SOCIAL DESIRABILITY BIAS IN SOFTWARE PIRACY RESEARCH

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Research in Progress

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Abstract

Most behavioural aspects of software piracy research are a subset of ethical research. Measures of ethical behaviour in research may be subject to biases in response to the social desirability of behaviours. Few studies in the area of software piracy have explicitly addressed this issue. Literature on social desirability bias (SDB) reports on three ways to address response bias: approaches to reduce bias, approaches to detect bias, and approaches to correct bias. In the current article, the published methods to reduce, detect, and, correct bias are reviewed. Then, the extent of SDB that may be present in the published software piracy literature is subjectively assessed. A study is proposed in which piracy behaviours involving real money are compared to the intent to pirate in paper-based scenarios, under equivalent conditions. The comparison is argued to be useful in compensating for SDB in future research.

Keywords: Software Piracy, Information System Ethics, Digital Media, Intellectual Property Theft, Social Desirability Bias

1 Introduction

Software piracy has been a problematic issue for the past three decades. The term 'software piracy' describes unauthorized use, or copying, of software products protected by legal intellectual property rights, such as copyrights, patents, and trade secrets (Gopal and Sanders, 1997; Konstantakis et al., 2010; Mishra et al., 2007). According to 2009 statistics developed by the Business Software Alliance, there is an annual revenue loss of over $50 billion throughout the entire industry (Chan and Lai, 2011; Moores and Esichaikul, 2011). Much of the research on software piracy views the phenomenon from an ethical perspective, seeking to understand why individuals pirate. In such research, subject responses are subject to social desirability bias (SDB) (Chung and Monroe, 2003). SDB is the under- or over-reporting of behaviours by a respondent in order to appear more acceptable, or gain the approval of others (Arnold and Feldman, 1981; King and Bruner, 2000; Nederhof, 1985). The topic of SDB has been studied extensively in psychology, ethics, and the social sciences (e.g., Nederhof, 1985; Paulhus, 1991); however, it remains neglected in software piracy research. While most published studies on software piracy acknowledge the possibility of biased responses, only four articles on software piracy published in Information Systems (IS) journals have directly addressed the issue. In the current article, we examine selected articles to qualitatively assess if SDB may have affected the reported results[1]. Our longer-term research goal is to explore ways in which SDB in software piracy research can be reduced, or compensated for. The current research-in-progress article outlines the first of the planned studies.

The rest of the article is organized as follows. First, the literature on SDB is reviewed, with particular emphasis on the techniques to reduce bias, detect bias, and correct for bias. Second, behavioural studies of software piracy published in IS journals are examined to assess if any efforts have been made to reduce, detect, or correct for SDB. Third, an empirical study planned to determine whether SDB affects the validity of software piracy research is described.

2 Literature Review

2.1 Social Desirability Bias

SDB can lead to serious validity problems in both laboratory and survey data (Nederhof, 1985). In response to social expectations, respondents tend to either 'fake good' (denying negative traits, and claiming positive traits), or 'fake bad' (claiming negative traits, and denying positive traits), depending on social context (Crowne and Marlowe, 1960; Gordon, 1987; King and Bruner, 2000). Traditionally, only the distortion of responses placing the respondent in a favourable light is considered when research refers to SDB (Nederhof, 1985). Distortion of responses can be done in two ways: through 'enhancement' and 'denial' (Paulhus and Reid, 1991). The former involves the over-reporting of socially desirable behaviours, and the latter the underreporting of socially undesirable behaviours.

The construct of 'faking good' is not a single component, but a combination of two separate factors: 'self-deception' and 'impression management' Paulhus (1984; 2002). Self-deception occurs when a respondent actually believes their inaccurate positive self-reports; on the other hand, impression management refers to the purposeful misrepresentation of the truth in order to avoid negative social evaluation (Paulhus, 1984; Nederhof, 1985). According to Nederhof (1984), the distinction of the two

[1] Other threats to the validity of results are recognized, but they are outside the scope of our present focus.

factors is important, as it separates SDB into situational determinants (which can in turn be influenced and manipulated by a researcher), and personal determinants (which can only be measured and controlled a-posteriori).

