



A multi-stage model of word-of-mouth influence through viral marketing[☆]

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ABSTRACT

With the growth and evolution of the Internet, electronic peer-to-peer referrals have become an important phenomenon, and marketers have tried to exploit their potential through viral marketing campaigns. At the same time, spam and e-mail-based viruses have cluttered electronic communications, making viral marketing campaigns problematic and challenging to deploy. The key driver in viral marketing is the effectiveness of unsolicited, electronic referrals to create awareness, trigger interest, and generate sales or product adoption. Yet, despite a large literature concerning interpersonal influence, little is known about *how* this electronic, or, indeed, any word-of-mouth process influences consumers' actual behaviors, particularly in a cluttered online environment. In this paper, we develop a model to help identify the role word-of-mouth plays during each stage of a viral marketing recipients' decision-making process, including the conditions that moderate such influence. We then present an innovative methodology for collecting data unobtrusively and in real time. We empirically test the model and methodology via a field study, where we observed the reactions of 1100 individuals after they received an unsolicited e-mail from one of their acquaintances, inviting them to take a survey and in turn spread the word about it. We found that characteristics of the social tie influenced recipients' behaviors, but had different effects at different stages: tie strength facilitated awareness, perceptual affinity triggered recipients' interest, and demographic similarity had a negative influence on each stage of the decision-making process. We conclude with a discussion of the theoretical and methodological contributions of our work and of managerial implications of these findings for online marketers interested in strategies for leveraging peer-to-peer referral networks.

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1. Introduction

The Internet dramatically facilitates consumer interconnections. E-mail referrals, online forums of users and newsgroups, as well as customer reviews encouraged by merchant websites allow consumers to share information far more easily than ever before. This interconnectivity is a global phenomenon that facilitates the dissemination of both positive and negative word-of-mouth (Shankar, Smith, & Rangaswamy, 2003), dissemination that cannot be easily controlled by marketers or brand managers. In addition, it challenges the existence of geographical markets, and hence the ability to conduct local marketing strategies.

However, marketers have noted the customer-leveraging possibilities the Internet offers (Brodin, 2000), among which viral marketing is amongst the most intriguing. The goal of viral marketing is to use consumer-to-consumer (or peer-to-peer) communications—as opposed to company-to-consumer communications—to disseminate

information about a product or service, thereby leading to more rapid and cost effective adoption by the market (Krishnamurthy, 2001).

Message dissemination can either be intentional or unintentional. In the latter situation, consumers are not intentional actors in the marketing-message dissemination process. A common example of unintentional dissemination involves Hotmail, where each outgoing e-mail sent via this free Web-based service contains a line promoting the company (i.e., “Get Your Private, Free E-mail at <http://www.hotmail.com>”). Hence, users sending e-mails from a Hotmail account automatically promote the service to every person they send a message to. Launched in July 1996, 12 million users signed-up for Hotmail within 2 years. The marketing budget over the same period of time was only \$500,000.

The most common version of intentional viral marketing occurs when consumers willingly become promoters of a product or service and spread the word to their friends; they are driven to do so either through an explicit incentive (e.g., financial incentives, need to create network externalities) or simply out of a desire to share the product benefits with friends (e.g., fun, intriguing, valuable for others). As examples, PayPal, by providing financial incentive to have members recommend members, acquired more than three million users in its first nine months of operation, while ICQ, a free instant-messaging service, offered an option to invite one's friends automatically to join

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the communication network. Launched in 1996, ICQ had 12 million users by 1997; its mother company Mirabilis was bought for \$287 million by AOL a year later.

The viral marketing concept and these examples suggest that marketers can leverage the power of interpersonal networks to promote a product or service. The concept assumes that electronic, peer-to-peer communications are an effective means to transform (electronic) communication networks into influence networks, capturing recipients' attention, triggering interest, and eventually leading to adoption or sales. Yet it is difficult to identify substantial evidence to support these assumptions or to explain why and how viral marketing works, which is perhaps why it is currently viewed as more of an art than a science (Diorio, 2001).

E-mail seems here to stay, and there is no doubt that peer-to-peer, e-mail-based communications will continue to play an informational and influential role on recipients' behavior. The proliferation of spam (i.e., unsolicited bulk e-mails) and e-mail-based electronic viruses have made recipients suspicious of most unsolicited e-mails. Consumers experience a high level of noise in their day-to-day electronic communications and for viral marketing campaigns to be designed more effectively, there is a need to better understand which online referrals are likely to cut through the clutter and which are not.

To better understand why and how viral marketing can be effective, we must understand its pass-along process and its underlying mechanisms of influence. While the existing word-of-mouth (hereafter WOM) literature can inform us, it is important to note that electronic referrals differ from their "offline" counterparts in two significant ways:

1. They are *electronic* by nature; there is no face-to-face communication.
2. Those referrals are usually *unsolicited*, that is, they are sent to recipients who are not looking for information, and hence are not necessarily willing to pay attention to them.

For reasons we review later, and despite an abundant literature, little attention has been given to *unsolicited* WOM communications. In addition, researchers who have addressed WOM communications have usually been limited in their ability to collect complete, detailed, and accurate information. Largely as a consequence of the lack of such data, the mechanisms by which WOM communications influence behaviors are not well understood. We concur with [Bansal and Voyer \(2000\)](#) that "...there is surprisingly little empirical research that examines [WOM] 'procedural' aspects" (p.166). And the advent of the viral marketing phenomenon underscores the importance of developing both methods to study and generate substantive findings about this phenomenon. Hence, our goals in this paper are three-fold:

1. To introduce multi-stage decision-making models as mechanisms to study and refine our understanding of unsolicited, electronic referrals.
2. To describe a research methodology we used to inform the model using data collected unobtrusively and in real time.
3. To test the above model and methodology with a field study,¹ and to compare our results with those from traditional one-stage models.

This paper is structured as follows. In the next section, we present a brief overview of the WOM literature and examine why so little is known about how unsolicited WOM communications influence consumer decisions. We then cast the existing WOM literature into a multi-stage framework to help decompose and predict the level, antecedents, and moderating effects of WOM influences on each stage

¹ The specific application chosen to illustrate this approach is how characteristics of the source moderate the effectiveness of online referrals. In our study, participants spread the word about a survey and encouraged their acquaintances to participate—a low-risk, low-involvement decision.

of recipients' decision-making processes. Next we introduce a research methodology to study the influence of WOM referrals at each stage of the decision process, and present the results of a field study in which we tracked the influence of one type of viral marketing: e-mail-based, unsolicited peer-to-peer referrals. We find that the antecedents of WOM influence (e.g., tie strength, demographic similarity) vary significantly and predictably across stages, thus enriching our understanding of the mechanisms of influence, and demonstrating the value of this new methodology for future research. We conclude with discussions of the theoretical, methodological, and managerial implications of this work.

2. How word-of-mouth (WOM) works

Word-of-mouth communications have received extensive attention from both academics and practitioners for decades. Since the early 1950s, researchers have demonstrated that personal conversations and informal exchange of information among acquaintances not only influence consumers' choices and purchase decisions ([Arndt, 1967](#); [Whyte, 1954](#)), but also shape consumer expectations ([Anderson & Salisbury, 2003](#); [Zeithaml & Bitner, 1996](#)), pre-usage attitudes ([Herr, Kardes, & Kim, 1991](#)), and even post-usage perceptions of a product or service ([Bone, 1995](#); [Burzynski & Bayer, 1977](#)). Some research has reported WOM influence as greater than print ads, personal selling, and radio advertising ([Engel, Kegerreis, & Blackwell, 1969](#); [Feldman & Spencer, 1965](#); [Katz & Lazarsfeld, 1955](#)), although [Van den Bulte and Lilien \(2001\)](#) show that some of those effects may have been overstated.

