

Investigating social comparison in the context of an online Pay-What-You-Want store

Graduation Thesis

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Abstract— Pay-what-you want (PWYW) is an attractive pricing mechanism that allows customers to pay the amount they are motivated to spend. The model has been successfully implemented in restaurants and stores, but online applications remain risky. Online customers are less driven by guilt and less influenced by what others might think of them when deciding on a price, as they are anonymous and do not meet the seller. In the present study, social comparison was considered as a variable that might influence a payment decision. A participatory experiment was designed in the form of a mock online PWYW store to investigate this. Results show that customers were generally more likely to compare themselves to others who had paid lower prices and decrease the amount of money they wanted to pay. Additionally, individualists were more likely to increase, while competitors were more likely to decrease their final offer after comparison.

Index Terms—Pay-what-you-want, voluntary contribution, social comparison, social value orientation, persuasion, captology.

I. INTRODUCTION

In today’s digital era, illegal file-sharing, while being extremely hard to fight against, has been reported as a main cause for big financial losses in music, film, game, software industries and others. Even though pirates must live with the fear of being caught and accept the lesser quality of the illegally obtained product (no updates, no available services from the seller, etc.), illegal file-sharing seduces many whether it is for the convenience or the free price. Amidst the consumers who refuse to pay prices they consider too high and companies who fear the effects of piracy, the Pay-What-You-Want (PWYW) model offers an interesting alternative that meets both parties halfway [1]. PWYW is a participative pricing mechanism that involves and gives control to the customer. Unlike other participative pricing strategies, like auctions and Name-Your-Own-Price, PWYW makes the seller more vulnerable to prices below marginal costs as the seller has to accept whatever price the buyer chooses, even if it is only 1 cent [2]. Particularly this last aspect makes the financial argument in favour of illegal file-sharing unreasonable, and should convince pirates to purchase the product legally.

Naturally, one could have doubts as to whether a model, that sounds as financially risky as PWYW, could work at all. Theoretically, and according to classic economics theory, which assumes that humans are rational economic beings, these doubts are well justified. This “rational economic man”, also called “Homo Economicus”, is being characterized as acting consistently in a rational, self-interested, and profit-seeking way [3]. If all customers behaved this way in a PWYW setting, they would all pay nothing, resulting in no profits (and possibly the bankruptcy of the seller).

However, humans do not act as rationally as these economic models assume. How poorly a world with only rational economic men would work was illustrated Nobel Prize-winning economist Amartya Sen in the subsequent scenario:

“‘Can you direct me to the railway station?’ asks the stranger. ‘Certainly,’ says the local, pointing in the opposite direction, towards the post office, ‘and would you post this letter for me on your way?’ ‘Certainly,’ says the stranger, resolving to open it to see if it contains anything worth stealing.” [4, p. 14]

Acknowledging how absurd this scenario really is, shows us how far from reality the theory modelling people as purely rational is. Even though humans may be profit-seeking, and direct their choices towards the highest profit, the Homo Economicus model is flawed [5]. Research in human behaviour for instance has demonstrated that humans are irrational too [6], [7], that they may trust and cooperate with strangers [8], are influenceable, and are subject to many biases [9], [10]. Although differences in population and within individuals exist [5], [9]–[11], these irrational characteristics are what may uphold the success of a PWYW method [2].

II. RELATED WORK

The PWYW pricing strategy is a fairly new concept in the marketing world and consequently relatively little research has been done on this subject. We summarize the relevant and important findings from the field here.

In their theoretical study on PWYW strategies in the music market, El Harbi and colleagues [1] have demonstrated that a

PWYW pricing system would even increase the total revenue. They give three reasons: it lures money from customers that would otherwise have obtained the product illegally, customers that attribute a high value to the product pay more than the retail price, and it motivates customers to undertake additional, complementary purchases, like buying merchandising and concert tickets [12].

Practical studies [2], [13], [14] have shown that applying a PWYW model can be profitable. These studies were all set in restaurants and shops however, where face-to-face interactions were unavoidable to complete a purchase. In an analysis of factors contributing to the profitability of a PWYW strategy, Kim *et al.* [13] point out that direct contact is likely to stimulate customers to pay more than if no contact was required, due to customers not wanting to appear cheap. In accordance to these findings, Hilbert and Suessmair [15] found that the level of social interaction (no interaction vs. interaction) was positively correlated with the PWYW offer made. Although face-to-face interaction thus seems to be an important factor contributing to the success of a PWYW strategy, the success of Radiohead's PWYW-distributed album "In Rainbows" shows that it has also online applications [1], [2].

III. RESEACH QUESTION

Although online ventures remain risky, the game store Humble Bundle¹ is a further example of a successful implementation of a PWYW model. The store offers a weekly assortment of games "bundled" together, which can be purchased for whatever price the customer wants. Humble Bundle has chosen several different strategies to motivate customers to buy their products and incentivise them to pay, and not only spend the absolute minimum of \$0.01.

For instance, by buying a bundle, a customer may automatically support chosen charities, often connected in theme to the bundle they are purchasing. Intertwining a purchase and charitable giving in such a way is known to increase both willingness to buy and the purchase price in a PWYW setting [14], [16], [17]. Additionally, as Humble Bundle are known to support charities and cross-platform gaming, which their customers value, and act like a third party, is more likely to be successful with a PWYW strategy than large and profitable corporations according to Schmidt and colleagues [18]. Buyers might not only choose Humble Bundle as retailer because it is financially beneficial for them, but they might do it out of loyalty and to keep them in business as well.