SDB may affect the validity of results in some cases, and not in others. For instance, if a software company conducts a survey of the user intent to pirate to get an aggregate measure of piracy rate as a prelude to a decision whether investments should be made to protect against piracy, then bias will distort results as respondents may understate intent to pirate. In contrast, if a researcher wishes to compare the effects of two treatments, and neither treatment is more socially desirable than the other, then the comparison may still be valid.

A number of different methods have been advocated to cope with the effects of SDB (King and Bruner, 2000; Nederhof, 1985; Paulhus, 1991). The first category refers to methods used to reduce SDB in the study. In the second, researchers attempt to detect and measure the bias. The third category refers to methods to correct observed SDB in the data. There are multiple methods in each category. Each method has its advantages and disadvantages; due to the limitations in page length, they are not discussed in the current article.

2.1.1 Reduction Methods

An array of methods is available to reduce the situational effect on desirable responding (Nederhof, 1985; Paulhus, 1991). These methods include the conditions under which data are gathered, the instructions given to the respondents, and other ways that make it difficult for the respondent to be biased. In the first category, methods to reduce response bias relate primarily to the demand bias exerted by the researcher. Data may be gathered using self-administered questionnaires, or through interviews. In general, self-administered questionnaires reduce interviewer expectations, and are more likely to be unbiased. However, the method has met with mixed results (Nederhof, 1985; Paulhus, 1991). In oral interviews, selecting appropriate interviewers helps to reduce SDB (Fisher and Katz, 2000; King and Bruner, 2000). Usually, efforts are made to establish adequate rapport with subjects in order to generate free and frank responses; however, the results of an interview are more likely to be biased when subjects feel a social connection to interviewers (Nederhof, 1985). Thus, it is important to swap 'warm' and 'person-oriented' interviewers with 'professional' and 'task-oriented' ones. For both self-administered questionnaires and oral interviews, stress minimization is important (Paulhus, 1991). Lastly, the bogus pipeline is a ruse, in which the respondent is connected to elaborate equipment (pseudo-lie detector) to make the respondent believe that false or biased responses can be detected, thus influencing the respondent to be truthful (Nederhof, 1985). It is complicated to set up, and its usefulness is doubtful at best.

In the second category of reducing response bias, the formatting of survey instructions could decrease the presence of SDB (Gordon, 1987). In particular, Gordon points out that it is vital to clearly state and emphasize that participation is voluntary, and respondents' identities will remain anonymous. Also, demand bias can be reduced by phrasing response items neutrally (Nederhof, 1985). Other methods rely on designs that make it difficult for the respondent to be biased. These methods include: forced choice items and randomized response technique (De Jong et al., 2010; King and Bruner, 2000; Paulhus, 1984). In forced choice items, researchers make subjects choose between two items possessing an equal degree of social desirability. The randomized response technique provides privacy protection through test item randomization, after which statistical analysis techniques are used to infer the true responses of participants (De Jong et al., 2010).

Finally, the use of proxy subjects can also prove advantageous (Bernardi, 2006; Nederhof, 1985; Paulhus, 1991). In this technique, instead of questioning the target individual about his or her personal behaviour, someone who knows the target is used as a proxy respondent. The 'proxy' is asked about

the behaviour of the target person. In a variation of this, the target subject can be asked about the likely behaviour of similar others in ethically dubious scenarios (Bernardi, 2006).

2.1.2 Detection Methods

Detection of the presence of SDB in data relies on scales developed to measure tendencies to favour desirable responses. A high correlation between a target variable and a SDB scale is considered indicative of the presence of response bias. Several scales have been developed to measure SDB. These include the Marlowe-Crowne Social Desirability Scale, Self and Other-Deception Questionnaire, Social Desirability Scale, varied MMPI Scales, Wiggins SD Scale, and the Balanced Inventory of Desirable Responding (BIDR) (De Jong et al., 2010; Nederhof, 1985; Paulhus, 1991). There was originally concern about the scales due to their low inter-correlations (Paulhus, 1991). Subsequently, Paulhus (2002) reconciled and integrated earlier work to suggest that socially desired responding results from egoistic bias or moralistic bias, and each form of bias having both a self-deception and impression management component. Further, his research suggests that impression management scales "are more useful as response sets than response styles." Response sets "are short-lived response biases attributable to some temporary distraction or motivation," and response styles are "biases that are consistent across time and questionnaires" (Paulhus, 2002, p. 49). This breakdown of the SDB scale into subscales facilitates the choice of scales to use depending on the response bias anticipated in a study.

