reddit, and the RSG forum used as recruiting tool. This resulted in 66 survey responses.

Results from the test showed a significant difference in choice proportions between the bundle and standard ADE situation, based on a binomial test. This increased confidence that a laboratory setting would provide more robust results.

Experiment Methodology

To increase validity of the results, a laboratory experiment was done. One expects this would be of most importance to Hypothesis 3. As mode of processing can be influenced by visual or analytic tasks, an experimental setup allows us to reduce the chance of subjects using a different mode of processing than the one they're primed for.
Because of the practical implications of have a three by three by two design and uncertainty about the number of participants, the meal product category was dropped from the study. A survey, similar to the one used in the pre-test was build, but a non-ADE situation was added. This to make sure that the added product actually had an effect compared to the situation without the decoy option.

The study consisted of three different product situations (a bundle-ADE situation called “BUNDLE” from now on, a standard ADE situation called “SINGLE” and a two product non bundle situation called “CONTROL”.

Priming for analytical and intuitive mode of processing

In addition to the differential effect of bundling, the study looked at the effect of mode of processing on choice share of the dominated option. Subjects were primed into analytical and intuitive modes.

Several different paths have been taken to prime subjects into the different modes of thought. In the paper on perceptual focus effects, Hamilton et al. (Hamilton & Hong, 2007) ask participants to justify their choices. According to them this would compel them to make the decision in an analytical mode. They refer to two studies by Simonson to justify this method of priming. In a paper by Simonson (Simonson, 1989) this method is used to evaluate if asking for reasons behind a certain choice would prompt different decisions. The other paper by Simonson and Nowlis (Simonson, 2000) looks into reasons and the need for uniqueness as driving certain unconventional decisions. In both papers however, there is no mention of two systems of processing.

However in Simonson and Nowlis ` (Simonson, 2000) paper on the role of explanation, they point to the work of Jonathan Schooler. He demonstrated the existence of verbal overshadowing. When describing something verbally, subjects tend to report those things that are easily put into words, not necessarily those that are the most representative of the situation. This does not seem like a very good way of priming subjects into either of the modes of cognition. As Simonson stated in that article with Nowlis asking for reasons shifts the decision making focus from the choice of good options to the choice of good reasons.
Also, the authors postulate in that article that the asking for justification leads to an increased need for uniqueness. This too would skew choice.

Also, searching for reasons that others would find acceptable could be leading to a choice of just a few of a number of potential heuristics that could be used in rule based reasoning (SYSTEM 2). Asking participants to follow this specific subset of rules does not imply that the following of a rule in general (i.e. not a specific subset, analytic reasoning) leads to the same result.

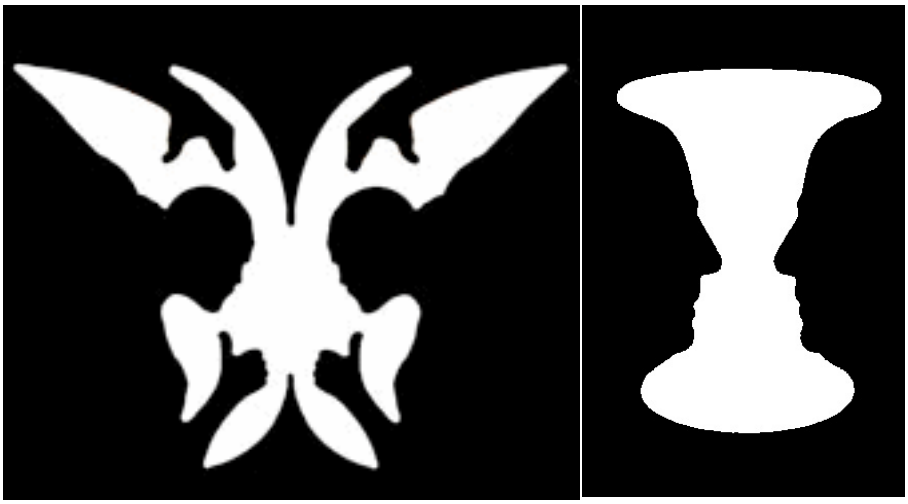
The paper by simonson (Simonson, 1989) clearly states the that giving reasons for a choice made people choose the dominated option more often, as the relationship between that and the dominated option is easily explained and not as much dependent on personal preference as the other option.

A great many papers (many co-authored by simonson) all posit the same basic finding: giving reasons leads to choosing the easily justified choice, the dominating option in this case (see for instance (Shafir, 1993)).
This seems to contradict Hamilton et al. in their statement when they claim they analytically primed subjects by asking for reasons.

A more likely priming was used in follow up experiments by Hamilton et al. By letting participants perform a task that initiates on of the two decision systems, a carry-over effect will ensure the likelihood of that mode of processing being used in the choice task is increased.In the Hamilton paper, there was no manipulation check for this method.

This study copied the priming methods used in the Hamilton paper, with one exception. Priming for analytical mode of thought was done by letting subjects solve five additions. Intuitive mode of thought was primed by showing subjects one of the following two ambiguous pictures, and asking them what element of the picture they saw first. To increase the likelihood of a carry-over effect, subjects could only answer after 30 seconds had passed.

Figure 2: Images used in perceptual task.



(Bradley, 1977)

Statistical analysis

Data is presented as frequency (percentage) and is compared using the Chi Square or Fischer's Exact test, where appropriate. To evaluate the association between parameters, binary logistic regression analysis was used. All statistical analysis were performed using SPPS version 18.0 for MAC (SPSS inc. 2010, Chicago, U.S.A.). An alpha level of 0.05 is considered statistically significant.