Humble Bundle also provides their customers with plenty of information on their products and the charities their bundles support. Statistics are displayed, showing the average purchase price, the amount of purchases and the top 10 contributors for a selected bundle. All this information serves as an indicators of quality for Humble Bundle's products. The provided statistics are even more important as an additional strategy, which consists of offering customers free, supplementary games if they pay more than the average and/or another price (typically around \$15). A recent study [19] that collected empirical data from a Polish equivalent of Humble Bundle for ebooks, has

found that while the display of the purchase prices of the top 8 contributors did not influence the price distribution of subsequent buyers, the average did have a positive impact on the price distribution, but a negative impact on the probability of a new customer buying the bundle.

These different incentives seem to work to some extent since the store has sold more than 19 million bundles since its beginning in 2010, proving the immense popularity of the concept. Although participating developers have apparently earned more than \$100 million, the fact remains that the average customer pays far under the recommended retail price of the total bundle. The store's most popular bundle for instance, the Humble Origin Bundle, that has grossed more than \$10 million, had a retail price of \$240, but customers paid no more than \$5 on average. Considering this big gap in value and payment, this study aims at determining whether the effects of social comparison may be effectively used to stimulate an anonymous customer to purchase a product for a higher, fairer price. Thus, can social comparison make PWYW more profitable?

IV. HYPOTHESIS

Captology is the study and design of Computers As Persuasive Technologies and involves the smaller or bigger elements of computing products such as software applications or online websites that aim to influence user behaviour [20]. Our aim is to persuade users to increase the price they want to pay for a PWYW product. We propose social comparison as a persuasive medium.

Social comparison is a psychological phenomenon first described by Festinger [21] as a tendency of humans to compare themselves to others to evaluate themselves and acquire self-knowledge if no objective and non-social means are available. This natural tendency to compare oneself to others occurs frequently, and often automatically and subconsciously [22]. The customer faces a lot of uncertainty during the purchase of a product using a PWYW scheme. He/she not only has to choose whether to buy the product or not, but also has to consider what price to pay: what is the product worth, what price would be beneficial for themselves, what price would be acceptable to pay? In such an ambiguous situation, customers seek to reduce this uncertainty [23], and when comparing themselves to others might be influenced by other customers' choices.

H: Social comparison is used to influence customers' purchase price.

H0: Social comparison does not influence customers' purchase price.

V. PREDICTIONS

A number of predictions were made based on previous literature.

When given the chance to compare their price decision to those of others, the customer will evaluate their own choice to reduce uncertainty [23] (see **P1**).

Moreover, this tendency to compare oneself to others has been found to be unidirectionally upward in the case of

¹<https://www.humblebundle.com/> [August 10, 2015]

abilities as a result of an intrinsic drive to improve oneself [21], [24]. Additionally, it is even stronger when certain situational factors apply: when there is no contact with the comparison other, the inferiority of oneself stays private, when there is no risk of the other looking down on oneself, or there is a salient motivation to better oneself [22]. We therefore expect customers to perform upward comparison as they usually prefer to compare with others that are slightly better off, meaning those who paid a higher price and this tendency is stronger in a private setting (see **P1 a**).

However, in a situation where an individual feels bad about their performance or behaviour, downward comparison can help him/her alleviate a negative affect, as a relative comparison would show them still performing or behaving better than those doing worse than them, meaning those who paid a lower price [22]. Thus, if customers chose a price below average for a PWYW product, they might feel inclined to perform downward comparison, since information that others are doing worse (ie. paying even less) than them would lessen their negative feeling (see **P1 b**).

Festinger [21] has also noted that the upward drive generates a natural dynamic of competitive behaviour to become or stay superior. According to Garcia and colleagues [25], competitiveness can therefore be seen as a manifestation of the process of social comparison. They distinguished several situational factors that increase comparative concerns and thus competitiveness: incentive structures, the proximity to a standard, the number of competitors, and social category fault lines. Competitiveness and social comparison are thus closely related and competitive individuals are therefore more likely to be affected if given comparative information (see **P2**).

Incidentally, Schuurman and colleagues [26] have classified gamers into 4 categories based on their motivations to play video games: overall convinced gamer, convinced competitive gamer, escapist gamer, and pastime gamer. For their sample of 2895 Belgian gamers, they found an occurrence of respectively 33.8%, 24.7%, 27.2% and 14.4%. The motivations “challenge” and “competition” were at ranks 3 and 4 (out of 11) for overall convinced gamers, 1 and 2 for convinced competitive gamers, 7 and 9 for escapist gamers, and 3 and 5 for pass-time gamers. These numbers indicate the importance of competitiveness amongst gamers. Simultaneously, it also suggests that gamers are a fitting target group for the use of social comparison in an online PWYW store to stimulate customers to purchase a product for a higher price.

Due to the motivating nature of social comparison, we believe that providing customers with comparative information would stimulate them to perform better than other customers and push them to pay more in a PWYW-type store (see **P3**). More specifically, and according to the classification of Social Value Orientations (SVO) [27], we expect competitive individuals to increase their initial price in order to improve their ranking in comparison to others (see **P4 a**). In contrast, individualists may use the comparative information as further incentive to increase their own profit, by decreasing their initial price (see **P4 b**). Prosocials on the other hand, since they are concerned with decreasing differences between them and others might direct their initial price to match those of the

majority (see **P4 c**).

