

TOWARD DEEP UNDERSTANDING OF PERSUASIVE PRODUCT RECOMMENDATION AGENTS

Research-in-Progress

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Abstract

Product recommendation agents (PRA) are systems built to facilitate customers' products purchase on e-commerce websites. Prior literature focuses on the "shaping" effects of PRA to customers' decision making. More challengingly, PRA can be built to change customers' product choice by combining with persuasive features. This paper explores this new type of PRA "persuasive product recommendation agents" (PPRA). In this paper, we make a distinction of PPRA with neutral and deceptive ones. The basic functioning principle of PPRA is stated and a classification of persuasive tactics is made. We propose the mechanism via which PPRA work by incorporating elaboration likelihood model, $4w$ and theory of reasoned action together. Despite marketing usage, the proposed PPRA can be used to benefit society by promoting green purchases or encouraging charity. The theory also has the generalizability to be used in decision making contexts like healthcare and education. Discussion and future research directions are made.

Keywords: Persuasion, Product Recommendation Agent, Consumer Decision Making

Introduction

Persuasion is a form of attempted influence in the sense that it seeks to alter the way others think, feel, or act. Traditionally, persuasion has meant “human communication designed to influence the autonomous judgments and actions of others” (Simons 2001). Persuasion has been the purview of human communication, person to person. However, the increasing sophistication of the Web and other similar technologies has created opportunities for technology to be a source of persuasive interaction. Technology can serve as sources of influence which were previously fulfilled by doctors, coaches, salespeople and others. Fogg defines this kind of “Persuasive Technology” as “interactive information technology designed for changing users’ attitudes or behavior” (Fogg 2003).

There are three types of persuasion: interpersonal persuasion, computer-mediated persuasion and human-computer persuasion. *Interpersonal persuasion* is the traditional persuasion which happens when two or more people interact with each other. *Computer-mediated persuasion* takes place when people are persuading others *through* technology, for example discussion forums, e-mail, instant messages, blogs, or social network systems. (Oinas-Kukkonen & Harjumaa 2007). *Human-computer persuasion* differs from other two types of persuasion in that it is the computer (system, technology, etc...) that makes the persuasion directly. As computers do not have intentions of their own, it is not always clear who the persuader is. Those who create, distribute, or convince others to adopt the technology are the ones who have the intention to affect someone’s attitudes or behavior, so we usually assume that the person or company who designed the system is the persuader (Fogg 2003). Although computers cannot communicate in the same manner as humans, recent studies suggest that some patterns of interaction similar to social communication may be utilized in human-computer interaction (Fogg 1997, Nass 1994). Persuasive technology also possesses the advantage of mass communication in that it can use many modalities to influence and it can scale easily to interact directly with large numbers of users (Cassell et al. 1998). It also has more strength over traditional persuasion for it is more persistent, offers more anonymity, manages huge volumes of data and reaches users more easily (Harjumaa & Oinas-Kukkonen 2009).

We investigate the role of persuasion in the context of product recommendation agents (PRA). Recommendation agents are software agents that elicit the interests or preferences of individual users for products, either explicitly or implicitly, and make recommendations accordingly (Xiao & Benbasat 2007). PRAs can improve customers’ decision making in purchasing (Haubl & Valerie 2000). It has been argued that recommenders always persuade when recommending (Gretzel 2007, Komiak 2004, Zanker 2006). This interpretation is based on the fact that recommenders successfully support the effective identification of alternatives which otherwise would not have been found by the customer and consequently have not been purchased. However, human minds are subtle and vulnerable. Persuasion can influence human decision making in different situations with different strategies. Prior literatures all focus on the shaping aspect of persuasion, where no decisions have been made. More challengingly, even if people have already specified their criteria and made judgments, PRA can still be designed to change their final decision by combining with persuasive features. This paper will discuss this new type of PRA, the “persuasive product recommendation agent” (PPRA).

