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Abstract

With the increased popularity of online social networks, friends become an available recommendation source for decisions that are made on the Internet, such as online purchases. There is substantial benefit in integrating different recommendation sources into one recommendation system so that more information and indeed more relevant information can be provided to the user. However, there is also the burden on the user of having to cope with the broader scope of and sometimes differing advice provided. This paper focuses on the issue of potential cognitive dissonance between the user's own preferences, social influencer's (e.g., friend's) recommendations, and advice from a recommendation agent (RA). It provides a model of how different recommendation system designs can lead to different magnitudes of dissonance and when. It also discusses the role of the user's product knowledge on influencing the extent of and reaction with dissonance. This paper contributes to the designing of recommendation systems which can create synergies between different recommendation sources to best assist the user.

Keywords: Recommendation agent, social network, recommendation source, cognitive dissonance.

1 Introduction

When making decisions, we are often influenced by others. "***Social influence*** occurs when a person adapts his or her behavior, attitudes, or beliefs to the behavior, attitudes, or beliefs of others in the social system" (Trusov and Bodapati, 2010, p. 646). Thus, when we design systems that help people to make decisions, social influence is a crucial aspect to consider.

Social influence also occurs when shopping on the Internet, for example when potential customers consider other consumers' and experts' advice and recommendations (Senecal and Nantel, 2004; Swearingen and Sinha, 2001; Wang, 2008; Wang and Doong, 2010).

With the increasing popularity of online social networks, in addition to consumers and experts, a third group of ***social influencers (SIs)*** has become available online: friends. Friends can have a strong influence on people's attitude and behavior (Kandel, 1978), and also on their purchase behavior (Furse et al., 1984; Kiecker and Hartmann, 1994; Mangleburg et al., 2004; Price and Feick, 1984). With online social networks, such as Facebook and LinkedIn, it has become easy to identify one's friends on the Internet. Facebook, for instance, allows other websites to use the Facebook login as a single sign-up feature such that new users of a websites just need to login in with their existing Facebook account in order to register for a new website. Thus, this feature provides these websites with easy access to the user's social network from Facebook.

In the field of information systems, ***recommendation agents (RAs)*** have been identified as one type of decision aid that facilitate and influence the online shopping task (Häubl and Murray, 2003; Xiao and Benbasat, 2007). RAs normally proceed in two stages. In the first stage, they elicitate user's preferences. In the second stage, they recommend products that best fit the user's preferences.

In a recent study by Xu (2011), users were given the opportunity to access up to three recommendation sources: RAs, experts, and other consumers. The expert's and consumer's recommendation were shown in the second stage of the RA, e.g. together with the RA's recommendation list. The study revealed that users prefer to see several sources (60 % chose to see all three sources). Although users chose experts and consumers more often than RAs, RAs had the highest influence on the final decision. Similarly, Senecal and Nantel (2004) found that RAs' recommendations influenced users more than experts' and consumers' recommendations.

We see a *high potential in integrating different kinds of recommendation sources because more relevant information can be provided to the user.* Therefore, we aim at creating synergies between RAs and SIs (in particular, friends) because, according to the above mentioned studies, both have a strong influence on consumers purchase behavior. To the best of our knowledge, no study has addressed as yet the issue of creating synergies between friend's recommendations and RAs.

With multiple recommendation sources, there is the risk that they may be inconsistent with each other. The friend, for instance, might recommend a product that is rated low on the RA's recommendation list, indicating a conflict between the RA's recommendation that is supposed to reflect user's preferences and her friend's preferences.