Considerable research has been directed at better understanding the antecedents and consequences of WOM. The existing literature can be classified into three streams. The first focuses on the reasons why consumers proactively spread the word about products and services they have experienced. That research reports that factors such as extreme satisfaction or dissatisfaction ([Anderson, 1998](#); [Bowman & Narayandas, 2001](#); [Dichter, 1966](#); [Maxham & Netemeyer, 2002](#); [Richins, 1983](#); [Yale, 1987](#)), commitment to the firm ([Dick & Basu, 1994](#)), length of the relationship with the firm ([Wangenheim & Bayon, 2004](#)), and novelty of the product ([Bone, 1992](#)) drive such behaviors.

The second stream aims to better understand information-seeking behaviors, or more specifically, under what circumstances consumers rely on WOM communications more than on other sources of information to make a purchasing decision. Consumers with little expertise in a product category ([Furse, Punj, & Stewart, 1984](#); [Gilly, Graham, Wolfenbarger, & Yale, 1998](#)), who perceive a high risk in decision-making ([Bansal & Voyer, 2000](#); [Kiel & Layton, 1981](#)), or who are deeply involved in the purchasing decision ([Beatty & Smith, 1987](#)) are more likely to seek the opinions of others for product advice.

Studies in the third stream examine why certain personal sources of information exert more influence than others. Researchers have identified factors such as source expertise ([Bansal & Voyer, 2000](#); [Gilly et al., 1998](#)), tie strength ([Brown & Reingen, 1987](#); [Frenzen & Nakamoto, 1993](#)), demographic similarity ([Brown & Reingen, 1987](#)), and perceptual affinity ([Gilly et al., 1998](#)) as important antecedents of WOM influence.

Despite this rich literature, we actually know very little about how WOM communications works, which can be attributed to four factors. First, as [Bristor \(1990\)](#) notes, most past research focuses on successful WOM communications; in other words, the research reports only on communications that have actually influenced the decision maker (see for instance [Brown & Reingen, 1987](#)).

Second, many studies focus only on recipients who were actively seeking information (e.g., [Bansal & Voyer, 2000](#)), i.e. those who were already interested in the product category in question and who were actively seeking to be influenced in their decisions. While these studies are useful to better understand information-seeking behavior and the flow of influence that spreads through social networks, their

design precludes them from explaining why some WOM communications have little or no influence.

Third, in most research, data are collected retrospectively, sometimes months or years after the communications have occurred (see for instance Bansal & Voyer, 2000, Brown & Reingen, 1987, or Wangenheim & Bayon, 2004). Such retrospective data is subject to erroneous recollection, post-interpretation, and hindsight bias.

Finally most surveys only measure the final outcome of WOM communications (e.g., recipients either bought the product or not), a single measure that ignores intermediate stages in the decision-making process. Those studies are therefore insufficient for determining how WOM communications affect purchasing decisions.

3. A multi-stage model of WOM influence

In this section, we first review multi-stage models as mechanisms for understanding the consumer decision-making process. We then integrate WOM into the model, and discuss how WOM is likely to influence each stage of the decision-making process and what antecedents (e.g., characteristics of the source) moderate such influence.

3.1. WOM influence and the stages of the decision-making process

It has long been argued that it is useful to view a consumer's purchasing decision as the outcome of a complex, multi-stage process (Bettman, 1979) whose stages are conceptually distinct although not necessarily observable. The multi-stage decision-making model consists of a sequence of mental stages or levels that consumers experience throughout a purchasing decision (the final stage). The sequence typically includes at least the following stages:

Awareness. The consumer knows the alternative exists, but may not have either interest in it or sufficient information to understand its possible benefits.

Interest. The consumer is aware, develops some interest, and hence decides to learn more about the product.

Final decision. The consumer has now taken an observable action, a purchase of a good or service or the sustained adoption of an innovation.

Note that this process is hierarchical in the sense that each step is conditional on the positive or favorable outcome of the previous one. The original sequence proposed by Rogers (1962) included an evaluation stage and a trial stage that may not be relevant in all contexts. Other variations of this sequence exist (Hauser & Urban, 1977; Rogers, 1995). For instance, if a consumer becomes aware through exposure to a very persuasive source (e.g., a very effective ad or an enthusiastic peer), awareness and interest may occur concurrently (Van den Bulte & Lilien, 2003). Alternatively, interest and evaluation may be combined. Nevertheless, most models rely on the above three-stage decision-making framework in one form or another.

We now consider how WOM communications can influence each stage of such a process, i.e. we discuss how to identify and measure WOM influence and its antecedents [e.g., tie strength, demographic similarity (see below)] during the *awareness*, *interest*, and *final decision* stages of the consumer decision-making process.

We posit that WOM plays a role not only in the flow of information but also in the flow of influence (Lin, 1971; Weimann, 1983), and that each (conditional) transition probability (i.e., probability of becoming aware; probability of interest; probability of positive action) may be influenced by source characteristics. Specifically, the literature suggests that certain characteristics should play a greater role in early stages, while others have more influence later. The amplitude and direction of such antecedents may also depend on the product category.

3.2. Costs, benefits, and cues throughout the various stages of the decision-making process

Decisions made by the recipient of an electronic communication (opening an e-mail, adopting a recommended service) can be analyzed in light of a cost/benefit analysis framework (Ratchford, 1982), based on available information (or cues). These costs and benefits as well as available cues vary across decision stages (Hansen & Helgeson, 1996). Given the purpose of this research, we focus on how these costs, benefits and cues are affected by the relationship between the sender and the recipient of the e-mail message.

3.2.1. Awareness stage

The first decision recipients face is whether or not they will open the e-mail, i.e. whether they will become aware of its content.² At this stage, the only cues available to the recipient are the relevance of the subject line, the familiarity of the sender's name, and the nature of the relationship between sender and receiver. Potential benefits include the possible information value of the message content, or the role that the message could play in strengthening the relationship with the sender, while potential costs and risks include the possibility of wasting time, of being a victim of spam, of opening a harmful message (e.g., that may contain a virus), or of violating the sender's trust or expectations by ignoring a well-intentioned personal e-mail.

3.2.2. Interest stage

During this stage, recipients are aware of the object and purpose of the e-mail communication (e.g., to spread the word about a product, offer, or service), and they may develop further interest and decide to learn more. In this way, recipients carry out a cost/benefit analysis that can be summarized as follows: "based on what I already know, is it worth my time to investigate further?" At this stage, the congruence of the sender's tastes with the recipient's, and the relevance of the sender's experience and expertise, may serve as additional cues about the potential benefits of the recommended product or service.

3.2.3. Final decision

At this stage, the recipient has gathered sufficient information about the product or service, and may decide to buy or adopt based on a cost/benefit analysis of the offer. The relationship with the sender will affect the recipient's final decision only to the extent that this relationship affects the anticipated costs or benefits of the decision outcome.

We now review each key dimension of the relationship between the sender and the recipient, and their likely influence, at each stage of the decision-making process, on perceived costs, perceived benefits, and information cues.

3.3. Tie strength

The strength of an interpersonal tie is a "combination of the amount of time, the emotional intensity, the intimacy (mutual confiding), and the reciprocal services that characterize the tie" (Granovetter, 1973, p.1361; see also Burt, 1982; Weimann, 1983). Tie strength has been found to be one of the most significant factors explaining the influence of WOM communications. For instance, Brown and Reingen (1987) showed that strong-tie sources were perceived as more influential than weak-tie sources. However, their conclusions were based on retrospective data collected exclusively from successful referrals, which may have limited the scope of their results.

² Although paying attention to the electronic communication is the action and becoming aware of its content is the likely result of that action, we use the two notions interchangeably for simplicity.