The remainder of the paper will first provide a distinction between different types of product recommendation agents. It will explore the basic functioning principles of persuasive PRA and provide a classification of persuasive tactics that can be employed in PPRA. A theoretical foundation of PPRA will also be provided. Lastly, we discuss future research directions on understanding PPRA impacts.

Types of Product Recommendation Agents

Persuasion is “human communication designed to influence the autonomous judgments and actions of others” (Simons 2001). An important distinction to be made is that of persuasion from deception or coercion. Unlike a person being deceived or coerced, a person being persuaded should always be able to make “voluntary” decisions. In deception, the communicator will try to influence others by withholding, manipulating, or falsifying information for his or her own benefits. It is therefore important to make sure that all information used in the persuasion process is authentic.

PRAs are systems built to assist customers in choosing products on e-commerce website. PRA can help reduce customers' decision efforts and increase their decision quality. Former studies also examined the potential of PRA to deceive customers (Xiao & Benbasat 2011). However, the persuasive PRA is different from both of these types of influences.

In order to make this distinction clear, we classify PRA into three types: neutral, deceptive and persuasive. We use four characteristics to differentiate them. The existence of *targeted products* and *focus of attitude manipulation* are the key criteria to differentiate persuasive PRA; *misuse of information* and *mutual beneficial relationship* with customers are key factors to differentiate deceptive PRA. Three PRAs with their distinctive characteristics are shown in Table 1.

Types of PRA	Characteristics to Determine Classification			
	Have Targeted Products?	Focus of Attitude Manipulation?	Misuse of Information?	Mutually beneficial? Long term relationship?
Neutral	No	Shape	No	Yes
Deceptive	Yes	Shape, Change, Reinforce	Yes	No
Persuasive	Yes	Change	No	Yes

Targeted products:

The existence of targeted products means that PRA has pre-determined certain types of products that are favored in the customer's choice over other products. The neutral type of PRA does not intend to persuade customers to buy a specific type of product. Persuasive PRA has a specific type of products as its target. The goal of persuasive PRA is to have customers choose the targeted products more than others. The reason to promote the targeted products may range widely from enhancing public policy (e.g. promoting environmentally friendly or green products) to marketing strategy (e.g. introducing new generations of products or clearing inventory). Deceptive PRA also has targeted products. It functions by using deceptive information practices to enhance consumers' perceived value associated with a target product and trigger strong feelings in consumers toward a target product. (Xiao & Benbasat 2011)

Focus of Attitude Manipulation:

Persuasive systems are defined as "computerized software or information designed to reinforce, change or shape attitudes or behaviors or both without using coercion or deception" (Harjumaa & Oinas-Kukkonen 2008).

In this definition, there are three potential successful outcomes for a persuasive system: the voluntary shaping, change or reinforcement of attitudes and/or behaviors. A shaping outcome means the formulation of a pattern for a situation when one does not exist beforehand. A changing outcome means altering one's previous attitudes or actions. A reinforcing outcome means the reinforcement of current attitudes or behaviors, making them more resistant to change. In many cases, communication that results in a shaping outcome may have a higher likelihood of success than communication that aims at a changing outcome (Lerbinger 1972). Moreover, different goals of outcome may imply the use of different persuasion strategies and techniques.

PRAs, as a type of persuasion system, can also be designed to shape, change or reinforce attitudes or behaviors. Different PRAs have different focuses. Neutral PRA aims to facilitate customers' product choice when they have not clearly formed their decision rules, product preferences and so on. Deceptive PRA has the "flexibility" to manipulate information and aims to influence customers in whatever way to achieve the greatest benefits for the merchants. Therefore, deceptive PRA doesn't have a focus of attitude manipulation. Persuasive PRA mainly focuses on attitude change. Customers usually don't put the

targeted products into consideration at first. For example, at the beginning one may just want to buy a cheap washing machine. After the use of PPRA, he or she may be well convinced that a green washing machine is necessary despite of its rather high price. Attitude change is usually considered harder than attitude formation and reinforcement; hence the designing of persuasive PRA is more challenging.