The existence and the strength of inconsistencies can be influenced by the design of the recommendation system. Since *RAs interact with users in two stages*, the system designer can decide whether to show the SI's recommendation in the first stage (i.e., eliciting user's preferences) or the second stage (i.e., when the RAs recommendations are provided). Thus, *we will propose two alternative system designs that show the SI's recommendations to the user at either the first or second* *stage* and analyze systematically in which design which kind of inconsistencies occur.[1] In design 1, users see the SI's recommendation during the first stage of preference elicitation while answering the RA's questions about their preferences about product features. If, for instance, the SI recommends a product of a specific brand, that recommendation may conflict with the user's own preferences. In design 2, users see the SI's recommendation in the second stage, together with the RA's recommendation list. If, for instance, the SI recommends a product that is not listed at the top position of the RA's recommendation list, but some lower position, the user faces the dilemma of which source to rely on for her decision.

For the analysis of the two different system designs, we will make use of the ***cognitive dissonance theory*** which helps us to theorize about how users react to such inconsistencies.

We postulate that users have a higher intention to use the recommendation system when the SI's recommendation is presented at the first stage of the RA. We base this proposition on a systematic analysis of potential inconsistencies which can occur in the two designs and which will give rise to cognitive dissonance. Furthermore, we argue that the negative influence of dissonances on the intention to use the recommendation system is moderated by the user's product knowledge. Product knowledge should also influence user's attempts to reduce dissonances. We present several arguments for the more knowledgeable users' tendency to ignore the SI rather than to change their own preferences. Thus, knowledgeable users should find the SI's recommendation less useful than novices. Furthermore, we will argue that the system design influences how useful the user finds the SI's recommendation, which in turn will impact their intention to use the proposed recommendation system again.

In the following section, we will provide a literature review and develop ideas for a system design that creates synergies among recommendation sources, thereby avoiding dissonances. In section three, we develop propositions that can serve as basis for future empirical validation. We end the paper with a discussion and ideas for future research efforts on this subject.

2 Theoretical Foundations for System Design

2.1 Recommendation Sources

When making purchase decisions, buyers consider both internal and external information sources (Murray, 1991). Internal information refers to product information stored in memory and experiences in a product class as well as previous learning about the environment (DeSarbo and Choi, 1999; Murray, 1991). External information comes from external stimuli in the marketplace such as consumers, experts, and friends (DeSarbo and Choi, 1998; Duhan et al., 1997; Gilly et al., 1998; Price and Feick, 1984; Senecal and Nantel, 2004; Swearingen and Rashmi, 2001). We will refer to these three groups – *consumers, experts, and friends* – as ***social influencers*** because they are all groups of people that can influence the buyer's preferences and behaviour.

Several studies have found an effect of consumer's and expert's recommendations on user's preferences and on their choice behaviour on the Internet (Senecal and Nantel, 2004; Smith et al., 2005; Wang, 2008; Wang and Doong, 2010). Furthermore, recently Iyengar et al. (2009) examined whether this is also true for friend's recommendations and whether friends from an online network help or hinder an online user's purchase decisions. They found a positive influence of friend's

[1] The term "system" for the purposes of this paper refers to the use of the RA and SI in an integrated fashion to provide recommendations to the user or potential customer.

purchase decisions for 4o% of the users; thus, for them the likelihood of buying a specific product increased when friends had already purchased the product. 48% of users were unaffected by friend's purchase decisions and for the remaining 12% a negative influence was found.

And now, with the possibility to shop online, another source of external information has become available: ***recommendation agents***. "RAs are software agents that elicit the interests or preferences of individual consumers for products, either explicitly or implicitly, and make recommendations accordingly" (Xiao and Benbasat, 2007, p.1). In this work, we focus on RAs with explicit preference elicitation which means that the RAs are query-based, rely on the explicit revelation of user's preferences, and make recommendations to the user in the form of a sorted list of alternatives based on its understanding of the individual's preference (Häubl and Trifts, 2000; Xiao and Benbasat, 2007). *We consider both SIs (experts, consumers, and friends) and RAs as **recommendation sources**.*

To the best of our knowledge, only two studies have compared recommendations of RAs and SIs: Senecal and Nantel (2004) and Xu (2011).