5. Data and results

A total of 185 participants completed the study survey. The survey consisted of three situations; the SINGLE situation (Situation 1), the BUNDLE situation (Situation 2) and the CONTROL (two-product) situation (Situation 3). Within these situations, the participants had three options; a non-dominant option (choice 1), a dominant option (choice 3) and an irrational option (choice 2). In case a participant chose the irrational option, their survey was excluded from analysis, which was the case for two participants. Consequently, a total of 183 surveys were eligible for analysis.

5.2. The existence of the ADE effect in bundled products.

The hypotheses posited basically fall into two categories. The first relates the ADE effect and its strength to bundling, the second takes mode of thought into account. To evaluate H1 and H2, we evaluated the effect of different choice situations on the chosen option.

5.2.1. Aggregate analysis

First, we evaluated whether the frequency of the dominating and non-dominating option differed between the three situations by means of crosstabulation and a Chi Square related test (Fisher's exact). An overview of counts can be found in table 1.

Table 1: Dominating and non-dominating choices across separate situations.

Situation	Dominating option n (%)	Non-dominating option n (%)	Total
SINGLE	95 (80,5)	23 (19,5)	118
BUNDLE	95 (74,2)	33 (25,8)	128
CONTROL	74 (60,7)	48 (39,3)	122
TOTAL	264	104	368

Fisher's exact tests aggregate analysis

Fisher's exact test was performed to analyze the effect of bundling on the ADE. First it was done on an aggregate level, looking at both product categories combined.

A quick review of statistical literature reveals a preference for Fisher's exact test for 2 by 2 tables with a discrete distribution compared to a standard Chi-square test. Upton (Upton, 1992) gives an overview of the arguments. Fisher's exact test (two-tailed) is what we will look at in the remaining crosstab tests.

Note that SPSS does not give a test statistic for Fisher's exact test.
For the corresponding SPSS output, please consult **Appendix A.**

When comparing the choice proportions of the SINGLE group and the CONTROL group (dominating option choice share SINGLE: 80,5% (n=95), CONTROL: 60,7%(n=74)) the test resulted in a significant p-value, $p < 0,05$), supporting the notion that the choice proportions between the ADE and CONTROL group are significantly different.

When performing Fisher's exact test on the BUNDLE and CONTROL situations (dominating option choice share BUNDLE: 74,2% (n=95), CONTROL: 60,7%(n=74)), the results were also significant ($p<0,05$) and in the expected direction according to H1, giving evidence that the null hypothesis has to be discarded.

Comparing the SINGLE and BUNDLE group choice proportions (dominating option choice share SINGLE: 80,5%, BUNDLE: 74,2%), we see that the direction of the result is according to hypothesis H2. However, we did not see a significant p value for

Fisher's exact test (p = 0,287, table 8). This result provides evidence against rejecting the null hypothesis corresponding, and suggest the proportions are in fact not significantly different.

5.2.2. Video-game Product Category

Next, an examination of the different product categories was done. A similar procedure was used as was used on the aggregate level.

Table 2: Counts and proportions for the dominating option, video-game category.

Situation	Dominating option n(%)	Non-dominating option n(%)	Total n
SINGLE	45 (77,6)	13 (22,4)	58
BUNDLE	47 (77,0)	14 (23,0)	61
CONTROL	38 (58,5)	27 (41,5)	65

Fisher's exact test Video-game category

Fisher's exact test was performed on all combinations of different situations. When comparing SINGLE and CONTROL groups (dominating option choice share SINGLE: 77,6% (n=45), CONTROL: 58,5% (n=38)) using Fisher's exact test, the result was a significant difference (p<0,05), as would be expected by existing theory.

Comparing BUNDLE and CONTROL groups (dominating option choice share BUNDLE: 77,0% (n=47), CONTROL: 58,5% (n=38)) in the Video-game product category resulted in a significant p-value (P<0,05, table 14).

However, comparing BUNDLE and SINGLE groups (dominating option choice share BUNDLE: 77,0% (n=47), SINGLE: 77,6%(n=45)) gave a non-significant p-value, indicating the difference between proportions was not significant (p= 1,000).

Appendix B shows the relevant SPSS output.

5.2.3. Magazine product category

The same procedure was used for the magazine category as was used for the Video-game.

Table 3: Counts and proportions for the dominating option, magazine category.

Situation	Dominating option n(%)	Non-dominating option n(%)	Total n
SINGLE	50 (83,3)	10 (16,7)	60
BUNDLE	48 (71,6)	19 (28,4)	67
CONTROL	36 (63,2)	21 (36,8)	57

Fisher's exact test magazine category

A similar analysis was performed on Magazine product category.
The theory predicted a significant difference between the SINGLE and CONTROL groups (dominating option choice share SINGLE: 83,3% (n=50), CONTROL: 63,2% (n=36)) was found ($p<0,05$).

The difference in proportion between BUNDLE and CONTROL (dominating option choice share BUNDLE: 71,6% (n=48), CONTROL: 63,2% (n=36)) was not found to be significant ($p = 0,340$).

The difference between the choice proportions in the BUNDLE group and SINGLE group (dominating option choice share BUNDLE: 71,6% (n=48), SINGLE: 83,3% (n=50)) in the Video-game category were not found to be significant ($p=0,141$).

Appendix C shows the relevant SPSS output.

5.2.4. Logistic regression and analysis

To provide more evidence that situation is of influence on choice, a binary logistic regression was performed.

Table 4: SPSS logistic regression output

Variables in the Equation

		B	S.E.	Wald	df	Sig.	Exp(B)	95% C.I.for EXP(B)	
								Lower	Upper
Step 1[a]	BUNDLE	,625	,274	5,188	1	,023	1,867	1,091	3,196
	SINGLE	,986	,297	10,993	1	,001	2,679	1,496	4,798
	Constant	,433	,185	5,455	1	,020	1,542		

a. Variable(s) entered on step 1: BUNDLE, SINGLE.