During the awareness stage, the strength of the tie between the sender and the recipient should exert a great influence on both risk and reward dimensions. Rogers (1995) argues that strong-tie sources are perceived as more credible and trustworthy than weak-tie sources, in line with Coleman (1990) who suggests that tie strength can operate through trust. One of the facets of trust is the fiduciary obligation that is created between the actors (Barber, 1983), i.e. “their duty and their motives to place the interest of others before their own” (Luhmann, 2000, p.94). In other words, strong-tie sources are more likely to reduce the potential risks of the e-mails they send; hence, opening an e-mail from a strong tie should be perceived as less risky than opening an e-mail from a weak tie. Notice that, to exert any influence, the importance of trust presupposes that a situation of risk exists, which is increasingly the case in the online environment following the advent of spam and e-mail based worms and viruses. Without risk, trust would play no role in the recipients' decision-making process (Luhman, 2000).

On the benefit or reward dimension, tie strength is also defined by the benevolence that characterizes the actors' actions toward one another (e.g., Wuyts, Stremersch, Van Den Bulte, & Franses, 2004). In line with Sahlin's (1972) social exchange theory, Frenzen and Nakamoto (1993) showed that strong ties were likely to transmit information of higher economic value than weak ties.

In a viral marketing context, and following both fiduciary obligations and source benevolence explanations, unsolicited e-mails are more likely to be opened if they come from close and trusted sources, while e-mails coming from strangers or remote acquaintances will be anticipated as containing potentially less valuable or more suspicious information, and hence more likely to remain unopened. Therefore, the literature suggests that tie strength will positively influence the likelihood of awareness.

While peer imitation, herding behavior (Banerjee, 1992, 1993), and brand congruence among members of a social group (Reingen, Foster, Brown, & Seidman, 1984) seem to provide evidence of the influence of tie strength beyond the awareness stage, these phenomena relate more strongly to demographic similarities and physical proximity than to tie strength. Although these dimensions are usually highly correlated (those alike and in close vicinity tend to develop stronger ties), they are conceptually distinct. We argue that the influence of tie strength on the later stages of the decision process is marginal, because it does not by itself modify the perceived costs or benefits of the product or service. In addition, physical proximity plays a much smaller role in electronic communication than it does in personal communication, especially in the context of this model, which aims to explain the influence of viral marketing, not its likelihood of occurring. Consequently, in most contexts, tie strength should not influence the stages of the decision-making process.

A possible exception would be if the recipient's decision not to adopt adversely affects the sender. In the presence of reciprocal benefits (“if you agree to sign in, I will receive a referral bonus of \$5”), or positive network externalities (“if you adopt this instant-messaging software, it will make my life easier”), the benevolence argument suggests that strong ties are more likely to adopt. While we did not find a supporting example in the literature, such an effect may indeed be present in some contexts.

3.4. Perceptual affinity

Brown and Reingen (1987) recommend incorporating measures of attitudinal/lifestyle similarity between the source and the target in studies of WOM communications. Following this suggestion, we consider the role of perceptual affinity, also referred to as “perceptual homophily” (Gilly et al., 1998; Wolfinger & Gilly, 1993), a construct related to—but conceptually distinct from—tie strength. Perceptual affinity is defined as similarities between two people's values, likes, dislikes, and experience.

When someone receives an e-mail and considers opening it before knowing the subject of the message, the decision to open and read cannot relate to message content (unknown) but only to the relationship with the source. At this early stage of the decision-making process, the congruence of likes and dislikes between sender and source is likely to be less important than the presence of a trust-based relationship, especially in today's cluttered environment.

Once opened and read, a WOM communication originating from a source with similar likes and dislikes will likely generate more interest than one from a source with dissimilar tastes. The fact that the source and the recipient have similar tastes should serve as a cue for the latter that the product or service in question may also be of interest to the former.

Notice that awareness and interest are conceptual (i.e., mental) stages that may not perfectly translate into separate, observable actions. For instance, if the subject of the e-mail is clear and informative, awareness and interest may occur concurrently³ (Van den Bulte & Lilien, 2003).

In the final stage of the decision-making process, congruence of likes and dislikes with the sender should not affect the recipient's assessment of the offer's costs or benefits, and we therefore should not find any evidence of an effect of perceptual affinity on the final decision. This assertion is in line with the finding of Reingen et al. (1984) that, while the interpersonal similarity hypothesis cannot be entirely discounted, it appears to have very little explanatory power.

3.5. Demographic similarity

Past research has found demographic similarity⁴ between source and target to be important for explaining the occurrence and influence of WOM communications, and it is usually measured along several dimensions such as age, sex, occupation, or level of education (Brown & Reingen, 1987). The literature reports ambiguous findings about the direction of such effects, a situation we attempt to address in this research.

A common finding of social network theory is that demographic similarity facilitates the flow of information. People who are alike tend to interact more often and communicate more easily (McPherson, Smith-Lovin, & Cook, 2001), an observation known as the “like-me” principle (Laumann, 1966). WOM communications are more likely to occur between people who are similar in terms of age, sex, and social status (Brown & Reingen, 1987). For instance, in their search for a physician, couples with children were found to be more influenced by WOM referrals from other couples with similar demographic characteristics (Feldman & Spencer, 1965). This argument suggests that demographic similarity will have a positive influence on various stages of the decision-making process.

Under certain circumstances, however, individuals may favor the advice of others outside their immediate social circle (“unlike-me”), finding them more influential because such sources expose recipients to a broader spectrum of information and experience. For example, college female students were more likely to be influenced by older and more educated male sources about when deciding on the purchase a VCR than they were if the source was another female college student (Gilly et al., 1998). This finding holds even after taking into account perceived expertise of the source on the topic.

During the awareness stage, where recipients decide whether to open or disregard an e-mail based on a cost/benefit analysis without

³ In the field study we describe later, we made sure that the subject line of the email contained as little information as possible in order to disentangle the effect of perceptual affinity on awareness and interest.

⁴ We use the term “similarity” throughout, representing observable characteristics rather than “homophily,” a term often used in the literature, referring to the effect that results from such similarity.

knowing the content of the message, the influence of demographic similarity should be unequivocal. In addition to depending on the strength of the tie with the sender, the information value of the message is also related to the likelihood that the source possesses information that the recipient does not. This likelihood is higher if the recipient does not evolve in the same social cluster as the recipient, but rather lies at the intersection of social worlds and can therefore play the role of *information broker* (Burt, 2005) or can help the recipient bridge *structural holes* in the network (Burt, 1992). This is consistent with Granovetter's (1973) "strength of weak ties" theory. Consequently, sources with demographic profiles that differ from those of the recipients may be perceived as having more or less complementary experience, exposure, or knowledge; here, these differences are likely to convey more unique information, and thus make the message more valuable.

Following the awareness stage, we argue that, depending on the context, demographic similarities can either *reinforce* or *discredit* the influence of the message. This context-based hypothesis would help reconcile some of the contradictory findings found in the literature, and is consistent with the work of Ferrand, Mounier, and Degenne (1999), who studied the structure of social relations in France and found that friendship ties shared the most demographic similarity, while mutual aid relations were the most demographically dissimilar.

Messages from sources with similar demographic characteristics will generate more interest and be more influential in situations where a high degree of trust, confidence, and intimacy is required (e.g., to choose an obstetrician/gynecologist), regardless of perceived expertise (Gilly et al., 1998). Demographic similarities between the sender and the recipient will serve as a cue for the latter that the product or service may be of interest to them and tailored to their demographic profiles and needs, thereby increasing the perceived potential benefits of the offer.

When WOM communications relate to impersonal products or services, i.e., when the situation involves objective/factual issues (e.g., choosing a VCR), the effect could be the reverse of what is described above. Seasoned points of view and novelty of information and experience outside the social circle can outweigh the "like-me" benefit, allowing these demographically dissimilar links to play a more important role as information brokers (Burt, 2005).