In Senecal and Nantel (2004), subjects were assigned to one of four recommendation source conditions: RA, other consumers, experts, or no recommendation. Subjects were led to believe that the recommendation from the RA was based on their answers to questions about their preferences, but in actuality the recommendation from the RA was the same that was given by the other sources. There was no analysis of what would happen if users saw several recommendation sources at the same time. Results indicate that subjects who consulted recommendation sources selected recommended products twice as often as subjects who did not consult recommendation sources. Furthermore, the RA was more influential than other consumers and experts.

Xu (2011) examined which of three recommendation sources (consumers, experts, or a RA) have a stronger influence on the user's decision. In his study, the user could choose up to three recommendation sources in parallel. If the RA was among the chosen recommendation sources, the user first answered some preference elicitation question and then saw all recommendations from the chosen sources in one screen. The results showed that although the users asked more often to see the recommendations from the consumers and experts, the RA seemed to have the highest influence on their final decision. Furthermore, the higher the user's product knowledge and task involvement, the more they relied on the RA's recommendation. Furthermore, users were more influenced by the recommendation sources when the sources all recommended the same product.

In sum, very little is known about the influence of friends' recommendations on online purchase decisions. Furthermore, there is little understanding about the effect of integrating SIs' recommendations into RAs.

2.2 Creating Synergies between Recommendation Sources

The underlying theory for our work is ***cognitive dissonance theory*** (Festinger, 1957). Cognitive dissonance theory states that when an individual holds two or more elements of knowledge that are relevant to each other but inconsistent with one another, a state of discomfort (i.e., dissonance) is created. Festinger theorized that people like to reduce dissonance by perceptual, cognitive, and behavioral changes (Harmon-Jones and Harmon-Jones, 2007).

In systems where users have access to RAs and SIs, there are ***three key elements of knowledge***:

1) the user's preferences, 2) the RA's recommendations, 3) the SI's recommendations.

Each of these three elements of knowledge can be inconsistent with the others (see Figure 1), and the inconsistencies in turn create dissonance in the user. For instance, there can be inconsistencies

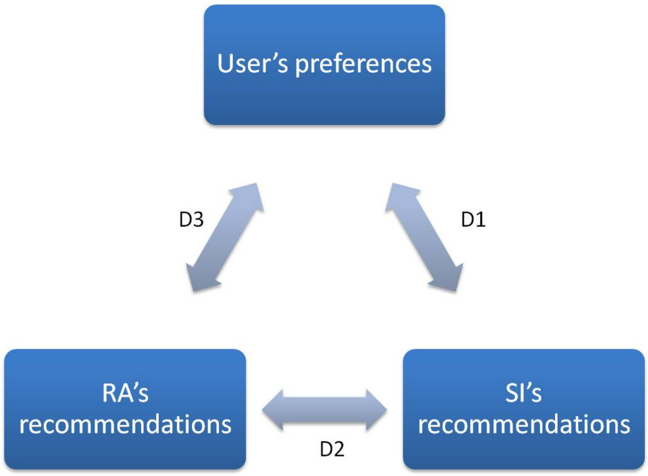

Figure 1. Three potential dissonances (D1, D2, D3) between three elements of knowledge.

between the user's own preferences and the SI's recommendations when the SI recommends a product which the user dislikes, resulting in D1. D2 can occur when the SI's recommendations are ranked low on the agent's recommendation list. D3 should only occur when the RA fails to meet its goal of suggesting products that fits the user's preferences. This would happen if the RA is i) poorly designed, ii) deceptive, or iii) the consumer is not capable of revealing his preferences to the RA, e.g. if the consumer is a product novice.

According to cognitive dissonance theory, people like to reduce these dissonances. Thus, the user can either change or ignore an element of knowledge. If, for instance, the SI's recommendation is inconsistent with the user's preferences, the user can reduce this dissonance (D1) by changing her own preferences and/or she can ignore the SI's recommendation. The notion that people do not have stable preferences but change them during the decision process has long been discussed in the field of decision-making behavior under the term 'construction of preferences' (Bettman et al., 1998).