The logistic regression shows that Situation (either BUNDLE, SINGLE) is of influence on choice. The odds ratios also indicate that BUNDLE (Situation 1 in the output) has a lower odds ratio than SINGLE (Situation 2 in the output). This indicates that it is likely (keeping in mind the confidence intervals) that a subject in a SINGLE situation, is more likely to choose the dominating option than a subject in the BUNDLE situation. This is evidence in support of H2 and H1.

5.3. The influence of mode of thought.

To evaluate the degree to which mode of thought influences choice, an analysis was done where the distribution of choice across different priming modes was tested, for each of the choice situations.

5.3.1. Aggregate analysis

The SPSS output for the aggregate analysis can be found in **Appendix D.**

Non prime versus prime

To evaluate wether or not the group of primed subjects showed a different choice distribution than the non-primed subjects (dominating option choice share non prime: 75,7% (n=81), prime: 70,1% (n=183), the variable prime indicates either intuitive or analytical primed subjects) a Fisher's exact test was performed to test for difference in choice proportions between the non-primed and primed subjects. The difference was not found to be significant (p = 0,309).

Intuitive primed versus non-primed

When comparing choice proportions between intuitively primed subjects versus non-primed subjects (dominating option choice share non prime: 75,7% (n=81), Intuitively primed: 65,2%(n=88)) using a two sided Fisher's exact test the p value found is not significant (p=0,91)

Analytically primed versus non-primed

Comparing choice proportions between analytically primed subjects versus non-primed subjects (dominating option choice share non prime: 75,7% (n=81), analytically primed: 75,4% (n= 95)) using Fisher's exact test, a non-significant p-value was found (p=1,000). This signifies there is no statistical difference between both group's choice distribution.

Analytically versus Intuitively primed subjects.

The difference in choice proportions between analytically primed subjects versus intuitively primed subjects (dominating option choice share intuitively primed group: 65,2%(n=88), analytically primed: 75,4%(n=95)) was tested using Fisher's exact test. This resulted in a non-significant p-value (p=0,08)

5.3.2. BUNDLE situation

To test if situation (bundle/SINGLE/control) mediates the effect of priming, choice proportions were analyzed for each priming mode, for the BUNDLE situations, SINGLE situation and CONTROL situations, aggregated over product categories.

As none of the tests was significant, the results are presented without full SPSS output, which for completeness have been printed in **Appendix E.**

Table 5: Counts and proportions for the dominating option for each priming situation, BUNDLE situation.

Priming situation	Dominating option n(%)	Non-dominating option n(%)	Total n
Primed	**67 (72)**	**26 (28)**	**93**
Non-primed	**28 (80)**	**7 (20)**	**35**
Intuitive	**29 (70,7)**	**12 (29,3)**	**41**
Analytical	**38 (73,1)**	**14 (26,9)**	**53**

Comparing primed subjects with non primed subjects (dominating option choice share primed group: 72% (n=67), non primed: 80% (n=28)) with Fisher's exact test gave a result that was not significant, with a p-value of p=0,497.

The choice proportions of intuitively primed versus non-primed groups (dominating option choice share intuitively primed group: 70,7% (n=29), non primed: 80% (n=28)) was shown not to be significant in a two-sided Fisher's exact test (p=0,430). This direction of the difference is opposite the one predicted by H3b.

Analytically primed and non-primed subject groups were compared (dominating option choice share analytically primed group: 73,1%, non primed: 80%), resulting in a non significant p-value (0,611) for a two sided Fisher's exact test.

Comparison of the choice proportions of the intuitively primed subject group with the analytically primed subject group (dominating option choice share intuitively primed group: 70,7%, analytically primed: 73,1%) showed a non significant p-value for and the two-sided Fisher's exact test (p=0,820).

5.3.3. SINGLE situation

A similar analysis was done on the SINGLE situation and the influence of priming as was done on the BUNDLE situation.
Again, no test showed a significant p-value. Results are shown without the corresponding SPSS output, which has been printed in **Appendix F**

Table 6: Counts and proportions for the dominating option for each priming situation, SINGLE situation.

Priming situation	Dominating option n(%)	Non-dominating option n(%)	Total n
Primed	**66 (79,5)**	**17 (14,4)**	**83**
Non-primed	**29 (82,9)**	**6 (17,1)**	**35**
Intuitive	**32 (72,7)**	**12 (27,3)**	**44**
Analytical	**34 (87,2)**	**5 (12,8)**	**39**

Primed subjects choice proportion was compared to non primed subjects choice proportions (dominating option choice share primed group: 79,5% (n=66), non primed: 82,9% (n=29)) with Fisher's exact test. The test was not significant, with a p-value of p=0,802.

Choice proportions of intuitively primed versus non-primed groups (dominating option choice share intuitively primed group: 72,7% (n=32), non primed: 82,9% (n=29)) were compared, and the difference was shown not to be significant in a two-sided Fisher's exact test (p=0,419). The direction of this difference was opposite the direction expected by the formulated hypothesis H3b.

A non significant p-value (0,422) for a two sided Fisher's exact test suggested that there was no difference between the choice proportions of the analytically primed and non-primed subject groups (dominating option choice share analytically primed group: 87,2% (n=34), non primed: 82,9% (n=29)).

The choice proportions of the intuitively primed subject group with the analytically primed subject group (dominating option choice share intuitively primed group: 72,7% (n=32), analytically primed: 87,2%(n=34)) were compared and showed a non significant result for the two-sided Fisher's exact test (p=0,172).

5.3.4. Control Situation

Lastly the CONTROL situation was analyzed in a similar manner to both other situations. The reader can find SPSS output in **Appendix G**.