Notice that the latter effects may be reinforced or weakened by social considerations. On the one hand, during the final stage of the decision-making process, when recipients decide to purchase or adopt, certain sources are likely to have greater influence due to their higher perceived authority or superior social status, such as sources who are older, more affluent, or more educated (e.g., a professor to her students, a father to his son, a manager to his younger assistant). In this case, *not* adopting a product or service recommended by such sources may be perceived to have potential social costs, where such costs are linked to the relationship with the sender, not the product or service itself. Thus, the effects of demographic dissimilarity may not be symmetrical (e.g., older sources may have more influence on younger ones than vice versa), even though this asymmetry has not been explicitly discussed in the WOM literature.

On the other hand, social status considerations may also play a role in some contexts, and reinforce the "like-me" principle. Demographic similarity is closely related to social status, which is defined not only by income and wealth but also by occupation, education, and place of residence: "people will seek to emulate the consumption behavior of their superiors and aspiration groups and [...] others of similar status" (Van den Bulte & Stremersch, 2004). This line of reasoning is exploratory, since it appears not to have been addressed in the WOM literature, and it merits further research.

3.6. Source expertise

The role of experts in the flow of information and influence through social networks has been one of the more widely investigated

aspects of WOM communications. Consumers are more inclined to seek the advice from, and be influenced by, expert sources than by non-expert ones (Bansal & Voyer, 2000; Gilly et al., 1998), and there are reasons to believe that this finding will hold in a viral marketing context.

In the initial stage of the decision-making process, however, source expertise should play no significant role. Expertise is domain-specific and the recipient is not aware of the relevant domain until he or she pays attention to the WOM communication.

During the later stages of the decision process, expertise of the source will only exert influence to the extent that it affects either the perceived costs or benefits of the recommended product or service. If the recipient can easily assess these costs and benefits without ambiguity and with full confidence, source expertise should bear no influence. On the other hand, when a product or service is complex, when its benefits are not immediately observable, or when the benefits are ambiguous or intangible, recipients of the WOM communication may rely on the expert opinion of the source as a cue for whether to show product or service interest, and for evaluating and potentially purchasing the product or service (Rogers, 1995). This argument aligns with Robertson (1971), who maintains that products high in complexity and perceived risk and low in testability are more susceptible to personal influences than those low in complexity and perceived risk but high in testability.

On the other hand, in the absence of such complexity, recipients will not need to use the source's expert opinion as a surrogate for their own judgment.

We next present a field study in which we are able to empirically test this model.

4. Research design

4.1. Methodological considerations

To empirically assess the influence of electronic referrals at different stages of consumers' decisions, we seek a research design that meets the following six criteria: *Multi-stage observability* (C1): subjects' behaviors should be observable at each stage of the decision process. Observing only the final outcome is not sufficient; *Exhaustive* (C2): referrals with little or no influence (i.e., that fail prior to the final decision) should be observable and included; *Unsolicited* (C3): referrals should be *unsolicited*, that is, sent to recipients who were not specifically looking for information. If this were not the case, the validity of our hypotheses about the *awareness* and *interest* stages would be questionable; *Real time* (C4): data should be collected as behaviors occur to eliminate incomplete data and recall bias; *Realistic context* (C5): the context should be realistic enough to permit the results to be translated into managerially relevant insights. *Unobtrusive and unbiased* (C6): the research should be executed in a manner that neither influences behaviors nor biases observations.

In retrospective surveys, researchers can ask participants to remember unsolicited referrals (C3), including those that did not lead to the adoption of the product or service (C2). Surveys that rely on retrospective data, however, are subject to erroneous recollection and possible hindsight bias, violating criteria C4 and C6. In addition, trying to collect retrospective data consistent with C1 would be challenging.

Although a lab experiment offers many advantages, the controlled setting can make extrapolation of the results and the translation of those findings into managerially relevant insights difficult, thus compromising the realistic context criteria (C5). In addition, certain stages are difficult to replicate satisfactorily in a lab setting (e.g., awareness), thus leading to potentially biased observations and violation of C6.

An Internet-based field study can satisfy the conditions above. Due to the available technology and the electronic nature of the communications, we can conduct field studies (C5) in which we

observe, unobtrusively (C6) and in real time (C4), the actual influence of e-mail-based, unsolicited (C3) WOM communications at different stages of recipients' decision-making process (C1), including referrals with little or no influence (C2). We therefore selected such a methodology for our research. We adapted Stanley Milgram's "small world methodology" (Milgram, 1967) to the context of the Internet (see below), and developed a field study to assess the influence of unsolicited electronic referrals at different stages of the decision whether to participate in a survey that generated the antecedents of that behavior.

4.2. Study design

The purported purpose of this study was to replicate Milgram's small world experiment (Milgram, 1967; Travers & Milgram, 1969). We gave participants the identity of a target person, and invited them to send an e-mail-based referral to one of their acquaintances, inviting them to participate in the study. The acquaintance would in turn refer the study to another person, and so on, until the target person was reached. This approach is similar to Milgram's small world methodology, except that in the original study, participants were asked to forward a package by postal mail rather than an e-mail-based referral.

The procedure in the present study was as follows. Participants received an e-mail from one of their acquaintances suggesting that they participate in an online survey. The e-mail contained a brief description of the study, a personalized message written by the sender, and a link that redirected the visitor to a website dedicated to the study. We rewarded participation with a chance to win a \$1000 cash prize. The only condition for a participant to enter the drawing was to complete the survey, a point made clear throughout, beginning in the body of the invitation e-mail. No action was required on the recipient's part for the sender to enter the drawing, so that the attributions that a recipient might make concerning the motivations

of the sender would be unaffected, reducing the risk of bias generated by such a promotional offer.

We designed the link to the experiment's website contained in the e-mail to be unique to each participant and, hence, we were able to automatically and unobtrusively identify those who clicked on the link and visited the website. In addition, when a recipient opened the e-mail, that action triggered a message to our Web server, a technique commonly used by online marketers to identify which e-mails have been actually opened. The "notify sender" feature was not used. Instead, each e-mail contained and referred to an image that was physically stored on our web server. The first time the e-mail was opened, the recipient's e-mail system downloaded the image from our server to display it on the recipient's screen. This image was "tagged" (usually referred to as a "web bug") with a unique name that unobtrusively identified the recipient so that, each time our server received a request to download an image, the server could record where this request came from, confirming the e-mail had been opened. Hence, recipients were unaware that confirmations were sent.

Notice that this procedure, while still the best option available at the time of this writing, is not free of measurement error, and may have generated *false positive*, *false negative*, and *misleading negative* types of errors. In Table 1, we outline the circumstances under which each type of error may have been generated, and we assess the likely size of such errors. Note that, while measurement errors are unavoidable, at least with today's technologies and in the context of a field study, we see no reason why these errors should be unevenly distributed across the population and generate biases.