We define an ***inconsistency*** between two different elements of knowledge to occur when the best product recommended by one does not correspond to the best product recommended by the other. The best product in terms of the RA is the top recommended product on the list. The best product in terms of the SI is the product that the friend recommends. The best product according to the user is the one that most closely fits her preferences. If the RA is designed well, the best product according to the user's preferences and the RA's recommendation should correspond to each other.[2] However, in the context of purchasing decisions, an inconsistency between two elements of knowledge is more probable than a consistency. This is because the large variety of products available on the Internet makes it improbable that two elements of knowledge will determine the same product to be the best one.

A recommendation information system that integrates both recommendation sources – the RA and the SIs – can influence the relationship between the three elements of knowledge because the system will be responsible for the following:

a) **Which RA's recommendations will be shown to the user**: The better the RA captures the user's preferences, the smaller will be the inconsistency between the user's own preferences and the RA's recommendations. Thus, the system's design will affect D3 (see Figure 1). However, the system might

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[2] We decided for a simple but restrictive definition of inconsistency. Our argumentation also holds for more relaxed definitions. An alternative definition could be to define an inconsistency to occur only when the n, i.e. n=3, best products of the recommendation sources do not correspond.

deceive the user (Xiao and Benbasat, 2011) by creating a recommendation list that matches well with the SI's choices. Thus, the system's design can affect D2.

b) **Which SI's recommendations will be shown to the user**: The system might deceive the user by choosing only a subset of the available SIs such that the SI's recommendations are consistent with the agent's recommendations. Thus, the system's design can affect D2.

c) **When the SI's recommendations are shown to the user**: The SI's recommendations can be shown to the user in one of two stages: (i) during preference elicitation or (ii) when the recommendation list is shown to the user (see Table 1).

i. **System design 1**: In this system design, *in the first stage*, *the user participates in the preference elicitation process and at the same time he sees the SI's recommendation*. Here, an inconsistency between this recommendation and his own preferences can occur and result in dissonance (D1). In the second stage, the user sees the agent's recommendations list. Here, a dissonance between the user's preferences and the agent's recommendations might occur (D3). Furthermore, it might be that in the second stage, the user still recalls the SI's recommendation which he saw in the first stage. We argue that even though this is possible, any dissonances occurring from the user's recall of the SI's recommendations from an earlier stage should be much weaker than a dissonance from recommendation sources that the user sees concurrently in the same stage. One reason is that the user might have ignored the SI's recommendation already in stage 1. In this case, the SI's recommendation would not be an issue for further stages. A second reason is that it should be less salient to recall a recommendation from memory than actually seeing it on the screen. To take into account dissonances that might occur from recommendations from an earlier stage, we will distinguish between weak and strong dissonances:

   Strong dissonance*: A dissonance between two elements of knowledge from the same stage.*

   Weak dissonance*: A dissonance where at least one element of knowledge is recalled from an earlier stage. We will denote weak dissonances with a *: D1*, D2*, D3**

ii. **System design 2**: In this system design, *in the first stage, the user participates in the preference elicitation process without seeing the SI's recommendations*, thus no dissonance can occur. *In the second stage, the user sees both the agent's recommendations and the SI's choices*, D1, D2 and D3 might occur.

Furthermore, the recommendation information system might be able to:

d) **Influence the user's preferences**: The information system might be able to influence the user's preferences which would affect both D1 and D2. Häubl and Murray (2003) have shown in some pioneer work that the inclusion of an attribute in a RA rendered the attribute more important for the user. To the best of our knowledge, no work exists yet that shows how the system design can influence the user's preferences more precisely which would be needed to effectively reduce D1 and D2.