Since the comparison highlights the position of the customers in relation to others, it is expected that customers will be motivated to change their initial price by their position and not by the cost (see **P5**).

We summarize the hypotheses as follows:

P1: Customers are likely to compare themselves to others if they are given the chance to do so.

P1 a: Customers will in general compare their offer with those who paid more than their initial offer.

P1 b: Customers with initial offers below average will compare with those who paid less than their own offer.

P2: Competitive individuals are more likely to show interest in comparing themselves to others.

P3: Interest in comparison is positively related to likelihood of changing amount offered.

P4 a: In the case of competitive customers, the change in price is likely to be upward.

P4 b: In the case of individualistic customers, the change in price is likely to be downward.

P4 c: In the case of prosocial customers, the change in price is likely to be upward if the initial price falls within the first quartile, and downward if the initial price ranks above the third quartile.

P5: Customers are likely to show interest in their relative position first, and in the price amount later.

VI. METHOD

The purpose of these hypotheses is to study whether customers of an online PWYW store might explore their position in ranking by comparing their price choice to those of other customers, what trajectory this exploration takes and whether it has any effect on the final price. To investigate these aspects, we make use of the existing online PWYW store Humble Bundle in two ways. Firstly, statistics on the store’s purchase numbers and amounts are relevant to study the consumer behaviour of anonymous, online customers which use a PWYW model. Secondly, because of its successful implementation, Humble Bundle is used as framework for the experiment’s purchase simulations.

VII. PRELIMINARY DATA COLLECTION

Data was collected from the main bundle sold by the online game store Humble Bundle. The collection period spanned from June 8th 2015 to October 14th 2015, which coincided with the sale of 9 different bundles that were each available for 2 weeks. The following information was retrieved every minute from the site’s real-time updated purchase statistics: total payments, number of purchases, average purchase, and payment amounts of the top 10 contributors.

A limited amount of this data collection was used for the implementation of pilot 1. However, no further use was made of it for the present study.

VIII. PILOTS

A. Pilot 1

The first pilot was conducted with 5 participants. All participants undertook 3 tasks: (i) answering a general questionnaire

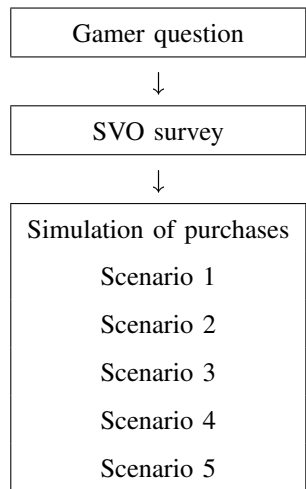


Figure 1. Flow through the experiment

on their relation to games, (ii) answering a SVO survey, and (iii) completing purchase simulations in 5 different scenarios (see Figure 1).

1) *Participants.*: Participants were postgraduate students of the Cardiff University and were recruited by approaching them in their offices. All participants were aged above 16 years, and no further information was asked and is known about them. All experiments were executed in accordance to local ethical guidelines, the English Law, and the Declaration of Helsinki.

2) *Experimental set-up.*: The experiment was designed as an online survey. The pilot was performed on a laptop, running the experiment on a local server.

More than being only a survey, the experiment is also concerned with the human-computer interaction aspect of the purchase experience. The site on which the purchase simulations are completed functions as interface, which is the key element that might influence the customer to display a certain behaviour or not.

3) *Procedure.*: The experiment started off with information about the experiment and a consent page, and followed by the 3 different tasks. The data generated by each of the tasks was recorded separately to keep track of whether and when a participant would quit the experiment. Additionally, the participant is allowed to leave blank answers in all tasks to prevent them from answering randomly against their will or out of boredom [28].

a) *Gamer question*: The participant is asked to select the options that describe him best in a list of statements about their relation to games (eg. “I play games as a pastime.”, “I spend a lot of time on games.”, and “I know the online game store humblebundle.com.”). Choosing several answers was allowed, and the participant was also given the opportunity to add their own statement. This single question is important to determine the suitability of the purchase simulations and to check for any consequences knowing and/or having used Humble Bundle might have. As regular customers’ offers tend to decrease over time [29], customers that have used Humble Bundle before might use the experiment’s interface differently from those who do not know of Humble Bundle.

b) *Social Value Orientation Scale*: In order to determine if the participant is competitive, they are asked to complete a survey modelled after the scale proposed by Van Lange *et al.* [27] to measure the SVO. This scale determines the SVO on the basis of 9 questions, which requires the participant to allocate points to themselves and an anonymous other, whether they are prosocial, individualistic, or competitive.

Table I
SUMMARY OF THE ANALYZED VARIABLES PER PREDICTION

Pred.	Analyzed variables						SVO
	Price		Clicks on arrow buttons				
	Initial	Final	Yes/No	↑/↓	\$/%		
P1			•				
P1 a				•			
P1 b	•			•			
P2						•	•
P3	•	•				•	
P4 a	•	•					•
P4 b	•	•					•
P4 c	•	•					•
P5					•		

c) *Simulation of purchases*: The interface for a fictitious online store “Modest Set” was created resembling that of Humble Bundle and each of the participants was presented a series of 5 different purchase scenarios. The participants were asked to assume the following: that they like all of the games presented in the bundles, that they want to own all of those games, that all games are compatible with their platform, and that they were buying these with their own money.