Table 7: Counts and proportions for the dominating option for each priming situation, CONTROL situation.

Priming situation	Dominating option n(%)	Non-dominating option n(%)	Total n
Primed	**50 (58,8)**	**35 (41,2)**	**85**
Non-primed	**24 (64,9)**	**13 (35,1)**	**37**
Intuitive	**27 (54)**	**23 (46)**	**50**
Analytical	**23 (65,7)**	**12 (34,3)**	**35**

Primed subjects choice proportion and non primed subjects choice proportions (dominating option choice share primed group: 58,8% (n=50), non primed: 64,9% (n=24)) were compared. Fisher's exact test resulted in a p-value that was not significant, with a p-value of p=0,553.

Intuitively primed versus non-primed groups choice proportions (dominating option choice share intuitively primed group: 54% (n=27), non primed: 64,9%(n=24)) were compared, and the difference was shown not to be significant in a two-sided Fisher's exact test (p=0,381).

The p-value for the two sided Fisher's exact test (p=1,000) was non significant for the difference between non-primed and analytically primed groups in the BUNDLE situation. This suggested that there was no difference between the choice proportions of the analytically primed and non-primed subject groups (dominating option choice share analytically primed group: 65,7% (n=23), non primed: 64,9% (n=24)).

The difference between the choice proportions of the intuitively primed subject group and the analytically primed subject group (dominating option choice share intuitively primed group: 54% (n=27), analytically primed: 65,7%(n=23)) was compared and showed a non significant p-value for the two-sided Fisher's exact test (p=0,371).

5.3.5. Logistic regression and analysis

To further investigate the influence of priming, a binary logistic regression was performed.

The following binary regressions were done to see what and if there was an association between mode of thought (or better: intuitive or analytic priming) and Choice, when compensating for the influence of the situation. All situations were entered as co-variates.

Table 8: Logistic Regression output SPSS, intuitive/analytic/BUNDLE/SINGLE.

Variables in the Equation

		B	S.E.	Wald	df	Sig.	Exp(B)	95% C.I.for EXP(B)	
								Lower	Upper
Step 1[a]	BUNDLE	,592	,277	4,560	1	,033	1,807	1,050	3,110
	SINGLE	,980	,299	10,745	1	,001	2,665	1,483	4,788
	analyt	-,056	,311	,033	1	,856	,945	,513	1,740
	intuit	-,511	,294	3,020	1	,082	,600	,337	1,067
	Constant	,664	,267	6,202	1	,013	1,943		

a. Variable(s) entered on step 1: BUNDLE, SINGLE, analyt, intuit.

The regression indicate that the intuitive priming does indeed have an effect on choice when correcting for situation. Here too, we see that the effect is the opposite of the one expected by H3b. "intuit" (the indicator for intuitive priming) is significant, ($p<0,05$). The indicator for analytical priming does not seem to be a significant covariant influencing choice ($p=0,345$).

6. Conclusions & Discussion

6.1. The existence of the ADE in bundled products

The BUNDLED situation had a lower choice-share for the dominating option than the ADE, but higher than the SINGLE in when taken across both product categories. Fisher's exact test indicated that H0 could not be discarded when testing for difference between BUNDLE and SINGLE situation, but all other combinations tested gave a significant p-value, indicating a difference between those proportions.

The two product categories both saw a similar distribution, in the sense that in both cases the choice share for the dominating option in the BUNDLE situation hovered between the SINGLE and CONTROL situation.

Not all differences were significant in all sub-tests, however. In the Video-game category, the difference between BUNDLE and SINGLE situations was not significant in the fisher's exact test that was performed.

In the Magazine product category the difference between BUNDLE and CONTROL was not significant in both types of statistical tests.

If we were to take this at face value, H1 would have to be rejected in favor of the related H0: No difference in proportion between BUNDLE and CONTROL. However, considering the aggregate analysis provides evidence in favor of H1, as did the console category, and considering the distribution of differences followed the expected pattern, a strong argument can be made to reject the null hypothesis.

This would indicate that in a BUNDLE situation, where the choice options consist of a CORE and an ADD product (together combined into a bundle), an effect analogue to the regular ADE situation can be seen. When a decoy bundle (a choice option where the CORE is asymmetrically dominated and the ADD is the same as for the two non-decoy options in the choice set) is added to a two bundle choice set, the choice-share of the dominating option increases, compared to the original (two bundle) situation.

However, H2 predicted a smaller increase in choice share for the dominating option than one would expect in a standard ADE situation, which we will discuss in the following paragraph.

Fisher's exact test for the difference between the SINGLE and BUNDLE was not significant in the aggregate analysis. This could be considered evidence against H2. Also, fisher's exact did not indicate a significant result for the difference between the BUNDLE and ADE group in the Video-game category. The p-value for Fisher's exact test between CONTROL and BUNDLE group was not significant in the Magazine group, as was the difference between BUNDLE and SINGLE.

When considering these test results its important to take the actual results into account. Not only was the choice proportion for the dominating option in the BUNDLE situation smaller in the aggregate analysis, this distribution was seen for both product categories.
The contradicting results for the difference between SINGLE and BUNDLE in the aggregate analysis could be due to a too small sample size. The fact we see the same ranking of the dominating option choice share in all three analysis (aggregate, Video-game and magazine) is an indication that the lack of overall consistent significant results is due to sample size.

Unexpected insignificant results occur on opposite sides: in the video game category, the difference between BUNDLE and SINGLE was not significant, in the magazine category it was the difference between BUNDLE and CONTROL which was not significant. This is a pattern that we would expect to see if sample size indeed was a problem.

The logistic regression of just Situation as co-variates with choice as a dependent variable, indicated that situation indeed has an effect on choice. The odds ratios give further evidence in favor of both H1 and H2.