When are the SI's recommendations shown?	Possible dissonances in Stage 1	Possible dissonances in Stage2
System Design 1: shown in stage 1	D1	D3, (D1*), (D2*)
System Design 2: shown in stage 2	No dissonance	D1, D2, D3

Table 1. Stage of the recommendation process when the SI's recommendations are shown and resulting dissonances that might occur in each stage.

In this study, we focus on case c), when the SI's recommendations are shown to the user, because of several reasons. First, a lot of research has addressed the question raised in case a) by studying the quality of the recommendations made by RAs (Xiao and Benbasat, 2007). That is not a problem inherent to our integrative approach, but to any RA. System designers should rely on the knowledge from these studies and select a RA that can provide a good estimation of users' preferences.

Furthermore, in the exploratory phase of our model testing we will refrain from designing a deceptive system. A deceptive system might decrease user's trust in the system which would have negative effects on the intention to use the system. Thus, a system which shows only a subset of the recommendations, as suggested in cases a) and b), is not considered further.

3 Hypotheses Development

In this section we make predictions along two lines of thought: first, strong dissonances between knowledge elements will affect users more than weak dissonances; second, knowledgeable users and novices will differ with respect to how they perceive dissonances and how they try to reduce them.

3.1 The Strength of Perceived Dissonances

As discussed in section 2, when the SI's recommendations are shown determines the number and quality of dissonances (weak vs. strong) that occur. When it is done in stage 2 of the RA process, all three dissonances are strong and occur simultaneously (see Table 1). Furthermore, when it is done in stage 1, D2 only occurs as weak dissonance. We think that strong dissonances affect the user more than weak dissonances. Furthermore, the occurrence of strong dissonances at the same point of time should evoke strong dissonance. Therefore, we propose that

Proposition 1: *When the SI's recommendations are shown in stage 1, the user will perceive less dissonance than when they are shown in stage 2.*

According to the cognitive dissonance theory, the dissonance will evoke a state of discomfort. In line with research on the effect of emotions on IT-usage, negative emotions can decrease the intention to use a system (see Beaudry and Pinsonneault, 2010, for an overview).

Proposition 2: *The higher the user's perceived dissonances, the less her intention to use the system.*

We argue that users who differ with respect to their product expertise react differently to dissonances. First, we think that dissonances have a stronger effect on the user's intention to use the system when the user is a novice. Users with low product knowledge (novices) will have less stable preferences than users with high product knowledge (knowledgeable users) and will be less confident with their purchase decision (Furse et al., 1984; Bloch et al., 1986; Murray, 1991). Thus, when novices are confronted with dissonances, they are likely to become uncertain about how to react to the conflicting recommendations of the systems. Similar results have been found for choices where information about product features was missing and lead to uncertainty for consumers (Meyer, 1981). It was shown that consumers respond negatively to such uncertainty (Jaccard and Wood, 1988).

Proposition 3: *Product knowledge moderates the effect of dissonances on the intention to use the system. The lower the user's product knowledge, the stronger is the effect of dissonances on the intention to use the system.*

3.2 The Usefulness of the SI's Recommendation

We predict that knowledgeable users and novice users differ with respect to how they try to reduce dissonances. Several studies have confirmed that knowledgeable users seek less information from external information sources and substitute that with internal information sources (Anderson et al., 1979; Moore and Lehmann, 1980), need less advice from external sources (Godek and Murray, 2008; Murray and Häubl, 2009; Yaniv, 2004; Yaniv and Kleinberger, 2000) and, in particular, engage less in search for information from other people (Furse et al., 1984). Narayan et al. (2011) find that when faced with information on the SIs' choices, greater certainty in the preferences of a user leads to less preference revision. Furthermore, people with high product knowledge often exhibit a confirmation bias, meaning that they seek and overvalue information confirming their own preferences while simultaneously undervaluing disconfirming information (see Nickerson, 1998, for a review of confirmation bias research). Thus, *we argue that knowledgeable users will reduce cognitive dissonances by ignoring the SI's recommendation and therefore will find SI's recommendation less useful*.