Scenario 1 (control): The first scenario is the simplest. The participant can chose a price based only on one type of information: the recommended retail price (RRP) of the bundle, which is varied randomly across participants between 88, 168, and 226 dollars.

Scenario 2: In this scenario, after the participant chooses an initial price, the screen changes and they are shown their current position according to the initial price chosen, eg. for \$10: “You are contributing more than 27.09% of others who bought this bundle.”. They are then given the opportunity to explore the shift in position (displayed by the percentage) through the manipulation of the price or vice versa by clicking the up and down arrows next to the given price or percentage. The price they stay on last is considered the amount they chose to pay.

The shown RRP for this scenario is \$155 and the distribution that matches prices and percentages together has been generated from the data collected during study 1 from an existing bundle from Humble Bundle, which had a RRP of \$155.

Scenario 3: This scenario is the exact duplicate of scenario 2, except that the displayed RRP (and the matching price-percentage distribution) is again randomized between \$88, \$168, and \$226. The distributions were created on the basis of the \$155 distribution, but were modified to match the averages of the existing bundles that had \$88, \$168, and \$226 as RRP.



Figure 2. Screenshot of the second scenario in the online experiment.

Table II
SUMMARY OF ALL SCENARIOS

Scen.	Comparison to others?	Manipulation of price influencing percentage?	Manipulation of percentage influencing price?	RRP
1	No	N/A	N/A	\$88, \$168, or \$226
2	Yes	Yes	Yes	\$155
3	Yes	Yes	Yes	\$88, \$168, or \$226
4	Yes	Yes	No	\$155
5	Yes	Yes	No	\$88, \$168, or \$226

Scenario 4: This scenario is similar to scenario 2, but instead of letting the participant choose between manipulating the given price or percentage, only the price can be manipulated and the percentage is shown accordingly.

Scenario 5: While scenario 4 has a RRP of \$155, scenario 5, has a randomized RRP (\$88, \$168, or \$226).

For all scenarios, the initial price, the “explored” prices, how they were obtained (by increasing the price or percentage), and the final price were recorded. A summary of the different variables is presented in Table I and summary of the differences between scenarios is shown in Table II.

B. Pilot 2

A second pilot was held as it was noticed that the distribution of the initial prices chosen by the participants in the first pilot were divergent. In order to test a more realistic scenario, the distributions for the 4 different RRPs were modified. Each of the distributions was created by generating a normal distribution with an appropriate mean and standard deviation. No other changes were made to the experiment.

In total, eight participants completed pilot 2, of which 3 had also done pilot 1.

C. Results

Firstly, it was hypothesized that customers are likely to compare themselves to others if they are given the chance to do so (**P1**). Both pilots provide evidence for this. In pilot 1 (p1), 4 out of 5 participants compared themselves to others at least once, while in pilot 2 (p2), 5 out of 8 did so. Both in p1 and p2, in most scenarios where no comparison was made, the participant had made an initial price choice above average (19 out of 26) with most price choices ranking them above 80% of the fictitious peers who had already bought the bundle (17 out of 26), see Table III.

Next, we speculated that customers are likely to compare themselves to others that are doing better than them (**P1 a**). This hypothesis seems unlikely as 9 of all 10 instances (i.e. scenarios) where participants compared themselves to others in p1 were downward, and only 1 was an upward comparison. However, p2 showed a higher ratio of upward comparisons

Table III
RANKING OF PARTICIPANTS (%) AFTER THEIR INITIAL PRICE CHOICE AND DIRECTION OF COMPARISON

Scenarios		2	3	4	5
Pilot	x				
1	1	90	90	90	20
	2	100	100	100	100
	3	90	100	90	20
	4	100	90	50	60
	5	100	90	100	90
2	6	0	0	0	0
	7	90	90	90	100
	8	0	0	0	0
	9	80	40	80	40
	10	0	90	80	0
	11	90	90	80	90
	12	0	0	0	0
	13	80	90	80	90

x = participants, orange = downward comparison, green = upward comparison, blue = no comparison

with 9 upward comparisons out of 15 comparison instances (Table III). Contrary to what we expected, participants that chose a price below average mostly did not compare themselves to those worse than themselves (**P1 b**), but to those who were doing better. In p1, the only instance where upward comparison was performed, the participant had chosen a price below average (the participant performed better than 27.09%). For all instances where downward comparison was performed, the participants had chosen initial prices ranking them already at more than 90%. Similarly, in p2, in 8 out of the 9 instances where upward comparison was performed, the participants had chosen a price below average, and in 4 out of the 6 instances where participants performed downward comparison, they had again chosen initial prices ranking them at more than 90% (Table III).

We further hypothesized that competitive individuals would be more likely to show interest in comparing themselves to others (**P2**). Since none of the participants in both pilots were classified as “competitive” by the SVO scale (which resulted in the classification of respectively 2 and 5 “prosocial”, and 3 and 3 “individualistic” individuals for p1 and p2), nothing can be said about **P2**.

Subsequently, customers that showed high interest in comparing themselves to others were expected to change their initial price more than those who those who showed less interest (**P3**). The amount of clicks on the arrow buttons participants made was not found to be relevant however, as all those who compared themselves to others (10 participants in total for both pilots) changed their initial price in all 25 instances, except for 1 participant in 1 scenario (Table IV).