Once on the website, visitors received more detailed information about the study (research goal, privacy policy, informed consent form, etc.), and were invited to continue the chain of e-mails and answer a few additional questions. Only if they agreed to participate were they informed of the identity of the target person (an international student at a university in the southern US). They were then invited "to send a message to a personal acquaintance of yours who is more likely than

Table 1
Commentary on possible measurement errors

False positive

Occurs when a notification is sent to the web server, notifying the e-mail has been opened, even though the recipient may not have become aware of its content

- The message is browsed and appears shortly in the preview pane of the e-mail software
 - Concerns mostly Microsoft Outlook and Outlook Express users, not Web-based e-mail services (e.g., HotMail), Netscape Communicator or Eudora users
 - At the time of the study (late 2001), Outlook had much lower market penetration than it has today
 - Most individual and corporate Outlook users disable such option for security reasons, since the preview pane is a security vulnerability
 - Recipients might open the e-mail, but not read it or pay attention to it
- The message is opened, but not read

False negative

Occurs if the e-mail was in fact opened and read, but the web server dedicated to the study did not receive notification

- The message is opened while there is no active Internet connection (i.e., offline)
 - If the e-mail triggered interest, then the reader would need to read the message online (with notification) in order to follow the link
- The outgoing notification is blocked by the e-mail software or firewall
 - Most current e-mail systems ask permission to download images containing identifiable information (e.g., "Some pictures have been blocked to help prevent the sender from identifying your computer. Click here to download pictures").
 - This feature was not available at the time of this study, so it did not affect our results, but it probably would if the same study were repeated today
- The network, or our web server, encounters technical problems that prevent it from receiving or storing the notification properly
 - No server downtime was reported during the course of this study

Misleading negative

Occurs if the invitation e-mail did not reach the recipient in the first place. The fact that the e-mail was tagged as not opened is misleading with regard to the recipient's actual behavior

- Obsolete or misspelled e-mail address
 - Since the invitation e-mail was sent on behalf of the participant, he or she would receive the "message could not be delivered" error message without our knowing
- The e-mail was blocked as spam
 - At the time of the study (late 2001), anti-spam software was not as widely used as today
 - The invitation e-mails were sent on behalf of the participants, with their name and e-mail address appearing in the "from:" field of the e-mail. By default, most spam filters do not act on e-mails sent by individuals known by the recipient
 - Most features that characterize spam e-mails were carefully avoided, such as invisible or barely visible text, "catchy" words, etc.
- The network, or a web server, has technical problems and does not send the invitation e-mail properly
 - No server downtime was reported on our end during the course of this study

you to know the target person.” We then requested the name and e-mail address of their “next link” along with other information.

To help analyze the influence of peer-to-peer online referrals and not merely the influence of forwarded e-mails, we invited participants to write a personalized message to be sent to the recipient along with the invitation. This message was clearly highlighted in the outgoing e-mails and identified as originating from the sender, thus enhancing the personal nature of the electronic communication. The following message appeared by default in the box:

Hello: I've just participated in a study conducted by researchers at [name of a northeastern US university]. They are studying the 'small world' phenomenon and are trying to link two strangers through a chain of acquaintances via e-mails. I'm inviting you to be my 'next link'. Would you agree to participate and to continue the chain, like I did? If you participate you can win a \$1,000 cash prize. It takes only 5 minutes to complete. Check it out, maybe it will be of some interest to you! Best regards, [name of the participant].

Participants were free to erase, modify, or keep the message unchanged. For reasons pertaining to participants' privacy, we did not record the actual messages sent. However, data collected during a pilot study showed that the vast majority of participants did not modify the message, thus assuring homogeneity of the outgoing messages.

Once all information had been entered (recipient's name and e-mail, personalized message), the website would then send an e-mail on behalf of the participant, with the name of the participant appearing in the “From:” field, and the chain of e-mails would continue.

After receiving confirmation that the e-mail had been sent, participants were asked to answer a few questions about the acquaintance they had chosen to be their “next link” (the questions were personalized with the next link's name), in addition to questions about themselves. The survey included six additional web pages, containing 40 items, 18 of which were used for the purpose of this study. We retained those questionnaire items that corresponded to existing theory, and excluded some others that were collected for

other exploratory work. Fifteen items were related to the relationship the sender had with his or her next link: the nature of the relationship, demographic similarity, strength of the social tie, and similarity in likes and dislikes. One item in particular asked what the recipient was to the sender (e.g., a close friend, a parent). This information was used to test the face validity of the data and to describe the dataset qualitatively (see Table 2), but was not part of the response models' independent variables. The last three items measured the sender's self-reported Internet-related expertise.

After completing the survey, participants were asked to enter additional personal information for the purpose of the cash prize drawing, and were also invited to “spread the word” to more persons and initiate more chains. If they did volunteer other names, we asked no additional questions, since we reasoned that asking many additional questions per pass-on would severely lower the response rate. We excluded these additional invitations from the data analysis; they represented 35.7% of the e-mails sent by participants.

4.3. Dataset

We seeded the experiment by inviting 4500 business students from a large northeastern US university, 634 of whom agreed to participate and initiate a chain of e-mails (a 14% response rate.) After eight weeks, 2198 e-mails had been sent by 1414 participants, with an average completion rate of 25.8%. After data cleaning and exclusion of incomplete surveys, we retained 1116 responses for analysis. The longest chain of e-mails involved seven acquaintances. The target person was never reached.

For privacy reasons, we did not exploit third-party e-mail addresses provided by participants to send their invitations, unless such third parties decided to participate in the study. We were therefore unable to conduct follow-up studies on non-respondents.

4.4. Multi-stage response analysis

Each completed survey was associated with an outgoing electronic referral sent to one of the participants' acquaintances, and we observed this person's actions at different stages of the study.

Table 2

Relationship categories between senders and recipients (as reported by the senders), relationship characteristics, and proportions in the dataset at each stage of the decision-making process

		A co-worker	A neighbor	Barely an acquaintance	A buddy	A close friend	Your best friend	Your spouse or partner	Your mother or father	Your brother or sister	Your child	Another relative	Other
Relationship characteristics	Tie strength	0.60 (0.25)	0.65 (0.24)	0.31 (0.22)	0.65 (0.18)	0.84 (0.14)	0.96 (0.06)	0.98 (0.05)	0.92 (0.10)	0.87 (0.15)	0.90 (0.14)	0.81 (0.20)	0.53 (0.29)
	Perceptual affinity	0.52 (0.19)	0.45 (0.25)	0.32 (0.23)	0.53 (0.18)	0.64 (0.16)	0.72 (0.14)	0.72 (0.15)	0.66 (0.15)	0.67 (0.20)	0.63 (0.20)	0.61 (0.20)	0.46 (0.24)
	Demographic similarity	0.67 (0.23)	0.73 (0.17)	0.62 (0.18)	0.70 (0.20)	0.74 (0.19)	0.75 (0.19)	0.49 (0.17)	0.33 (0.17)	0.56 (0.22)	0.40 (0.13)	0.47 (0.23)	0.55 (0.27)
Proportions in the dataset, at each stage	Receive e-mail n=1116 (%)	4.3	0.6	0.8	12.6	39.1	19.3	6.6	3.7	6.7	0.4	3.1	2.7
	Open e-mail n=825 (%)	3.6	0.6	0.4	12.2	39.6	19.5	7.3	4.3	6.6	0.5	2.9	2.5
	Visit website n=488 (%)	5.2	0.0	0.4	10.5	37.5	19.0	7.9	5.2	8.2	0.6	3.1	2.5
	Complete survey n=304 (%)	4.7	0.0	0.6	10.2	37.3	19.3	7.8	5.9	8.4	0.6	2.5	2.8
	Variations from referral to completion (%)	+7.2	-100.0	-19.0	-18.7	-4.7	-0.4	+18.4	+57.4	+24.6	+45.8	-19.0	+2.5

Question asked to the sender: “Who is the recipient for you?”.

Relationship Characteristics: averages of the three relationship variables (multi-item measures averaged and scaled between 0 and 1) reported for each category of sender–recipient relationships. This table provides good face validity of the measured constructs (e.g., close friends are high on the tie strength dimension; neighbors share many demographic similarities, etc.) Averages over .70 are in bold. Standard deviations are in parentheses.

Proportions in the Dataset: most participants sent the electronic referral to a friend or buddy (71%) or to a family member (14%). Due to attrition phenomena, proportions in the dataset vary noticeably across stages. The fact that remote acquaintances represented only 0.8% of the recipients might explain why the target person was never reached (see Granovetter, 1973).