We think that there is another explanation why knowledgeable users will find recommendations from SIs less useful. Social influence can be conceptualized as a two-dimensional construct, compromising of informational and normative influence (Bearden et al., 1989; Deutsch and Gerard, 1955; Pincus and Waters, 1977; Price and Feick, 1984; Senecal, 2001). Informational influence describes an "influence to accept information from others as evidence about reality", while normative influence refers to an "influence to conform to some expectations of other individuals through reward//punishment relationship or a desire on the part of the person to identify with the other individuals or their point of view" (Pincus and Waters, 1977, p.615). While the normative influence might be relevant to both knowledgeable users and novices likewise, information influence should be more relevant for novices; they have less product knowledge and thus a higher need for additional information. For example, particularly for a novice, a product recommendation from a SI has value in indicating that the product is of high quality or otherwise attractive.

Proposition 4: *The lower the user's product knowledge, the more useful the user finds the SI's recommendations.*

The user can try to reduce cognitive dissonance by changing her own preferences and/or she can ignore the recommendation source. *We argue that it is harder for users to change the own preferences in stage 2 than in stage 1 of the RA*. One reason is because users will construct their preferences before and during the preference elicitation process and according to the literature on "belief persistence", once a belief or opinion has been formed, it can be very resistive to change (Freedman, 1964; Luchins, 1942; Nickerson, 1998; Rhine and Severance, 1970). We argue that this has an effect on how useful the user finds the SI's recommendations subject to the stage when the SI's recommendations are shown. Users of a system that shows the SI's recommendations only after the preference elicitation process is finished will already have formed their preferences when being confronted with the SI's recommendations. Consequently, they are more likely to ignore the SI's recommendations in case of a cognitive dissonance because they are resistive to change their own preferences.

We believe that there is a second reason why users will it find easier to change the own preferences in stage 1 than in stage 2. A user who sees the SI's recommendations before or during the elicitation process will have the chance to change the own preferences in the mind before communicating preferences to the system. A user will see the RA's question concerning for instance the importance of the attribute "brand" and on the same time the user will see the brand of the product which is recommended by the SI. The user can then change the own preferences for brand before he inputs them into the system and can thus hide the fact that he was influenced by the system or other observers.

In sum, because reducing D1 dissonance by changing one's own preferences is more difficult in stage 2 than in stage 1, users who encounter D1 in stage 2 are more likely to ignore the SI's recommendations for reducing D1 than users who encounter D1 in stage 1.

Proposition 5: *Users find the SI's recommendations less useful when they are shown in stage 2 than when they are shown in stage 1.*

The recommendation from the SI is an important component of the proposed system. Following other studies and in line with the technology acceptance model that states that perceived usefulness is a major driver for the intention to use a system (Davis, 1989), we formulate our last proposition:

Proposition 6: *The more useful the SI's recommendation is for the user, the higher his intention to use the system.*

4 Discussion

The advent of e-commerce and the vast variety of products that one can choose from have been both a boon and a burden to customers. The burden is the information overload a customer faces and the boon is the promise of finding better and cheaper product choices. The solution to alleviate the burden has been to develop product recommendation agents or RAs (Xiao and Benbasat, 2007). However, the proliferation of other recommendation sources on the internet (e.g., sites such as Amazon.com and recent developments in social networks) has exacerbated both the boon (additional information) and the burden (i.e., a different type of information overload), resulting in a new issue: how to cope with the scope and sometimes differing advice provided.

These differences between the desires a consumer has about product features and those that are suggested by various recommendation sources create cognitive dissonance and have to be dealt with by the consumer. This paper focuses on this issue and provides a model of how different types of recommendation information system designs will lead to different magnitudes of dissonance and when. It also discusses the role of the customer's product knowledge on influencing the extent of dissonance that occurs. It is intended to lead to empirical research efforts on the subject. Before we outline some ideas about how to test the model in the next section, we like to discuss some limitations and extensions of this work.