More particularly, we hypothesized that competitive individuals would change their price upwards, that individualists would reduce their price, and that prosocials would change

Table IV
PRICE DIFFERENCE (\$) BETWEEN THE INITIAL AND FINAL PRICE

Scenarios			2	3	4	5
Pilot	x	SVO				
1	1	P	-2.5	-7.5	0	2.5
	2	I	-150	-77.5	-150	-142.5
	3	I	-47.5	-12.5		
	4	I	-120			
	5	P				
2	6	P	2.5	2.5	2.5	2.5
	7	I	-77.5	-35	-77.5	-115
	8	P	-5	5	-5	
	9	P	10	15		20
	10	I	5			
	11	I				
	12	P				
	13	P				

x = participants, orange = negative difference in price, green = positive difference in price, blue = no difference in price, blank = no comparison

their price in the direction of the average (**P4 a, b, c**). Again, no data on competitive individuals was available, therefore no comment could be made about **P4 a**. However, partial support for **P4 b** and **P4 c** was found. In p1, all 3 individualists that compared themselves to others at least once decreased their price in all instances they performed a comparison. In p2, of the 2 individualists that compared themselves to others at least once, one decreased the price in all the scenarios, and the other increased the price in the only instance they performed a comparison (Table IV). Again in p1, the only prosocial that compared themselves to others mainly decreased the price (in 2 out of 4 instances, with 1 increase and 1 constant in the other scenarios). In p2, 2 out of 3 prosocials that had compared themselves to others increased the price in all instances, and the last mainly decreased the price (in 2 out of 3 instances, with 1 increase in the in the other scenarios), see Table IV. Additionally, in the 4 scenarios where the participant performed a comparison and chose an initial price above 75%, the price was consequently decreased twice, increased once and stayed constant once. Simultaneously, the price was increased in 6 out of the 8 instances where the chosen initial price was below 25% and decreased twice. This results in 3 out of 4 prosocials being consistent with the proposed hypothesis **P4 c**, see Tables III and IV.

It was also noted that the direction in which the comparison was made and the direction in which the price was changed were strongly correlated. Indeed, in all 16 instances but one, a downward comparison meant a decrease in price and all 10 upward comparisons led to an increase in price, see Tables III and IV.

Lastly, it was hypothesized that customers are likely to explore their position in relation to others first, before revising the price (**P5**). However, except for one instance in p2, all

participants changed the price rather than the percentage in the interface, therefore nothing could be said about **P5**.

D. Discussion

Since the analysed data stems from pilots with few participants, the results may not be entirely representative of neither the general population, nor gamers. We can therefore not draw meaningful conclusions, but we will discuss the preliminary results.

1) *Presence of social comparison*: In line with our expectations, most participants chose to compare their initial price choice with the final price choices of others. This finding is in agreement with Festinger's social comparison theory [21]. It is also consistent with people's drive to decrease uncertainty in an ambiguous situation, namely being given absolute freedom in price choice.

The choice of those participants that did not perform any comparison may be founded too. Although they did not participate in further comparisons by clicking on arrow buttons, they did get comparative feedback on their first price choice. If they were immediately satisfied with the position they might not feel compelled to explore other possible rankings further. This situation might have occurred for some of the participants, as they were ranked above 80% in 19 out of 25 instances where no comparison was made. Others, undoubtedly, were not aware of or were uninfluenced by the shown ranking.

2) *Direction of comparison*: Contrary to our hypotheses, the preliminary results showed that customers who chose a price below average tend to compare themselves with those who did better and vice versa. It was hypothesized that those who chose relatively inferior prices would alleviate their negative affect by comparing to those who did even worse. However, it seems that participants, in an effort to feel better, chose to simultaneously compare to those who did better than them showing them the improved ranking they would achieve if they were to give more. Participants who chose a high initial price however, instead of aiming at getting an even better ranking, could justify decreasing the price to themselves as it was shown that they were still doing better than most others while benefiting more financially, making them feel better by having gotten a "better deal".

3) *Presence of price change*: As outlined previously, in all but one instance where a comparison was performed, the price-ranking exploration process induced a price change. Rather than low or high interest being a factor in predicting a price change, any interest resulted in the participant increasing or decreasing their initial price. This indicates that social comparison is indeed a variable that influences customers' price decisions.

4) *Direction of price change*: For correlations between the direction of price changes and the social value orientation, the statistical power of the analysis is even weaker than the previously stated findings. We therefore advise caution handling the following interpretations.

The results seem to indicate the confirmation of our hypotheses linking social value orientation (individualistic and prosocial orientations) to the direction of the change in price.

In accordance to the description of the individualistic orientation [27], the participants classified as individualists sought in all instances but one to maximize their own profit by decreasing their initial price. Prosocials, who both maximize their outcomes and those of others and minimize individual differences [27], indeed tended to shift their price towards the average.

5) *Adjustments prior to the experiment*: Based on the results of the pilot studies, several adjustments can be made to the full study in order to obtain qualitatively better results.

Firstly, the distributions used as a basis for comparison will be the same as used in pilot 2. This is done in an effort to achieve a realistic distribution adjusted to the target group of the study.

Secondly, **P5** will be discarded, since the interface created for the experiment appears not to be suited to answer this hypothesis. This consequently makes scenarios 2 and 3 superfluous.