The overall conclusion then could be that there is enough evidence to support H2 that we can reject the null hypothesis relevant to H2.

6.2. The influence of priming

H3 was formulated very generally, as the anticipation was that results from previous studies regarding priming would carry over. The most general analysis (the aggregate analysis of non-primed versus primed subjects over all situations) showed no significant difference. When adhering to strict statistical rules on significance, H3 would have to be rejected. However, in aggregate a number of Fisher's exact test

results were on the path to significance. The very general nature of H3 allows us to reject the null-hypothesis

Aggregate analysis

In aggregate intuitive versus non-primed showed a promising result. Fisher's exact was close to significant.
It is important to note are the differences in proportion that are reverse to what is expected and predicted by H3a and H3b.

The BUNDLE situation

A quick glance at the counts for the different priming groups in the BUNDLE situation shows a small difference in favor of the dominating option in the analytically primed group compared to the intuitively primed group (analytical choice share for the dominating option was 73,1%, in the intuitively primed group this was 70,7%). The non-primed group has the highest percentage choice-share for the dominating option.

However, Fisher's exact test was not significant, with primed subjects showing a lower choice-share for the dominating option.

The SINGLE situation

When looking at the counts, the intuitively primed group stands out as having the lowest choice-share for the dominating option (72,7). The analytical group has a higher choice-share for the dominating option than the non-primed group (87,2% and 82,9% respectively). In contrast to the BUNDLE situation, the non-primed choice is ranked middle in terms of choice share for the dominating option.

Fisher's exact test did not result in a significant p-value. The analytically primed subjects showed a higher preference for the dominating option than the intuitively primed subjects.
This is evidence against H3a, and H3b and in fact, opposite to the expected direction.

The CONTROL situation

In the CONTROL situation, the intuitively primed subjects group showed a lower choice share for the dominating option in terms of percentage of counts (54%). Analytical and non-primed choice share for the dominating option were about equal (65,7% and 64,9% respectively).

Overall, the intuitively primed subjects group had the lowest choice-share for the dominating option, not the highest as expected. This is convincing evidence that H3b has to be rejected, in favor of the corresponding null hypothesis.

Note that there were no significant results.

Table 10: Choice-share for the dominating option per priming group

	BUNDLE		SINGLE		CONTROL
Intuitive	29 (70,7%)	<	32 (72,2%)	>	27 (54,0%)
Analytical	38 (73,1%)	<	34 (87,2%)	>	23 (65,7%)
non-primed	28 (80 %)	<	29 (82,9%)	>	24 (64,9%)

Interesting is also that only in the bundle situation the analytically primed group has a lower choice-share for the dominating option than the non-primed group.

Logistic regression.

Evidence that intuitive priming had an effect on choice when compensating for situation was given by the logistic regression. However, the odds ratio seemed to give an opposite direction for intuitive priming than was proposed by H3b.

6.3 Discussion & limitations

The existence of the ADE effect in bundled products

The results from the laboratory experiment seem to provide enough support to reject the null hypothesis for both H1 and H2. Differences were consistently in the predicted direction, even if they were not significant. This would suggest that bundled products are subject to the ADE effect, but that that effect is diminished.

The study that was conducted has some validity issues. First there is the issue of internal validity. Was the result measured really due to bundling? The way the bundles were presented was as a combination of two products. No single packaging was shown. It was made clear that the two products belonged to one bundle, but the representation could have led to a different way of analyzing the different attributes. The amount of attributes was the same as in a standard ADE situation, but one could argue that subjects perhaps saw the attributes of the ADD product as being different from attributes. Also, the attributes chosen were very general. They were chosen so that an increase in a particular attribute could only be interpreted as a positive, allowing us to create a dominated option.

Some selection bias could have taken place, as all subjects were Erasmus University students. Cognitive resources can be assumed to be higher among students than among the general population, perhaps decreasing the ADE effect in this study. However, as other studies have used a similar population, this should not be problematic.

The influence of priming

No evidence was found regarding H3a and H3b. In fact, the results indicate a strong possibility that a larger sample size would have shown significant results in the exact opposite direction of these hypotheses, and (more importantly) existing literature(Hamilton & Hong, 2007)(Pocheptsova et al., 2009) for intuitive priming.

The priming methodology used in the analytical priming method was a direct copy of a previously used method. In the case of the intuitive priming method, subjects were inadvertently primed for a shorter duration than in previous research (Hamilton & Hong, 2007). This suggests that had the exact same protocol been followed, perhaps a more significant outcome would have revealed itself. A larger sample size would definitely provided more certainty regarding the significance of the findings.

In the study by Hamilton et al. (Hamilton & Hong, 2007) the authors used two different types of priming that lead to the same results, leading them to conclude they both achieved these results through the same path.
Considering the results of this study however, it could very well be that the two types of priming did not actually prime the same mode of thought.

The priming used in this study was used in an experiment by Hamilton that did not exactly mirror our study. In that study (conducted online), participants chose from a total of 5 options, with one being perceptually focal.
The perceptual nature of the task in the priming for intuitive mode might have meant that although subjects were not actually primed for SYSTEM 1, they chose a heuristic that focused on perceptual characteristics.

The same applies to the analytical priming. Perhaps results seen in the Hamilton study are not those of subjects primed for analytical mode, but non-primed subjects. As the study did not have a control group in that experiment, that is certainly a possibility.

Although the non-significant results preclude us from making statements regarding the validity of the Hamilton method, results from this study seem to make them suspect. What is certain is that the priming we assumed was intuitive showed results. Perhaps redefining this priming method as "perceptual" is wise.