We assume that dissonances are perceived negatively and that users would normally like to reduce dissonances. However, the recommendation of a product that the user has not thought of before might also invoke serendipity (Herlocker et al., 2004) which can be enriching and rewarding (Ross, 1999). This aspect is neglected in the current model.

Iyengar et al. (2011) analyzed the adoption of new products within a real-world social network of physicians and showed that the magnitude of social influence is moderated by both the SIs' volume of product usage and the recipients' perception of their own opinion leadership. Models for system designs that control for which recommendations from which SIs are shown (see system design b in section 2.2) should therefore include the SIs' extent of product usage. Regarding the recipients' perceptions of opinion leadership, the authors measure opinion leadership with both sociometric (indegree in the network) and self-reported measures and found that sociometric measures are more strongly associated with early adoption than is self-reported leadership. It will be interesting to include the concept of opinion leadership next to product knowledge in our model.

Narayan et al. (2011) studied social influence on preferences in an offline social network in an MBA program. They found that the lesser uncertainty in preferences of the SIs and the greater the number of SIs, the greater the preference revision. While the first result is again of interest for system designs that control for which recommendation from which SI is shown, the second result might be interesting for a setting where not only the recommendation of one SI is shown to the user but the recommendations of multiple SIs are shown. The relationship between increasing conflict caused by an increasing number of recommendation sources and increasing degree of influence caused by an increasing number of SIs should be analyzed.

One issue, that has not been dealt with in this paper, but will be the focus of the extension of the proposed model, is how to help the consumer deal with cognitive dissonance and thus increase her intentions to adopt such systems.

5 Future Research

We plan to test our model in an online-experiment. The main challenge is to create a system where participants can access their real friend's recommendations for a product. This can be achieved by letting participants log onto the system with their Facebook accounts which gives the system access to the participant's friend's. The system can then choose those friends who have already participated in the study and for which, consequently, preferences and final product choices are known. To increase the probability that a participant's friend has already taken part in the experiment, at the end of the experiment participants are incentivized to invite other Facebook friends to participate in the experiment.

The *two recommendation information system designs* (discussed in section 2.2) provide the SI's recommendation information to the user at different stages of the recommendation process. A crucial aspect for enabling a fair comparison of both systems is to ensure that (i) the same kind of SI's recommendation is given in both systems and that (ii) although stages are of different nature (preference elicitation question vs. recommendation list of products), the user can easily match the SI's recommendation with what is relevant in the stage. We propose that in both system design 1 and system design 2, the friend's recommendation will be the product that she has chosen when participating in the experiment. In the system design 1, we will therefore not only show the friend's recommended product itself, but also highlight product features that are relevant for the attribute for which the preferences are currently elicited. If, for instance, the RA asks for the user's preferences for the price range, the prices of the product that the friend recommends must be displayed. In the system design 2, next to the recommendation list, the friend's purchased product will be shown in the same format as the RA's recommended products appear in the recommendation list.

With regard to *manipulating product knowledge*, we suggest a two step approach. As a first step, before the actual recommendation process starts, participants can answer questions that test what they think they know about the product (subjective knowledge) (Brucks 1985) because this subjective feeling should have a stronger impact on perceived dissonances than objective knowledge. As control, the objective knowledge can be measured as well. In the second step, we advice to follow the procedure suggested by Rathnam (2005) and provide additional training to those who have been classified as knowledgeable users. The additional training is supposed to increase the knowledge of knowledgeable users even further which will allow for a stronger separation of novices and knowledgeable users.

We hope that the model proposed in this paper will increase the understanding necessary for designing systems able to create synergies between different recommendation sources. We encourage following this avenue of research because, with the growing popularity of social networks, social influence in online purchase decisions or other kind of decision problems will become increasingly important.

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