IX. EXPERIMENT

A. Participants

Participants were recruited via social media, email, forums, message boards, particularly but not exclusively focusing on gaming-themed communities. All participants had to be aged above 16 years, and no further information was asked of them. All experiments were executed in accordance to local ethical guidelines, the English Law, and the Declaration of Helsinki.

B. Experimental setup.

Contrarily to the pilot, the experiments for the study were conducted online². This online setting provides several important advantages compared to a lab setting:

- The environment is more natural if participants complete the experiment on their own computer (or machine they usually use), since they would do the same if they were going to make a real online purchase.
- The target audience, gamers in this case, are easier to reach through message boards, forums, online communities centred on games.

The anonymity is kept to a greater level as participants make no direct or even indirect contact with researchers, which replicates most accurately the level of anonymity which a customer of an online store would have.

C. Procedure.

The experiment followed the exact same procedure as the pilots, with the exception of having only three scenarios instead of five, since the second and third scenarios (useful only to **P5**) were no longer required. The reason for this change is explained in the discussion of the pilots (see Section VIII-D5).

²<http://gamer-study.cs.cf.ac.uk/>

X. RESULTS

Data from 266 people was collected of which 168 were complete entries and 98 incomplete. Only the complete entries ($N = 168$) were used for the analysis of the results. The experiment’s distribution of prosocials, competitors, individualists and unclassified were similar to that of previous studies [30] (see table V). However, it should be noted that most social value orientation studies have been performed in the field of psychology and with psychology students as participants. This selective pool of participants may differ from the real world population [?].

Table V
PERCENTAGES OF PROSOCIALS INDIVIDUALISTS, COMPETITORS AND UNCLASSIFIED

Social value orientation	Experiment	Au & Kwong (2004)
Prosocials	57.1	49.7
Individualists	20.2	23.5
Competitors	12.5	13.4
Unclassified	10.1	13.4

A. Scenario 3

A much smaller subset of participants were interested in comparing themselves to others in scenario 3 than in scenario 2 (respectively 75 and 44 out of 168). This might have been caused by a loss of interest for the comparison. Alternatively, it could have been the consequence of a heuristic effect which may have led their decisions and observations in scenario 2 to influence the way they behaved in scenario 3. This effect is significant and strong for eg. the initial price for scenario 2 and the initial price for scenario 3 ($\rho = .776$, $p = .000$).

For these reasons, only the data collected from the second scenario is analysed in the subsequent paragraphs. However, it should to be noted that except for prediction 1, none of the significant findings described in this section for scenario 2 were replicated for scenario 3. This might have been caused by the smaller sample size of participants that used the arrow buttons or by the observed learning effect.

B. Descriptive statistics

In the second scenario, 168 “customers” purchased the “Sphere Set”. The set, labelled with a \$155 retail price, was bought at an average price of \$37.35, which corresponds to 24.10% of the total worth. In contrast, the average price paid by Humble Bundle customers for 10 different bundles, sold between March 3rd 2015 and August 31st 2015, corresponded to only 4.45% of the retail price [?]. This is indicative of a gap between real purchases and the simulations used in the present study.

C. Prediction 1

It was hypothesized that customers are likely to compare themselves to others if they are given the chance to do so (**P1**). Indeed, almost half of the participants (75 out of 168) made

Table VI
DESCRIPTIVE STATISTICS OF PURCHASES ($N = 168$)

	Initial offer	Final offer	Initial ranking	Final ranking
Mean	39	37.35	19.90	19.08
SD	38.7	39.09	32.73	31.60
Median	25	25	2.21	2.21
Total	6552	6274		

offers in \$, rankings in %

use of the arrow buttons, shifting the individual’s ranking and offered price up and/or down. Moreover 49 out of the 75 used both up and down arrows. Prediction **1** is therefore supported.

We further speculated that customers are likely to compare themselves to others who are doing better than them (**P1 a**). This was measured by evaluating if their first click on an arrow button was down or up. A binomial test indicates participants were significantly more likely to press the down arrow first (66.7%), compared to the up arrow (33.3%), $p = .005$. Prediction **1a** is therefore unsupported as the reverse effect was found.

These results remained the same for the subset of people that had chosen a price below average. The difference between participants that chose to go up and the participants that chose to go down was statistically significant ($p = .030$), with again 66.7% going down. Prediction **1b** is therefore supported.

During the pilot, it seemed like the high ranking achieved by a high initial offer might be partly responsible for participants not further comparing themselves to others (i.e. not using any of the arrow buttons) as they might consider their high ranking sufficient and satisfying. However, analysis of the experimental data showed there was no significant difference ($\chi^2(1) = 0.524$, $p = .469$) in initial offers between participants that used the arrow buttons and participants who did not. The initial amount offered was therefore not predictive of whether or not participants would compare themselves to others.

D. Prediction 2

Moreover, we hypothesized that competitive individuals would be more likely to show interest in comparing themselves to others (**P2**). The level of interested was quantified by the number of times the participant clicked on an arrow button. Since the data was not normally distributed, a Kruskal-Wallis test was used. The SVO, when classified in a binary fashion into “competitors” and “others”, was indeed a significant predictor of the number of clicks on arrow buttons ($\chi^2(1) = 5.148$, $p = .023$), with competitors having a mean of 9.714 ($SD = 12.434$) and others a mean of 6.252 clicks ($SD = 14.229$). Prediction **2** is therefore supported.