6.4. Managerial Implications

Real world implications are difficult to estimate as there are a great many influences on choice outside of the ones discussed in this thesis.
The research done is of a very theoretical nature and has more implications for further research than real life managerial decisions.

The ADE however has been shown to be robust in real world application (Doyle et al., 1999). For category managers then, the effect in general could be applied as a tool to increase the sales of that product that has the highest margins.
Specifically in electronics (Video games), bundles are created on a large scale by warehouse category managers. The results of this study could be taken to mean that using bundling as a tool to create these ADE situations, will not be as effective.

Likewise, those companies using bundling as a product strategy should be aware that their SKU's are subject to these types of context effects. Being aware of possible changes in choice share due to bundling should be part of new SKU development.

6.5. Suggestions for further research

Several findings in this study suggest new avenues for research. Bundling is still an underdeveloped subject of study within behavioral economics. Clearly bundles are evaluated differently.

Different types of bundles could lead to different decisions. A difference between compliments and substitute bundling could be an interesting subject, as a CORE products will not be as easy to define in substitute bundling.

Extending the setting to include different ADD products across bundles would provide valuable insight into new strategies.

This study focused on bundles that could be evaluated on two attributes. This is an abstraction that made analysis easier, but it is perhaps unrealistic. Adding additional attributes could lead to different decision tactics and therefore different choices. However, in the relevant product categories it can be argued that consumers do indeed make these types of abstractions in developing an assessment of a bundle.

With regard to priming, this study shows that the definition of the two modes of thought, and the priming methodology through which they are achieved, need improvement. Having decision scientists construct a thorough investigation into these subjects in conjunction with psychologists would benefit a variety of fields. What we have seem to have discovered is that intuitive thought does not necessarily lead to a heightened attention to perceptual information. Perceptual information could possibly be subject to either modes of cognition as well.

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8. Appendices

Appendix A: Cross-tabulation tests for differences in choice proportions between situations, aggregate.

SPPS summary of cross-tabulation tests (SINGLE, CONTROL, aggregate).

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	11,349[a]	1	,001		
Continuity Correction[b]	10,416	1	,001		
Likelihood Ratio	11,544	1	,001		
Fisher's Exact Test				,001	,001
Linear-by-Linear Association	11,301	1	,001		
N of Valid Cases	240				

a. 0 cells (,0%) have expected count less than 5. The minimum expected count is 34,91.

b. Computed only for a 2x2 table

SPPS summary of cross-tabulation tests (BUNDLE, CONTROL, aggregate).

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	5,246[a]	1	,022		
Continuity Correction[b]	4,645	1	,031		
Likelihood Ratio	5,266	1	,022		
Fisher's Exact Test				,030	,015
Linear-by-Linear Association	5,225	1	,022		
N of Valid Cases	250				

a. 0 cells (,0%) have expected count less than 5. The minimum expected count is 39,53.

b. Computed only for a 2x2 table

SPPS summary of cross-tabulation tests (SINGLE, BUNDLE, aggregate).

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	1,381[a]	1	,240		
Continuity Correction[b]	1,047	1	,306		
Likelihood Ratio	1,389	1	,239		
Fisher's Exact Test				,287	,153
Linear-by-Linear Association	1,376	1	,241		
N of Valid Cases	246				

a. 0 cells (,0%) have expected count less than 5. The minimum expected count is 26,86.

b. Computed only for a 2x2 table

Appendix B: Cross-tabulation tests for differences in choice proportions between situations, video-game.

SPPS summary of cross-tabulation tests (SINGLE, CONTROL, Video-game category).

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	5,109[a]	1	,024		
Continuity Correction[b]	4,274	1	,039		
Likelihood Ratio	5,198	1	,023		
Fisher's Exact Test				,034	,019
Linear-by-Linear Association	5,067	1	,024		
N of Valid Cases	123				

a. 0 cells (,0%) have expected count less than 5. The minimum expected count is 18,86.

b. Computed only for a 2x2 table

SPPS summary of cross-tabulation tests (SINGLE, CONTROL, Video-game category).

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	4,953[a]	1	,026		
Continuity Correction[b]	4,142	1	,042		
Likelihood Ratio	5,022	1	,025		
Fisher's Exact Test				,036	,020
Linear-by-Linear Association	4,914	1	,027		
N of Valid Cases	126				

a. 0 cells (,0%) have expected count less than 5. The minimum expected count is 19,85.

b. Computed only for a 2x2 table

SPPS summary of cross-tabulation tests (SINGLE, CONTROL, Video-game category).

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	,005[a]	1	,944		
Continuity Correction[b]	,000	1	1,000		
Likelihood Ratio	,005	1	,944		
Fisher's Exact Test				1,000	,560
Linear-by-Linear Association	,005	1	,944		
N of Valid Cases	119				

a. 0 cells (,0%) have expected count less than 5. The minimum expected count is 13,16.

b. Computed only for a 2x2 table

Appendix C: Cross-tabulation tests for differences in choice proportions between situations, magazine.

SPPS summary of cross-tabulation tests (SINGLE, CONTROL, Magazine category).

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	6,109[a]	1	,013		
Continuity Correction[b]	5,117	1	,024		
Likelihood Ratio	6,202	1	,013		
Fisher's Exact Test				,020	,012
Linear-by-Linear Association	6,057	1	,014		
N of Valid Cases	117				

a. 0 cells (,0%) have expected count less than 5. The minimum expected count is 15,10.

b. Computed only for a 2x2 table

SPPS summary of cross-tabulation tests (BUNDLE, CONTROL, Magazine category).

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	1,014[a]	1	,314		
Continuity Correction[b]	,663	1	,415		
Likelihood Ratio	1,013	1	,314		
Fisher's Exact Test				,340	,208
Linear-by-Linear Association	1,006	1	,316		
N of Valid Cases	124				

a. 0 cells (,0%) have expected count less than 5. The minimum expected count is 18,39.

b. Computed only for a 2x2 table

SPPS summary of cross-tabulation tests (SINGLE, BUNDLE, Magazine category).