Misuse of Information:

One key differentiation of deceptive PRA is its misuse of information. Xiao & Benbasat have summarized three ways of misuse of information: (1) concealment—to withhold, omit, or disguise relevant information; (2) equivocation—to present information vaguely and or ambiguously; and (3) falsification—to present false or exaggerated information. In contrast, neutral and persuasive PRAs don't misinform users during the whole recommendation process, which is to say, the information won't be concealed, equivocated or falsified in PRA. All information is authentic.

Long-term relationship with customers:

What needs to be clarified is that both neural and persuasive PRAs are mutually beneficial. Customers are aware of authentic product information and make their decisions voluntarily. Their relationships with PRA work in the long run. Deceptive PRA works by impairing the benefits of customers to gain benefits for the merchants. This may bring short-time benefits to the merchants but there won't be ongoing trust or an established relationship with the customers.

Persuasive Recommendation Agent Functioning Principle

A central function of PRAs is to capture consumer product attribute preferences, which allows for the identification of products appropriate for a consumer's interests (Xiao & Benbasat 2007). Because of the conflicting values of product attributes, tradeoffs are inherent in many purchase choices (Haubl & Murray 2003, Bettman et al. 1998). For example, a laptop computer's faster processor comes with a higher price, and a larger screen size comes with a heavier weight. Solution to preferential choice problems, given a specified set of alternatives and a set of attribute values, is difficult because rarely is a particular option best on all attributes of value (Payne et al. 1993). This is recognized as presence of conflict, which is the major source of decision difficulty.

The basic functioning principle that persuasive PRA works with is influencing the trade-off evaluation of product attributes. For example, if one wants to buy a computer, he may experience the conflict between convenience and using comfort. Computers with large screens will bring a more enjoyable and comfortable user experience. However, it entails a heavier weight and thus results in less convenience. In this situation, customers have to make a trade-off between screen size and computer weight. Persuasive recommendation agents function by changing the attribute weighing of products. It will persuade customers to value more of the attributes that the targeted products possess. For example, a customer may simultaneously value both a large screen size and a lightweight laptop. If the PRA wants to promote larger screen computers, in the course of using a persuasive PRA, the user may find that the screen size attribute is relatively more important and so favored in the trade-off comparison. This could lead to the user assigning more weight to the screen size attribute. As a result, the user's final choice of computer will have larger screen than he used to plan to buy.

Persuasive Tactics

How can PPRA work to change customers' trade-off evaluation about attributes? There are rich literatures in marketing and psychology discussing persuasive tactics. For example, Cialdini has identified six explicit influence techniques: reciprocity, commitment and consistency, social proof, liking, authority and scarcity (Cialdini 1988). Fogg suggests seven types of persuasive technology tools: reduction, tunneling, tailoring, suggesting, self-monitoring, surveillance and conditioning. (Fogg 2003) To make all these persuasive tactics more organized for the design and evaluation of PPRA, we propose a classification of

persuasive tactics that can be used in PPRA. We consider two basic questions: 1. what components will customers judge to process persuasion? 2. How will persuasion be processed in different situations?

What components will customers judge to process persuasion? There are four categories of factors in the persuasion process: (1) the source of the message, (2) the contents of the message itself, (3) the medium (or channel) used, and (4) the type of audience receiving the message. (Popovich & Wanous 1982). To make it simple, the four factors are “4W”: who says what by what means to whom. In this case, PPRA is the source; persuasive arguments during the recommendation process are the messages; the Internet is the channel of persuasion and customers are the receivers. We can see that to design a persuasive PRA to influence customers, we can employ tactics manipulating information about PRA (the source) and persuasive arguments (the message).