E. Prediction 3

Customers that showed high interest in comparing themselves to others were expected to change their initial price more than those who showed less interest (**P3**). The results from a simple logistic regression revealed that the number of clicks is a statistically significant predictor of whether or not

there is a change in price, $Wald = 4.517$, $p = .034$, with the test of the overall model being statistically significant, LR chi-squared 5.085, $p = .024$. This is however no longer significant when only the cases where participants used the arrow buttons at least once are considered ($Wald = .143$, $p = .705$). It is therefore the presence of clicks (ie. participants choosing to compare themselves to others), rather than the number thereof that was predictive of the presence of a change in price, with roughly two thirds (51 out of 75) of the participants that used the arrow buttons changing their final offer. Prediction 3 is therefore unsupported.

F. Prediction 4

Finally, we hypothesized that competitive individuals would change their price upwards, that individualists would reduce their price, and that prosocials would change their price in the direction of the average (P4 a, b, c). A Kruskal-Wallis test indeed showed that significant differences existed in price changes (in dollars) between the different types of SVO ($\chi^2(3) = 14.431$, $p = .002$). An evaluation of the means further showed that individualists were the only group with a positive mean, signifying an increase of the final offer ($M = 0.368$, $SD = 22.055$). The other groups had all decreases in price on average. Prosocials decreased the least ($M = -1.094$, $SD = 8.742$), followed by the unclassified participants ($M = -3.971$, $SD = 16.227$), and with competitors coming last with a mean of -5.595 ($SD = 16.862$), see Table VII. Predictions 4a and b are therefore unsupported as the opposite effect was found.

Further Kruskal-Wallis tests were conducted to check for the SVO's influence on the price difference specifically for cases where participants had chosen an initial price below 25%. A significant difference ($\chi^2(3) = 13.635$, $p = .003$) was found between the different types of SVO. The negative prosocials' mean ($M = -0.531$, $SD = 8.322$) however contradicts the prediction. Furthermore, no significant difference between SVO groups ($2(3) = 1.046$, $p = .790$) was found for initial price choices above 75%. Prediction 4c is not supported.

Interestingly, how much a SVO group increased or decreased their final offer in average was not influenced by how "generous" in average they were. While the initial offer and the change in price were not significantly correlated ($p = .227$), the final offer and the change in price were weakly correlated ($\rho = .266$, $p = .000$). Differences between initial and final offers for the different SVO groups were however not statistically significant ($p = .058$ and $p = .251$ respectively), see Table VII.

G. Summary

P1: Supported. Customers are likely to compare themselves to others if they are given the chance to do so.

P1 a: Unsupported. Customers will not in general compare their offer with those who paid more than their initial offer, but compare their offer with those who paid less.

P1 b: Supported. Customers with initial offers below average will compare with those who paid less than their own offer.

P2: Supported. Competitive individuals are more likely to show interest in comparing themselves to others.

P3: Unsupported. No relation was found between the level of interest and the likelihood of changing the amount offered.

P4 a: Unsupported. In the case of competitive customers, the change in price is unlikely to be upward, but is likely to be downward.

P4 b: Unsupported. In the case of individualistic customers, the change in price is likely to be downward, but is likely to be upward.

P4 c: Unsupported. Insufficient evidence was found to determine the relation between the direction of price change and the initial price rank for prosocial customers.

XI. DISCUSSION

A. Presence of social comparison

In agreement with our expectations and the results from the pilots, participants were likely to compare their initial price choice to the final prices chosen by others. This is congruent with people's drive to decrease uncertainty in ambiguous situations [23]. The position of being given the freedom of choosing whatever price they like for a product while still wanting to remain fair thus drives participants to seek and rely on information that is presented to them. This information is limited to the retail price of the product and the possibility to see how many people paid more or less than them. People's tendency to evaluate themselves by comparison to others [21] then comes into play.

B. Direction of comparison

In partial support with our predictions, it was found that for both the whole sample of participants and the subset who chose an initial price below average, the participants chose to compare their offer to those who paid less. No distinction was therefore made between participants at different rankings (i.e. participants that have received a lower or higher position based on their initial price). Festinger's theory states that people tend to compare themselves to those who perform better in order to better themselves [21]. In the context of this research, "performing better" was interpreted as "paying a fairer price", i.e. a higher price in this case. However, the perspective from the participants might have been different. In their point of view, "performing better" might have been equivalent of "getting a better deal", i.e. paying a lower price than others. This would explain the current findings.

C. Interest in comparison

In line with our expectations, competitive individuals showed more interest in comparing themselves to others than participants belonging to the other SVO groups. This confirms in principle the greater impact of social comparison on those who are more competitive [25]. However, a confounding factor should be considered too: since the arrow buttons have not only the function of enabling comparison but also of changing the price. The comparison to others remains nonetheless the determinant factor for a change in price if there is one.

Table VII
MEANS, STANDARD DEVIATIONS, AND MEDIANS OF THE INITIAL AND FINAL OFFER, AND DIFFERENCE IN PRICE (IN \$) PER SVO

SVO	N	Price difference			Initial offer			Final offer		
		Mean	SD	Median	Mean	SD	Median	Mean	SD	Median
Unclassified	17	-3.971	16.227	0	55.412	42.717	50	51.441	42.566	47.5
Competitive	21	-5.595	16.862	-5	54.048	50.488	25	48.452	52.210	20
Individualistic	34	0.368	22.055	0	31.794	31.244	25	32.162	33.988	17.5
Prosocial	96	-1.094	8.742	0	35.349	36.325	25	34.255	36.381	25
Total	168	-1.652	14.226	0	38.997	38.701	25	37.345	39.089	25

D. Presence of price change

No evidence was found for a relation between the level of interest in comparing to others and the likelihood of triggering the action of changing the final offer. The presence of interest itself was decisive rather than the level thereof, making the level of interest a contributing but not determinant factor.