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	2,456[a]	1	,117		
Continuity Correction[b]	1,837	1	,175		
Likelihood Ratio	2,495	1	,114		
Fisher's Exact Test				,141	,087
Linear-by-Linear Association	2,436	1	,119		
N of Valid Cases	127				

a. 0 cells (,0%) have expected count less than 5. The minimum expected count is 13,70.

b. Computed only for a 2x2 table

Appendix D: Output SPSS cross tabulation tests for difference in proportion between priming groups, aggregated over situations.

Counts of choice for primed and non primed subjects.

NonPrime_Choice

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1	26	7,1	24,3	24,3
	3	81	22,0	75,7	100,0
	Total	107	29,1	100,0	
Missing	System	261	70,9		
Total		368	100,0		

Prime_Choice

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1	78	21,2	29,9	29,9
	3	183	49,7	70,1	100,0
	Total	261	70,9	100,0	
Missing	System	107	29,1		
Total		368	100,0		

SPPS summary of cross-tabulation tests (Non prime, Prime, Aggregate).

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	1,168[a]	1	,280		
Continuity Correction[b]	,909	1	,340		
Likelihood Ratio	1,190	1	,275		
Fisher's Exact Test				,309	,170
Linear-by-Linear Association	1,165	1	,280		
N of Valid Cases	368				

a. 0 cells (,0%) have expected count less than 5. The minimum expected count is 30,24.
b. Computed only for a 2x2 table

Counts of choice for intuitively and non-primed subjects.

IntuitChoice

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1	47	12,8	34,8	34,8
	3	88	23,9	65,2	100,0
	Total	135	36,7	100,0	
Missing	System	233	63,3		
Total		368	100,0		

NonPrime_Choice

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1	26	7,1	24,3	24,3
	3	81	22,0	75,7	100,0
	Total	107	29,1	100,0	
Missing	System	261	70,9		
Total		368	100,0		

SPPS summary of cross-tabulation tests (Non-primed, intuitively primed, Aggregate).

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	3,133[a]	1	,077		
Continuity Correction[b]	2,654	1	,103		
Likelihood Ratio	3,170	1	,075		
Fisher's Exact Test				,091	,051
Linear-by-Linear Association	3,120	1	,077		
N of Valid Cases	242				

a. 0 cells (,0%) have expected count less than 5. The minimum expected count is 32,28.
b. Computed only for a 2x2 table

Counts of choice for analytically and non primed subjects.

NonPrime_Choice

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1	26	7,1	24,3	24,3
	3	81	22,0	75,7	100,0
	Total	107	29,1	100,0	
Missing	System	261	70,9		
Total		368	100,0		

AnalytChoice

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1	31	8,4	24,6	24,6
	3	95	25,8	75,4	100,0
	Total	126	34,2	100,0	
Missing	System	242	65,8		
Total		368	100,0		

SPPS summary of cross-tabulation tests (Non-primed, analytically primed, Aggregate).

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	,003[a]	1	,957		
Continuity Correction[b]	,000	1	1,000		
Likelihood Ratio	,003	1	,957		
Fisher's Exact Test				1,000	,540
Linear-by-Linear Association	,003	1	,957		
N of Valid Cases	233				

a. 0 cells (,0%) have expected count less than 5. The minimum expected count is 26,18.
b. Computed only for a 2x2 table

Counts of choice for analytically and intuitively primed subjects.

AnalytChoice

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1	31	8,4	24,6	24,6
	3	95	25,8	75,4	100,0
	Total	126	34,2	100,0	
Missing	System	242	65,8		
Total		368	100,0		

IntuitChoice

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1	47	12,8	34,8	34,8
	3	88	23,9	65,2	100,0
	Total	135	36,7	100,0	
Missing	System	233	63,3		
Total		368	100,0		

SPPS summary of cross-tabulation tests (Intuitively primed, analytically primed, Aggregate)

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	3,243[a]	1	,072		
Continuity Correction[b]	2,774	1	,096		
Likelihood Ratio	3,263	1	,071		
Fisher's Exact Test				,080	,048
Linear-by-Linear Association	3,231	1	,072		
N of Valid Cases	261				

a. 0 cells (,0%) have expected count less than 5. The minimum expected count is 37,66.
b. Computed only for a 2x2 table

Appendix E: Output SPSS cross tabulation tests for difference in proportion between priming groups, in the BUNDLE choice situation.

SPPS summary of cross-tabulation tests (primed, non primed, BUNDLE situation).

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	,841[a]	1	,359		
Continuity Correction[b]	,477	1	,490		
Likelihood Ratio	,872	1	,350		
Fisher's Exact Test				,497	,248
Linear-by-Linear Association	,835	1	,361		
N of Valid Cases	128				

a. 0 cells (,0%) have expected count less than 5. The minimum expected count is 9,02.
b. Computed only for a 2x2 table

SPPS summary of cross-tabulation tests (Intuitively primed, non primed, BUNDLE situation).

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	,865[a]	1	,352		
Continuity Correction[b]	,441	1	,506		
Likelihood Ratio	,875	1	,350		
Fisher's Exact Test				,430	,254
Linear-by-Linear Association	,854	1	,356		
N of Valid Cases	76				

a. 0 cells (,0%) have expected count less than 5. The minimum expected count is 8,75.
b. Computed only for a 2x2 table

SPPS summary of cross-tabulation tests (non primed, analytically primed, BUNDLE situation).