How will persuasion be processed in different situations? Elaboration Likelihood Model (ELM) is a general theory of attitude change, which remains as one of the most influential persuasion paradigms. Its fundamental idea is that there are two routes to persuasion, a central and a peripheral route. One’s motivation and ability will determine which route he or she will react to persuasion in a specific situation. An individual who carefully evaluates the content of the persuasive message may be influenced via the “central route”, while an individual who is less thoughtful and uses a simple cue (e.g. the source or length of the message) or a rule of thumb (e.g. “more is better”, “experts can be trusted”, “consensus implies correctness”) for evaluating the information may be persuaded through the “peripheral route” (Petty & Cacioppo 1986). Sometimes it is hard to say which mechanism it acts through because people use their feeling and thinking at the same time. This distinction is when processing persuasion, whether one engages in issue-relevant thinking with the aim of determining the merits of the issue.

Combining the two theories together, we get a 2(Source vs. Message)*2(Central vs. Peripheral) framework of tactics. PPRA is the source of persuasion and persuasive arguments during the recommendation process are the messages. Some tactics aim to influence customers’ evaluation of the source to gain persuasion effects while some aim to influence customers’ evaluation to the message directly. The distinction of peripheral and central is the same to ELM, based on whether the tactics intend to lead customers engage in issue-relevant thinking with the aim of determining the merits of the issue. Table 2 provides the classification of tactics.

Table 2. A Classification of Persuasive Tactics in Product Recommendation Agents		
Manipulation of persuasion routes	Manipulation of persuasion components	
	Source	Message
Peripheral	1	3
Central	2	4

The first type (Source Peripheral) of persuasive tactics is to influence customers’ evaluation of PPRA itself more from the peripheral route. It may stimulate customers’ positive feelings about the source to achieve persuasion. For example, PPRA can use persuasive tactics such as praising customers, showing understanding of customers needs and so on to incur customers’ positive feelings and build “intimacy” with them. It may also adapt to customers’ attributes like gender and age by sharing similar attributes to make the acceptance of persuasive arguments easier. (Al-Natour et al. 2006, 2008)

The second type (Source Central) of tactics also aims to influence customers’ evaluation of the PRA but more from a central route. For example, tactics like presenting information expertly or providing explanations about the process of reasoning the PPRA will apply are of this kind. (Wang & Benbasat 2008) Customers will deliberate PPRA’s merits carefully so that they will tend to accept persuasive arguments made by it.

The third type (Message Peripheral) is tactics aimed to make the persuasive arguments more attractive or desirable from the peripheral route. For example, without changing the content of the message, the PPRA can use media and animation to make the arguments more vividly in order to make it more persuasive.

The fourth type (Message Central) is tactics aimed to make the arguments more persuasive from the central route. For example, in the message, we can use simulation to enable customers to predict or clearly understanding the outcomes of the alternatives presented by the PPRA. The customers will have stronger justification to accept the persuasive message.