Specifically we observed whether or not the recipient (1) opened the e-mail, (2) clicked on the link to visit the website, and (3) completed the survey.

The above steps are reasonable proxies of the recipients' *awareness*, *interest*, and *final decision* stages of their process to decide whether to complete the survey, following their initial unawareness stage as follows:

Unaware. Recipients receive an e-mail from one of their acquaintances, but have not read it yet and are unaware of its content. (The e-mail's subject was deliberately vague, i.e., "Check it out that might be of interest to you.")

Awareness. At this stage, recipients open and read the e-mail. In this way, they become aware of the existence of the study. Interviews with selected participants confirmed that the amount of information contained in the invitation was sufficient to give a general idea of what the study was about, but—as intended—it was vague about what was expected of participants, and about how much time and effort their participation would take.

Interest. Recipients' decision to visit the website shows that the referral successfully generated interest.

Final decision. Participants fully participate in the study and complete the entire survey.

Fig. 1 provides an overview of the process.

The observable actions of the recipients appear to mimic fairly well the steps of the stylized decision-making process depicted in the literature, at least in the context of this study.

We fit a different Logit model to the observations made at each step. Since the experiment was designed as a funnel of three successive decisions (e.g., only those who opened the e-mail could click on the link and go to the website), we fit each model to a diminishing number of observations. This multi-stage analysis is similar to and has the same desirable statistical properties as the

sequential-response model discussed by Maddala (1983, pp. 49–50). We fit this sequential Logit model by sequentially maximizing the likelihood functions of the three dichotomous models, with each likelihood function incorporating the estimated probabilities of the preceding stages (see Appendix B for details).

Note that observations dropping out at each stage are not random but are the result of respondents' self-selection. While this self-selection is the focus of this study, and hence should not be labeled as a "bias", it may appear to raise statistical concerns. However, parameter estimates for our model structure have been shown to be unaffected by changes in the marginal distributions of the variables (Bishop, Fienberg, & Holland, 1975; Mare, 1980).

In addition, in order to compare our multi-stage model to the classic, single-stage model benchmark usually reported in the literature, which observes only the final decision, we fit a fourth model that directly links receipt of the e-mail to completion of the survey.

4.5. Measured constructs

The measured constructs are reported in Appendix A with their verbatim formulation, and are as follows:

Tie Strength was measured by a five item version (Cronbach's $\alpha=0.93$) of the scale developed by Frenzen and Davis (1990).

Perceptual Affinity was measured using a four-item version ($\alpha=0.87$) of the scale from Gilly et al. (1998).

Demographic Similarity between the sender and the recipient included four dimensions: sex, level of education, age, and occupation. Since this is a formative scale, we report no alpha coefficient. Items were then transformed to a 0-to-1 continuum, where 0 represented complete dissimilarity (e.g., "male–female", "not at all similar occupation"), and 1 complete similarity (e.g., "male–male", "extremely similar occupation").

Source Expertise (in this case, Internet-related expertise) was measured by three items ($\alpha=0.81$).

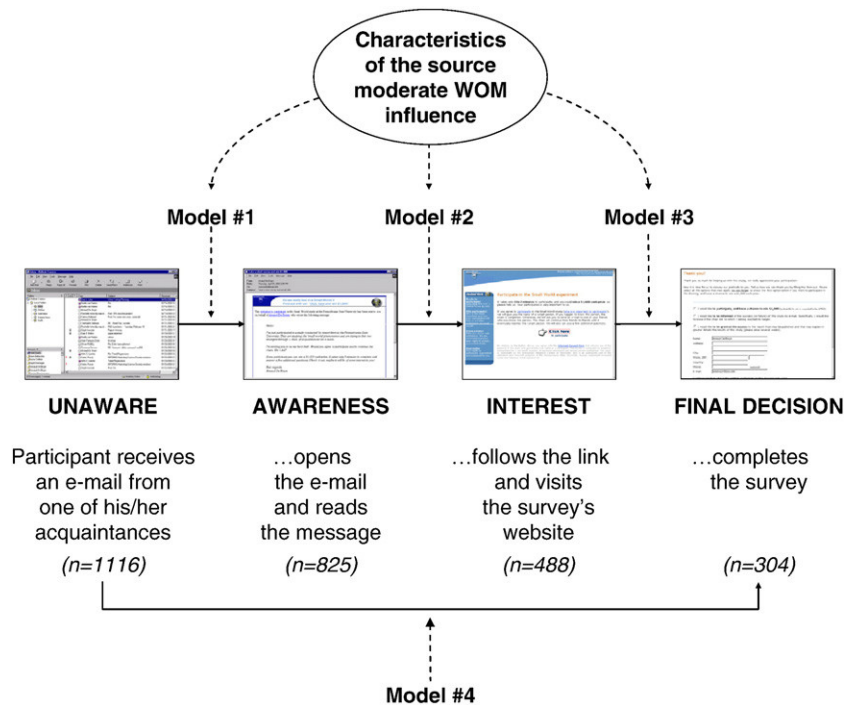


Fig. 1. Study design and related models. The study was designed as a funnel of three consecutive decisions, namely the decisions made by the respondents (i) to open the e-mail received from one of their acquaintances and become aware of the existence of the study, (ii) to show some interest in the survey by following the link in the e-mail and visiting the survey's website, and (iii) to complete the survey (final decision). We fit a separate Logit model to each of these three steps. A fourth, benchmark model directly links the receipt of the e-mail to the completion of the survey.

The top part of Table 2 shows the average scores obtained for Tie Strength, Perceptual Affinity, and Demographic Similarity (average of items, scaled between 0 and 1) as a function of sender–recipient relationships. Source Expertise, which is specific to the sender, is not reported. As expected, neighbors share many demographic similarities, but they are not necessarily close nor do they necessarily share many affinities. Best friends and remote acquaintances score high or low, respectively, across all dimensions, and spouses and partners score highest on the tie strength dimension. This table provides an interesting and convincing validity check of the measured constructs.

Notice that most participants sent the electronic referral to a friend or ‘buddy’ (71%) or to a family member (14%).

4.6. Hypotheses

The context we chose (spreading the word about a survey) is a low-cost, low-benefit, low-involvement, and rather impersonal “product”. This context is nested within the general theoretical framework presented earlier, and only those hypotheses relevant to our context can be formally tested. Specifically, we hypothesize that:

H₁. The stronger the tie, the more likely WOM communications are to generate awareness.

Given the nature of the viral marketing campaign in this study, we do not hypothesize any further influence of tie strength beyond the awareness stage, but note this might not hold in other contexts.

H₂. The higher the perceptual affinity between the source and the recipient, the more likely WOM communications are to generate interest.

During the awareness stage, the influence of demographic similarity seems unequivocal:

H₃. The more demographically *dissimilar* the tie, the more likely WOM communications are to generate awareness.

Our theoretical development suggests that the influence of demographic similarity on further stages depends on the ‘personal’ or ‘impersonal’ nature of the object of the referral. Since referring a survey does not require a high degree of trust or intimacy, the most appropriate hypotheses to be tested are:

H₄. The more demographically *dissimilar* the tie, the more likely it is to generate interest.

H₅. The more demographically *dissimilar* the tie, the more likely the recipient is to complete the survey.

The “benefits” of the product are easy to understand (e.g., chance to win a lottery), and so are its “costs” (e.g., time necessary to

participate). Recipients should not need to rely on the sender's expertise as surrogates for their own judgment; thus, source expertise should have no significant impact, and we hypothesize that this factor has no effect on the process analyzed here.

Fig. 2 summarizes the relevant hypotheses in the context of this study.