2.1.3 Correction Methods

Once the presence of bias is established, different approaches have been proposed to cope with it, or correct for it. These include: discarding responses of subjects who have high measures SDB, or using statistical control techniques to account for bias. Statistical control techniques include partialing out the effect of social desirability or the use of multiple regression to avoid spurious correlations, suppression of correlations, and moderation of correlations between variables of interest (Ganster, Hennessey and Luthans, 1983).

2.2 Software Piracy

The possibility of SDB in software piracy research has been acknowledged by many researchers (e.g., Christensen and Eining, 1991). However, only a few attempts have been made to apply formal techniques to reduce, or detect, and correct bias. Our goal is to document evidence that would suggest the presence or absence of bias in published literature on software piracy. Towards this end, we reviewed 63 articles on software piracy in the Information Systems journals, identified through a systematic search of major scholarly databases (e.g., EBSCO, ProQuest, Google Scholar). Of these, 30 were behavioural studies that contained empirical data. Of these 30, eleven made no direct or indirect reference to issues related to response bias. The remaining 19 studies were examined further to identify possible evidence of the presence or absence of response bias. Key issues from 19 relevant studies have been tabulated (Table 1.).

In the selected articles, some studies were surveys, which queried users on their personal behaviour (e.g., Solomon and O'Brien, 1999). These are labelled self-perpetrator in the table under the 'perpetrator' column. In other articles, the studies required subjects to respond to conditions described in a scenario. In these scenarios, the subjects were asked to express opinions about the software piracy behaviour of others. These are labelled other-perpetrator in the table. The study sites have been broadly identified (e.g.: U.S., East Asia), when the information was clearly available. The use of techniques to reduce, detect, or correct response bias in each study have been tabulated. Lastly, if the

overall piracy rates are reported, then they have been included. The overall piracy rate refers to the per cent of subjects who admitted to engaging in unauthorized copying, or intent to copy.

#	Source	Perp-etrator	Study Location	Reduction Methods	Detection Methods	Correction Methods	Piracy Rate
1	Solomon & O'Brien (1990)	Self	U.S.	Anonymous			52.8%
2	Christensen & Eining (1991)	Self	U.S.	Anonymous			52%
3	Reid et al. (1992)	Self	U.S.	Anonymous	Balanced Inventory of Desirable Responding's Impression Management Scale	"Respondents who scored over two standard deviations from the mean [Impression Management Scale] score were eliminated from the sample so that their results would not bias the results"	58.7%
4	Gopal & Sanders (1997)	Other		Anonymous			
5	Seale et al. (1998)	Self	U.S.	Anonymous			44%
6	Thong & Yap (1998)	Other		Voluntary & Anonymous			
7	Moores & Dhillon (2000)	Self	East Asia	Voluntary & Anonymous			93%
8	Peace et al. (2003)	Self	U.S.	Anonymous; Used 'intention to pirate' as proxy for behaviour			59.2%
9	Moores & Dhaliwal (2004)	Self	East Asia				75.8%
10	Siponen & Vartiainen (2005)	Self	Finland	Anonymous			72.5%
11	Cronan et al. (2006)	Self	U.S				34%
12	Moores & Chang (2006)	Other	East Asia	Anonymous			93%
13	Woolley & Eining (2006)	Self	U.S	Randomized response technique	Compared randomized response results to direct response sample		54%
14	Mishra et al. (2007)	Self	Turkey				23%

15	Siponen & Vartiainen (2007)	Self		Anonymous			
16	Moores et al. (2009)	Self	U.S.				35%
17	Konstantakis et al. (2010)	Self: Face-to-face	Greece	Voluntary			100%
18	Kwan et al. (2010)	Self		Anonymous	Direct questioning compared to randomized response technique in subsequent studies		
19	Chan & Lai (2011)	Self		Anonymous	Marlowe-Crowne Social Desirability Scale	One-sample t-test revealed that the social desirability score was significantly lower than the mid-scale value, thus eliminating any serious threat	