E. Direction of price change

While a positive change in price was expected for competitors and a negative change was predicted for individualists, the reverse effect was found for both SVO groups. Moreover, no evidence supporting our prediction about prosocials changing their offer towards the average price was found.

The reason behind the results found for the competitors might be similar to the reverse effect found for the general direction of comparison (see Section XI-B). While we interpreted a better performance to be “paying a fairer price”, it is likely that customers see this differently. Thus resulting in competitors, who have an even stronger drive to perform better than others, to decrease their final offer even more. This is also reflected in the mean price difference in comparison to other SVO groups (see Table VII), where competitors have the highest absolute value.

We expected individualists to decrease their price, as their SVO is characterised by their tendency not to be influenced by others and to maximize their own profits [27]. Surprisingly, and contrarily to this expectation however, the outcome of our experiment singled them out as the only SVO group that increased their price on average. However other inconsistencies with SVO group characteristics have been found previously. While the importance of the equality of outcomes had been reported as solely a prosocial characteristic, Van den Bergh, Dewitte and De Cremer [?] found evidence that it concerns individualists as well. Additionally they point out the relevance of Bazerman, Loewenstein and White’s studies [?] for SVO scales. Bazerman et al. found that although “\$500 for self/\$500 for other” was rated independently more desirable than “\$600 for self/\$800 for other”, participants chose “\$600 for self/\$800 for other” when presented with both options. Van den Bergh et al. regard this as an indication that prosocials may only choose to maximize joint outcomes when they are given the simultaneous choice between an option that minimizes the differences between individual outcomes and an option that maximizes joint outcomes, which is the case in Van Lange’s SVO scale [27]. This suggests that SVO groups’ motivations appear to be context-dependent. As a result, certain SVO

groups, such as individualists in our case, might not behave as expected, because of external factors that have not yet been identified or controlled for. One such external factor could be the online setting of the study.

XII. CONCLUSION AND FUTURE WORK

Results from the experiment have demonstrated that social comparison can be used as a persuasive mechanism to prompt customers in an online PWYW store to change the price they are offering to pay. However, in this setting, the majority of the users chose to decrease their final offer, while an increase towards the retail value of the product was aimed for.

While our findings regarding competitors were justifiable, the outcomes for individualists were surprising. Further research will be needed to explore the reasons behind these findings contradicting SVO research. Moreover, the results on prosocials were inconclusive. This is unfortunate since they form the majority (57.1%) of the population, which makes it challenging to make recommendations for achieving better results.

The framing of the social comparison element could however be experimented with. It has been discovered that the different formulation of a sentence (particularly positively and negatively) containing the exact same information has consequently led to different preferences of choices [9]. While a positive formulation was chosen (“You are contributing more than 26.97% of others who bought this bundle.”), a negative variant (“You are contributing less than 73.02% of others who bought this bundle.”) might be more effective.

Another limitation of the study consists of the experiment’s distribution matching offers inputted by the users with ranking in percentages based on generated previous purchase amounts. This distribution, based on one of the pilot studies, gives a high threshold (eg. \$75.47 to get a rating of 50%) resulting in low rankings for the majority of the participants, while their price choice would be considered medium or high for Humble Bundle standards. We therefore recommend reproducing the experiment with different distributions matching medium and high rankings to the same price in order to evaluate whether this study’s findings are robust.

In conclusion, social comparison can be used as persuasive mechanism and incites the display of a certain behaviour, namely changing the original price the individual wanted to pay). It however has distinctive impacts on individuals with different social value orientations.

APPENDIX A
INFORMATION AND CONSENT PAGE

Consent

The research aims at gaining more insight on decision-making and the purchasing behavior of gamers.

It is divided into 3 parts:

- a general question on your relation to games (~30 sec),
- a survey on decision-making (~5 min), and
- a simulation of purchases on the online game store similar to humblebundle.com (~5 min).

Please be aware of that your participation is **totally voluntary** and you may withdraw from this research at any moment by closing the window or tab.

Please note that **no private information will be asked of you**. The data that is gathered will be collected **anonymously** and will stay so even if it is published in a scientific paper.

For juridical reasons, we are only interested in the participation of respondents that are **16 years or older**. If you are 15 years old or younger, please quit this research by clicking on the button “I do not agree” or by closing the tab or window.

If you have any questions concerning this research please send an email to NoeB@cardiff.ac.uk.

If you consent to the terms listed above, please click the button “I agree”, it will lead you to the first part of the research. If you do not consent to the terms listed above, please click the button “I do not agree” or close the tab or window.

Thank you

APPENDIX B
GAMER QUESTION

Select the options that describe you best

Choose as many as you like:

- I play games as a pastime.
- I play games professionally.
- I only play games once in a while.
- I spend a lot of time on games.
- I spend a lot of money on games.
- I don't play games.
- I know the online game store humblebundle.com.
- I have made at least one purchase on humblebundle.com.
- Other please specify:

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