5. Empirical results

We have reported the 12 categories of sender–respondent relationships in Table 2. Their proportions vary noticeably across the different stages. For instance, “brothers and sisters” represent 6.7% of the initial recipients, and 8.4% of those who completed the survey, corresponding to an increase of 24.6%. On the other hand, “buddies” tend to withdraw from the study faster than other categories, and their representation in the dataset falls from one stage to the next, decreasing 18.7% from a value of 12.6% at the first stage to 10.2% in the final stage.

Tables 3a and 3b gives the results of all four models, reporting the parameter estimates of the Logit models. The independent variables are the four constructs discussed earlier (specifically, the un-weighted average of their corresponding items), mean-centered and standardized across the population, plus an intercept. Dependent variables are dichotomous; for example, in the first model, the dependent variable equals 1 if the respondent opened the e-mail and 0 otherwise.

5.1. Hypothesis tests

5.1.1. Tie Strength

H₁ is supported ($p < 0.05$). Tie Strength significantly influenced the decision of the recipient to open the e-mail he or she received, hence facilitating awareness. No other parameters for Tie Strength were found to be statistically significant in the other models.

5.1.2. Perceptual Affinity (H₂)

Once the recipient opened the e-mail, Perceptual Affinity between the sender and the recipient increased the chance that the latter would click on the link and visit the website, strongly supporting H₂ ($p < 0.01$). Thus, referrals from sources with similar tastes and preferences are more likely to generate interest. We found no other parameter estimates for Perceptual Affinity to be significant in the other models.

5.1.3. Demographic Similarity (H₃, H₄, H₅)

Demographic Similarity is, as expected, the only dimension that had a significant impact in all three models. All parameters are negative and significant, strongly supporting H₃, H₄, and H₅. Under these testing conditions, electronic referrals from demographically dissimilar ties had more influence than referrals from

	WOM	→	Awareness	→	Interest	→	Final decision
Tie strength		↑	H ₁				
Perceptual affinity				↑	H ₂		
Demographic similarity		↓	H ₃	↓	H ₄	↓	H ₅
Source expertise							

Fig. 2. The multi-stage model and summary of hypotheses. Our theoretical model posits that (i) each transitional probability of the multi-stage decision-making process is influenced by characteristics of the source, and that (ii) certain characteristics play a greater role in early stages, while others exert more influence later.

Table 3a
Model results and parameter estimates

	Multi-stage model				One-stage model	
	Unaware	Awareness	Interest	Decision	Unaware	Decision
	Receive e-mail <i>n</i> = 1116	⇒ Open e-mail <i>n</i> = 825 Model 1	⇒ Visit website <i>n</i> = 488 Model 2	⇒ Complete survey <i>n</i> = 304 Model 3	Receive e-mail <i>n</i> = 1116	⇒ Complete survey <i>n</i> = 304 Model 4
Tie strength		H ₁ 0.172 **	0.037	-0.038		0.064
Perceptual affinity		0.093	H ₂ 0.253 ***	-0.086		0.131
Demographic similarity		H ₃ -0.220 ***	H ₄ -0.160 **	H ₅ -0.310 ***		-0.328 ***
Source expertise		0.029	0.020	0.036		0.052
Intercept		1.056 ***	0.359 ***	0.496 ***		-1.013 ***
Log-likelihood		-632.0	-798.1	-713.6		-640.7

Parameter estimates of the four Logit models linking recipients' responses to characteristics of the sender–recipient relationships and to the source expertise. Parameters significant at $p < 0.05$ are in bold. Cells hypothesizing significant effects are boxed. Inputs of the models are mean-centered and standardized. Statistical significance: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

demographically similar ones at each stage of the decision-making process.

5.1.4. Source Expertise

Although this result is likely to be specific to our context of an online questionnaire for which others' expertise may be unnecessary for assessing the merits of the offer, we found no significant parameters for Source Expertise in any of the three models.

5.2. Comparison with one-stage model results

Comparing the results of the observations above with results that we estimate from the one-stage model usually reported in the WOM literature reveals some striking contrasts. In the one-stage model, only one parameter is significant besides the intercept: Demographic Similarity.

It is useful to compare the different conclusions we would have drawn if we could only observe the final outcome of the electronic referral. First, Perceptual Affinity, which influences only one stage, loses statistical significance once amalgamated into a single-stage model. Although its parameter estimate is positive in the fourth model, it does not achieve statistical significance ($p = 0.13$).

Second, the role of Tie Strength would have been overlooked; neither its influence nor its direction would have been identified ($p = 0.79$ in the fourth model).

Finally, a multi-stage model offers additional insights since the stages at which each factor influences recipient decisions can be identified. These differences are summarized in Table 3b.

This comparison highlights the importance of studying electronic referrals' influence within a multi-stage decision-making framework,

Table 3b
Single-stage vs. multi-stage model comparisons of results, highlighting qualitative differences in conclusions

Factors	Conclusions based on the standard single-stage model	Conclusions based on our three-stage model
Tie Strength	No influence	Strong influence: Facilitates awareness
Perceptual Affinity	No influence	Strong influence: Generates interest
Demographic Similarity	Strong negative influence	Strong negative influence
Source Expertise	No influence	No influence

and the additional insights both researchers and practitioners can gain from such a perspective.

6. Discussion and conclusions

6.1. Theoretical and methodological contributions

We developed a model to study the influence of unsolicited, electronic referrals within a multi-stage decision-making framework, and we hypothesized that the antecedents of WOM's influence varied across stages and across contexts.

Our specialized research methodology provided the model with data collected in a field study. The Internet-based design permitted us to track recipients' reactions at each stage of their decision-making process, unobtrusively and in real time. The Internet also allowed us to observe and include referrals that had no influence, that is, that did not lead to the completion of the survey, in marked contrast to WOM studies using traditional methodologies.

This study deepens our understanding of how source characteristics moderate the influence of online referrals. We hypothesized and found supporting evidence that tie strength only facilitated awareness, perceptual affinity triggered recipients' interest, and demographically dissimilar ties were more influential than demographically similar ones across different stages of the decision-making process. These results are markedly richer than those from traditional, one-stage models as evidenced by our benchmark one-stage model, where demographic similarity was the only parameter found to be statistically significant. Indeed, one theoretical contribution of our work may be to call into question prior findings using more aggregated models of social influence; in these studies, more limited measurement and research frameworks may have masked or overstated theoretical conclusions (Van den Bulte & Lilien, 2003).

6.2. Managerial implications

In light of our theoretical model and empirical findings, it should not be surprising that online marketers seeking to implement "send-to-a-friend" and "viral marketing" campaigns have faced substantial challenges. Our study found that while close relationships can be effective in capturing recipients' attention and creating awareness (e.g., to drive traffic to a website), they had no influence at later stages. Indeed, online visitors who were driven to the website because they

were close friends of the source were no more likely than others to complete the survey.

Hence, our work suggests to online marketers looking to design a viral marketing campaign that not all social networks are equally effective for harnessing the potential of peer-to-peer referrals. Given the importance of tie strength and perceptual affinity for generating awareness and trigger interest, it seems that networks of friends (as opposed to networks of professionals or colleagues) are more suited to the rapid and effective diffusion of peer-to-peer online referrals. Attempts to initiate viral marketing mechanisms in the absence of close relationships among the actors in a network may be ineffective.

6.3. Limitations

6.3.1. External validity

In our field study, the object of the WOM communications was to spread the word about a survey, and one might question whether the insights provided by this empirical study generalize to more traditional WOM communications about products or services. To be sure, all contexts are different, but we argue that our results can be generalized, at least to a limited extent.