Table 1. Social Desirability Bias in Information Systems Software Piracy Literature

The examination of the table suggests that most researchers, intentionally, or unwittingly, took steps to reduce bias. Confidentiality of responses is known to decrease bias. The responses were written and anonymous in most cases, further assuring confidentiality. Only one study used a face-to-face oral interview (Konstantakis et al., 2010). The results of that study are anomalous, in that 100% of the subjects confessed to unauthorized copying. Three studies did not clearly report that responses were anonymous. Overall, one could argue that there is a significant safeguard against biased responses based on two factors: the use of anonymous self-administered responses and/or the use of surrogates (i.e., directing respondents to judge/predict the behaviour of others). In contrast, there is evidence that biases in response may be present. For example, in one study (Seale, 1998), an average of 38% of subjects admitted to copying software or receiving copied software. In contrast, the same subjects estimated that at least 66% of people possessed pirated software. Such a discrepancy is typical of biased responses. A second pattern surfaces when the piracy rates are compared across studies. First, they vary from 23% to 100%, which raises questions about the validity of some studies at least. Second, studies conducted in Western countries that provided anonymity report piracy rates in the range of 44% to 72.5% (Christensen and Eining, 1991; Peace et al., 2003; Reid et al., 1992; Seale et al., 1998; Siponen and Vartiainen, 2005; Solomon and O'Brien, 1990; Woolley and Eining, 2006). In contrast, studies in the same region, which did not report anonymity report piracy rates in the range of only 23% to 35% (Cronan et al., 2006; Mishra et al., 2007; Moores et al., 2009). This pattern would suggest that in the absence of assurance of response anonymity, subjects under-report piracy, i.e., that the self-reports of low piracy rates may be biased. While there is greater admission to piracy in the anonymous studies, it still does not eliminate the possibility that there is residual bias in those studies. Similar patterns are observed in studies conducted in the East Asia region. In anonymous studies, piracy rates of over 90% are reported, while piracy rates of only 75% are reported in other studies (Moores and Chang, 2006; Moores and Dhaliwal, 2003; Moores and Dhillon, 2000). The difference in the piracy rates between Western countries and East Asia is generally attributed to differences in ethical values and incomes levels across the regions. They could also be attributed to differences in social acceptability of piracy in the two regions. In Western countries, piracy is less socially acceptable, so there may be a greater unwillingness to admit to such behaviour.

The evidence presented does not conclusively demonstrate the presence of SDB, nor does it permit us to conclude that response bias is not a problem. It does point out that there is a need for systematic empirical examination for SDB in studies of software piracy to increase trust in the reliability of the reported results. This view is consistent with the views of others. For instance, Christensen and Eining (1991) have also recommended that the typical underreporting of anti-social behaviour be examined in future software piracy research. It may also help us understand the wide variations in software piracy rates reported (between 23% and 100%) across studies.

3 Planned Study

Studies focused on examining the influence of antecedents of software piracy behaviour often use scenarios to tease out the effects. Studies using scenarios are easier to conduct than those using actual money, but are limited to determining the likelihood of pirating, (which are subject to response biases) rather than getting a truer measure of piracy. The current goal is to conduct a controlled study that will allow a comparison of the results of scenario-based studies with one that uses actual money. The comparison will allow the determination of whether bias is present, and if so, which of the methods proposed in literature serves best to correct for the bias.

Three treatments are being planned: two of these will ask subjects to respond to descriptions of the scenario on paper. In the third, acquisition of software will be simulated using actual money.

The study envisaged is as follows. For the paper-based scenarios, the task is described. For the actual money scenario, subjects will go to a real website and use actual money to execute a transaction. Subjects are required to get a software program for their class. They are randomly given a bankcard worth $20. They are instructed that any money remaining after they buy the software is theirs to keep. Thus, they could make $10 if they legitimately purchased the software, since the software price is $10. Otherwise, they could make $20 if they pirated the software.

Subjects are provided a link to a website to acquire the software from a legitimate source. When they visit the website, there is a prominent advertisement with a link to get the same software for free from a different pirate site. A confederate actor in the subject group loudly points out to the presence of the link to the pirate site in order to assure saliency of the pirate link.