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	,548[a]	1	,459		
Continuity Correction[b]	,235	1	,628		
Likelihood Ratio	,556	1	,456		
Fisher's Exact Test				,611	,317
Linear-by-Linear Association	,541	1	,462		
N of Valid Cases	87				

a. 0 cells (,0%) have expected count less than 5. The minimum expected count is 8,45.
b. Computed only for a 2x2 table

SPPS summary of cross-tabulation tests (Intuitively primed, analytically primed, BUNDLE situation).

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	,063[a]	1	,802		
Continuity Correction[b]	,000	1	,986		
Likelihood Ratio	,062	1	,803		
Fisher's Exact Test				,820	,491
Linear-by-Linear Association	,062	1	,803		
N of Valid Cases	93				

a. 0 cells (,0%) have expected count less than 5. The minimum expected count is 11,46.
b. Computed only for a 2x2 table

Appendix F: Output SPSS cross tabulation tests for difference in proportion between priming groups, in the SINGLE choice situation.

SPPS summary of cross-tabulation tests (primed, non primed, SINGLE situation).

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	,175[a]	1	,676		
Continuity Correction[b]	,027	1	,870		
Likelihood Ratio	,178	1	,673		
Fisher's Exact Test				,802	,443
Linear-by-Linear Association	,173	1	,677		
N of Valid Cases	118				

a. 0 cells (,0%) have expected count less than 5. The minimum expected count is 6,82.
b. Computed only for a 2x2 table

SPPS summary of cross-tabulation tests (Intuitively primed, non primed, SINGLE situation).

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	1,137[a]	1	,286		
Continuity Correction[b]	,634	1	,426		
Likelihood Ratio	1,159	1	,282		
Fisher's Exact Test				,419	,214
Linear-by-Linear Association	1,123	1	,289		
N of Valid Cases	79				

a. 0 cells (,0%) have expected count less than 5. The minimum expected count is 7,97.
b. Computed only for a 2x2 table

SPPS summary of cross-tabulation tests (non primed, analytically primed, SINGLE situation)

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	,272[a]	1	,602		
Continuity Correction[b]	,038	1	,846		
Likelihood Ratio	,272	1	,602		
Fisher's Exact Test				,747	,422
Linear-by-Linear Association	,269	1	,604		
N of Valid Cases	74				

a. 0 cells (,0%) have expected count less than 5. The minimum expected count is 5,20.
b. Computed only for a 2x2 table

SPPS summary of cross-tabulation tests (Intuitively primed, analytically primed, SINGLE situation).

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	2,651[a]	1	,103		
Continuity Correction[b]	1,838	1	,175		
Likelihood Ratio	2,729	1	,099		
Fisher's Exact Test				,172	,087
Linear-by-Linear Association	2,619	1	,106		
N of Valid Cases	83				

a. 0 cells (,0%) have expected count less than 5. The minimum expected count is 7,99.
b. Computed only for a 2x2 table

Appendix G: Output SPSS cross tabulation tests for difference in proportion between priming groups, in the CONTROL choice situation.

SPPS summary of cross-tabulation tests (primed, non primed, CONTROL situation).

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	,394[a]	1	,530		
Continuity Correction[b]	,182	1	,670		
Likelihood Ratio	,397	1	,528		
Fisher's Exact Test				,553	,337
Linear-by-Linear Association	,391	1	,532		
N of Valid Cases	122				

a. 0 cells (,0%) have expected count less than 5. The minimum expected count is 14,56.
b. Computed only for a 2x2 table

SPPS summary of cross-tabulation tests (Intuitively primed, non primed, CONTROL situation).

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	1,035[a]	1	,309		
Continuity Correction[b]	,635	1	,425		
Likelihood Ratio	1,041	1	,307		
Fisher's Exact Test				,381	,213
Linear-by-Linear Association	1,023	1	,312		
N of Valid Cases	87				

a. 0 cells (,0%) have expected count less than 5. The minimum expected count is 15,31.
b. Computed only for a 2x2 table

SPPS summary of cross-tabulation tests (non primed, analytically primed, CONTROL situation).

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	,006[a]	1	,940		
Continuity Correction[b]	,000	1	1,000		
Likelihood Ratio	,006	1	,940		
Fisher's Exact Test				1,000	,568
Linear-by-Linear Association	,006	1	,940		
N of Valid Cases	72				

a. 0 cells (,0%) have expected count less than 5. The minimum expected count is 12,15.
b. Computed only for a 2x2 table

SPPS summary of cross-tabulation tests (Intuitively primed, analytically primed, CONTROL situation).

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	1,166[a]	1	,280		
Continuity Correction[b]	,733	1	,392		
Likelihood Ratio	1,176	1	,278		
Fisher's Exact Test				,371	,196
Linear-by-Linear Association	1,153	1	,283		
N of Valid Cases	85				

a. 0 cells (,0%) have expected count less than 5. The minimum expected count is 14,41.
b. Computed only for a 2x2 table

Appendix K: example choice situation.

The following three products are modern video game consoles similar to the "xbox" and "playstation" .

Each console is bundled with the same game.

Please review the attributes of each of the three bundles and select the bundle that you would buy.

The price is given for the console, for the game, and for the bundle as a whole.

"fun" is rated from ★☆☆☆☆ to ★★★★★

1 star means that "fun" is okay and 5 stars means that the "fun" is great.

Please review the attributes of each of the three bundles and select the bundle that you would buy.

Console A	fun: ★☆☆☆☆	Console price: € 99	With:	 game: tennis	fun: ★★☆☆☆	Price: € 30
Console B	fun: ★★☆☆☆	Console price: € 399	With:	 game: tennis	fun: ★★☆☆☆	Price: € 30
Console C	fun: ★★★★☆	Console Price: €399	With:	 game: tennis	fun: ★★☆☆☆	Price: € 30