Persuasion Mechanisms

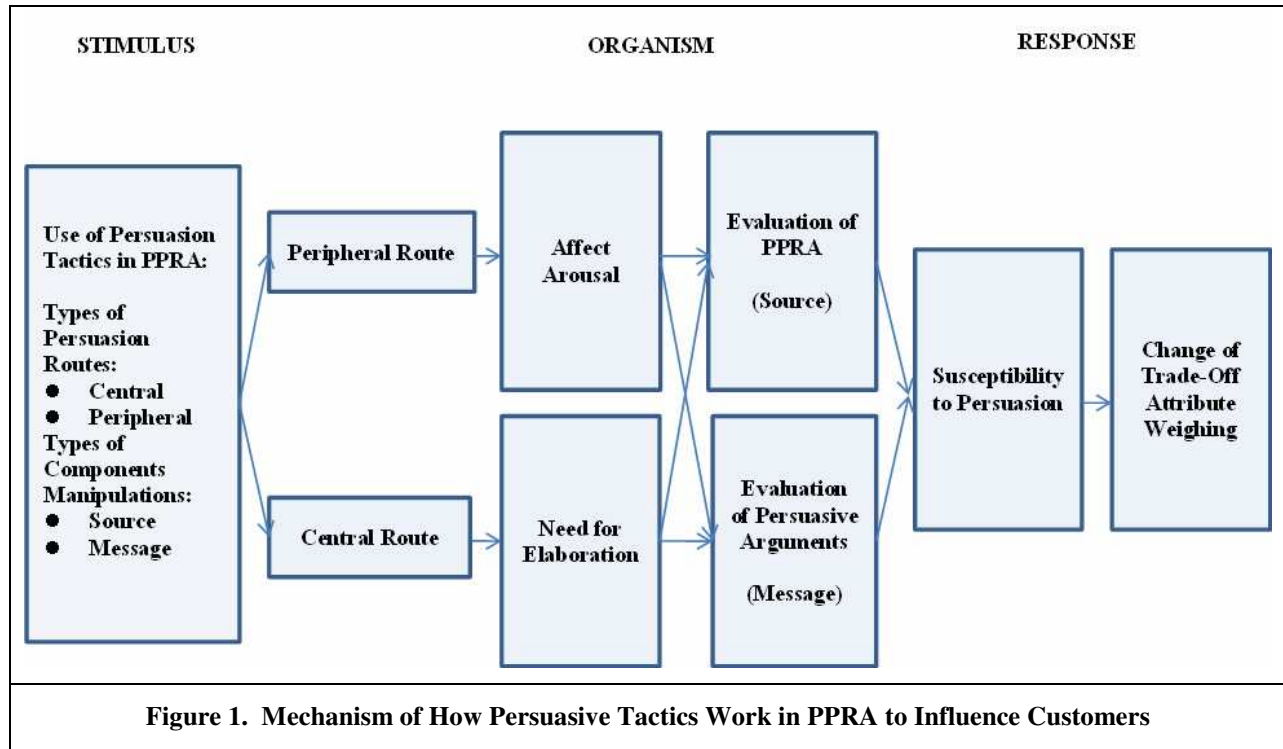
What is the mechanism that makes PPRA work? What is the process via which the customers are being persuaded? To determine the answers to these questions, we incorporate the theory of reasoned action (TRA) with ELM.

TRA was posited as a theory of attitude formation, which led to the study of attitude and behavior. The key application of TRA is prediction of behavioral intention, spanning predictions of attitude and prediction of behavior. A recipient may estimate both the likelihood and desirability of the consequences the message describes to form his or her attitude towards doing something (Ajzen & Fishbein 1980). Ajzen proposed an extension of the theory of reasoned action in 1985 by bringing behavioral control into the theory (Ajzen 1985). This theory (Theory of Planned Behavior, TPB) aims to cover non-volitional behaviors for predicting behavioral intention and actual behavior. Since persuasive recommendation agents focus on the voluntary change in customers' purchase intention, we adopt TRA as our main framework. In our case, customers will evaluate the PPRA first to estimate the likelihood of the persuasive message to be true. They will also evaluate the persuasive message to determine its desirability. PPRA also serve as a source of subjective norm. Their combined evaluation of RA and persuasive arguments will decide their attitude towards the arguments, which will decide their susceptibility to persuasion.

According to ELM, central routes and peripheral routes are ways that persuasion will take effect. Specific tactics can be predicted for how they will work. If a strategy is a central one, it aims to remind customers of the need for elaboration. Peripheral tactics, on the other hand, try to arouse customers' affect to build implicit cues toward successful persuasion.

In the proposed theory, when online customers use product recommendation agents, they will evaluate the PPRA itself (the source) to see the possibility of the messages it presents being true. The evaluation process of PPRA can be through a "central route", involving merit related elaboration of PPRA or a "peripheral route", developing affect towards PPRA. Both routes influence their evaluation of PPRA. Similarly, they will also evaluate the persuasive arguments in PPRA (message). They may elaborate the messages carefully (central routes) or their affective mechanism may be influenced to form positive feelings toward messages (peripheral routes). Customers' evaluation of PPRA and persuasive arguments will both influence their susceptibility to persuasion, which makes people favor certain attributes. As a result, customers' trade-off attributes' weighing will be changed. When customers value the attributes that the targeted products have, they will tend to choose the targeted products more.