The dependent variable is piracy behaviour. In the first paper-based scenario, the subject is required to indicate the likelihood that they would personally use the pirate website to get the software (personal behaviour). In the second paper-based scenario, the subject is required to indicate the likelihood that their peers would get the software from the pirate site (peer behaviour). In the actual money scenario, the subject either gets the software from the legitimate site or the pirate site (actual money behaviour).

In addition, SDB scales will be used to assess moralistic bias both along the self-deception and impression management dimensions (Paulhus, 2002). The moralistic scales are chosen because software piracy is considered an ethical issue rather than an egotistical issue. Both the impression management and self-deception sub-scales are included to determine if one, or both tendencies influence response bias. Prior literature has not examined if SDB in software piracy originates in self-deception, or impression management.

The following analysis will be conducted. First, the correlations between each of the three individual behaviours (personal, peer, and actual money) and the two SDB scales (moralistic self-deception, and moralistic impression management) will be calculated. It is anticipated that the personal piracy behaviour will be highly correlated to one or both of the SDB scales, but that neither peer nor actual money behaviour will be (i.e., personal behaviour measure is influenced by SDB, but not peer behaviour, or actual money behaviour). The correlation with moralistic self-deception and moralistic impression management scales will point to the root cause(s) of the bias, i.e., whether it is self-deception, impression management, or both.

Next, the personal behaviour scores will be adjusted based on the SDB scores following the methods described by Saunders (1991). The adjusted scores will be on a scale of 1 to 7, and will be converted to dichotomous values (score of 1, 2, and 3 indicating piracy, and 5, 6, and 7 indicating legitimate purchase, and 4 being indeterminate, which will be dropped.). This conversion is necessary to help compare personal behaviour with actual money behaviour. A similar procedure will be used to convert the 7-point scale of the peer behaviour to a dichotomous value. The actual money behaviour will already be available as dichotomous values.

Pairwise comparisons will be done using Chi-Square analyses, between adjusted personal behaviour and real money behaviour, as well as adjusted peer behaviour and actual money behaviour. Significant relationships would be interpreted as follows. Actual money behaviour is considered the truest indicator of piracy behaviour. A significant relationship between adjusted personal behaviour and the actual money behaviour would suggest that personal behaviour is a reliable indicator of unbiased behaviour. Similarly, a positive relationship between adjusted peer behaviour and actual money behaviour would suggest that peer behaviour would be a reliable indicator of unbiased behaviour. If either the adjusted personal behaviour, or peer behaviour emerges as a reliable indicator, then paper-based scenarios can be used to generate robust results. If neither emerges as a reliable indicator, then the practice of using paper-based scenarios to study software piracy will be difficult to justify.

The most optimistic outcome of the study will be that we will have provided "preliminary" evidence to support a way to generate unbiased data in software piracy research. The limitation would be that the method would have been empirically demonstrated for one set of conditions. Similar studies using variations in scenario conditions and different subject sample sets will have to be conducted to establish the robustness of the method. A second contribution would be to indicate whether the response bias has its roots in self-deception, or in impression management. This finding is of limited interest in software piracy; it is of greater importance in gaining understanding of which form of response bias comes into play under what conditions.

Details of the study will be presented to the audience at the conference. It is hoped that preliminary data and analysis will be available at that time to provide additional material for discussion and elaboration.

4 Conclusion

The validity of research in the social sciences has always been of the utmost importance; and SDB is a vital component to consider for the internal validity in behavioural studies involving human subjects. While SDB is an acknowledged phenomenon in software piracy literature in the Information Systems discipline, it is clear that the majority of published research has failed to include any measurement, or correction of the bias. Reduction methods are a step in the proper direction, but as can be seen, they may not eliminate bias sufficiently, leaving doubts about the reliability of the published studies.

The examination of SDB in software piracy research could provide three major outcomes (Chung and Monroe, 2003). First, previously conducted software piracy research in the Information Systems discipline relying on self-report human subject data may need to be re-examined due to internal validity issues. Second, if research conclusions are skewed, individuals who deem themselves more ethical relative to their peers may feel no pressure to improve their own conduct. And finally, exaggerated results might lead individuals to justify their own unethical software piracy behaviour. Thus, if research on the topic utilizes valid research methodology, software piracy could effectively be measured and hopefully addressed.

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