According to ELM, motivation and ability will determine which routes people are in. Persuasive tactics and customers' personal situations are a two-way interaction. On the one hand, a certain strategy may influence people's motivation and ability and lead them to engage in a certain route to process persuasion. For example, the vivid presentation of attributes information will entail more possibilities for customers to engage in peripheral route processing while simulation tools may enable their ability to focus on the central routes elaboration. On the other hand, people's motivation and ability situation will determine the effectiveness of the strategy. In other words, a strategy will have more persuasiveness when it matches the persuadee's personal situation. For example, when one's motivation and ability is low, source-peripheral tactics may be very useful ways to persuade. Factors like type of product purchased, purchase context and task complexity may all influence customers' ability and motivation. The theory of how the four types of persuasive tactics work in RA is demonstrated in Figure 1. We can see that the four tactics have different degrees of "central or peripheral" features.



Discussion and future research directions

In this paper, we propose a theoretical model to understand the impact of a new type of recommendation agent: persuasive product recommendation agents. The distinction of PRAs is based on four characteristics: whether there are targeted products, focus of attitude manipulation, misuse of information and long-term relationship with customers. It is the first study that makes a distinction of different types of product recommendation agents (neutral deceptive and persuasive ones). This offers great heuristic value both for merchants to design systems and for customers to identify decision aiding tools. The basic functioning principle of PPRA is clarified: PPRA works by influencing customers' evaluation of trade-off attributes. When customers make trade-offs between attributes, we persuade them to favor the attributes that the targeted products have strength in. A 2*2 classification of persuasive tactics is proposed according to persuasion components and processing routes (source vs. message)* (central vs. peripheral). We propose the mechanism via which PPRA works. The theoretical model combines elaboration likelihood model, 4w and theory of reasoned action together.

The paper makes contributions both theoretically and practically. Prior research in persuasive technology discusses a lot about the external persuasion manipulations but this paper takes an internal view by exploring how customers react to persuasive systems. The paper can also offer insights practically. It will illuminate system designers by stating the basic design principle, synthesizing persuasive tactics and identifying conditions for the effective use of the tactics.

The paper has generalizability in that it is not limited to online purchases, it can be used in any situations when people make decisions between alternatives. Each human decision alternative is composed of trade-off attributes in nature. In health care, for instance, a persuasive system in a hospital can be designed using four tactics to encourage patience compromise flavor and choose a more balanced and healthy diet. In education, for instance, according to different motivation and ability of each student, different tactics can be used to persuade more involvement with inspiring but effort-taking projects.

Persuasive PRA is a promising research area. It influences customers to make “voluntary” but also “directional” decisions. This offer companies great power to implement marketing tactics without impairing the longitudinal relationship with customers. For example, merchants can use PPRA to promote new products to accelerate the upgrading of product generations. What's more, PPRA can be

used as a social benefit by promoting green purchases or encouraging charity-related decisions. We can also foresee its use in areas like healthcare and education. For example, patients may always choose treatments with immediate effects but, as a result, they may overlook their longitudinal health. Students may always struggle with the entertaining and educational features of reading. In these cases, by persuading people to put more weight on longitudinal effects, persuasive PRA can enable users to make wiser decisions.

This paper represents a necessary first step toward a thorough understanding of persuasive recommendation agents. Future research can be conducted as following: 1. The theoretical model can be extended by considering customers' reuse intention of PRA. To explore this issue, factors like the persuasion detection and awareness are important to consider. 2. The theoretical model presented in Figure 1 represents a set of causal relationships so empirical work needs to be done to test the theoretical model. We suggest testing the relationships of different persuasive tactics on product choice and reusing intention considering the interaction effects of individual factor (e.g., motivation and ability).

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