First, from a consumer's point of view, to participate in a survey is a *choice process* that shows many similarities to more traditional decision processes. Most noticeably, that choice process involves cost/benefit evaluations, which have been found to occur at various stages of the decision-making process (Hansen & Helgeson, 1996). Consequently, similar theories and concepts, such as multi-stage decision-making models, have been applied to study survey participations (Helgeson, Voss, & Terpening, 2002) and purchase decisions alike. As Bettman (1979) noted, "choice of a particular brand from a set of alternatives, although the focus of most consumer research, is not the only type of choice made [by consumers]" (p. 13).

Also, from a marketer's point of view, "obtaining a survey response is a *persuasion process*" (Helgeson et al., 2002), as is obtaining a sale. Both require influencing consumers' attitudes and behaviors (p.325). And in both cases, the process involves an offer, a message, a target, and a response behavior. This behavior is the outcome of a consumer's decision-making process, as influenced by factors that the marketer controls (e.g., incentive, design, copy) and factors that the marketer does not control (e.g., individuals' characteristics, preferences, and prior attitudes).

Other contexts will activate other hypotheses of the model. For instance, we expect source expertise to be important for explaining the influence of WOM communications with regard to a complex technological product, even more so if the product is expensive. However, the overall theoretical structure should hold across contexts.

6.3.2. Other limitations

Since recipient participation was the focus of this study, independent variables included in the models had to be collected without recipient participation: only source-side measures could be gathered. Hence a limitation of our research involves the omission of relevant recipient-side independent variables, such as recipients' interest in the subject and how the recipient perceived the source as an expert. This limitation was a by-product of our unobtrusive measurement strategy.

Second, while our theoretical framework addresses many facets of the influence of electronic referrals across contexts and product categories, we could test only those hypotheses relevant to our empirical context. Hence, further experimentation to test and validate other hypotheses in different contexts is called for.

Third, the instrument we adapted to measure demographic similarity should be refined. Demographic *similarity* might reinforce interpersonal trust, while demographic *dissimilarity* may serve as a surrogate measure of perceived authority, social power, social status,

and information-bridging potential—all factors likely to increase the influence of the WOM communication. Confounding these two demographic factors may explain the contradictory findings reported in the WOM literature on the role of demographic similarity. This possibility warrants future research. In addition, the scale itself should be refined to better capture all these nuanced effects.

Fourth, a limitation of the field study design was the limited range of variability in all types of variability in the study. In a laboratory one can create a stronger effect by forcing communication between near-strangers; such a situation was not possible in our field design. Hence, the results of our research must be viewed within the framework of effects between naturally occurring WOM options, excluding the Internet equivalent of cold calls.

Finally, viral marketing is a new phenomenon that keeps evolving in a dynamic marketplace, and both firms and consumers are still adapting to it. Its long-term role in the marketing mix is unclear. For example, it is an open question whether the dissemination of a marketing message through "send-to-a-friend" programs will remain effective over time. In other words, a study similar to the one here may yield different results if conducted several years from now in a more mature market, perhaps with different electronic technologies and with more acclimated users. How consumers adapt their behaviors to marketers' attempts to leverage their personal networks of acquaintances warrants further research, as well.

6.4. Future research

The study reported here is an illustration of the valuable insights that can be gained from multi-stage models aiming to better understand the mechanisms of the influence of viral marketing. Our goal is not to draw generalizations from a single study, but rather to illustrate the fact that the multi-stage decision-making model, usually considered as a useful "conceptual" framework or a mental model of how consumers make decisions, can now be operationalized and informed with real-life data as a result of today's technologies.

More importantly, this paper opens the way to further experiments and manipulations. For instance, one may use our methodology to investigate the best incentives to trigger "send-to-a-friend" behaviors, and to study the stages most affected by such incentives. Researchers interested in brand equity may also find this methodology valuable for studying whether or not old and reputable companies are more likely to effectively leverage their consumers' personal networks, or if new, lesser-known firms are equally capable of triggering such behaviors; they may also wish to examine what stages are most likely to be affected by superior brand equity. For instance, does the value of a respectable brand lie more in its ability to generate interest more easily, or can it also increase the likelihood of final decision? Also, Bearden et al. (1989) have suggested that some people are more susceptible to interpersonal influence than others, although this trait has not always been found to be significant (Bone, 1995). If studied through the lens of multi-stage models, we may find that susceptibility to interpersonal influence significantly influences only certain stages, but is not significant when only the final outcome is measured.

Another fruitful arena would be to replicate this study in parallel in different countries or over time. We expect that cultural differences in dimensions such as trust, intimacy, or social power should have different influences on the WOM process. Such studies would increase our understanding of viral marketing in an international context. Combined with longitudinal studies, this research could reveal both inherent cultural differences as well as the evolution of the processes that underlie viral marketing.

This study, motivated by the challenges facing viral marketing, is an attempt to help disentangle the influence of WOM, and the antecedents of such influence, at different stages of the decision-making process. Multi-stage models offer a rich perspective to study this phenomenon, and this work demonstrates that WOM works

much more subtly than previously reported. We hope that our conceptualization and our use of new Internet research methodologies will trigger further research to deepen our understanding of WOM and how it can be leveraged in the future.

6.5. Afterthought: generalization of the findings to “traditional” WOM

One may question whether any research on Internet-based communication generalizes to more traditional, face-to-face WOM communications. This question is important since it is unlikely that face-to-face contexts can allow for the collection of such precise data, unobtrusively and in real time.

While we have no direct supporting evidence, we believe that the *direction* and *nature* of the effects found here will generalize to traditional WOM communications. However, the magnitude of the effects will likely differ: they will be much greater in a face-to-face context, which may raise some effects to the level of statistical significance that were not so in our study. For instance, while it is easy to ignore an e-mail referral sent by a friend, it is much harder, given social norms, to avoid listening to the same referral delivered in person. In the context of our model, WOM communications from close ties will likely generate more awareness offline than online (H_1).

Close ties tend to engender similar consumption patterns in the physical world. For instance, Reingen et al. (1984) found a strong choice congruence for pizzas, restaurants, and TV shows among friends in a sorority house, and the hypotheses we have developed in a viral marketing context will not fully explain such findings. By the same token, the physical world has several properties that do not translate into the context of an electronic referral, such as repeated exposures (electronic referrals are usually one-time communications) or joint consumption settings (the distance and electronic nature of the communication make that unlikely). These characteristics all predict a greater interpersonal influence offline than online.

Influence of source expertise should also be stronger in traditional WOM communications: face-to-face communications are richer, more complex, and convey more information than their electronic counterparts. Hence, perception of source expertise should be reinforced, making this factor more persuasive and salient than in an online context, and thereby giving it a more pervasive impact on the next steps of the decision-making process in face-to-face WOM.

It is, however, unlikely that data about face-to-face WOM communications can be gathered with the same precision and unobtrusiveness as the online data reported here, which may make it difficult to apply a multi-stage model of WOM influence in the real world. In this way, such a model may be most appropriate as a conceptualization tool useful for placing empirical studies in perspective.

Appendix A. Survey items

Tie Strength (Frenzen & Davis, 1990)

- There are some people in our daily lives with whom we are willing to share personal confidences. How likely would you be to share personal confidences with John? ($1 = \text{not at all likely}$, $7 = \text{very much likely}$)
- There are some persons in our daily lives with whom we would gladly spend a free afternoon socializing. There are others with whom we would rather not spend our free time. How likely would you be to spend some free time socializing with John? ($1 = \text{not at all likely}$, $7 = \text{very much likely}$)
- How likely would you be to perform a LARGE favor for John? ($1 = \text{not at all likely}$, $7 = \text{very much likely}$)
- In your opinion, how likely would John be to perform a LARGE favor for you? ($1 = \text{not at all likely}$, $7 = \text{very much likely}$)

- On a scale of 1 to 7, please rate your closeness to John. ($1 = \text{not at all close}$, $7 = \text{extraordinary close}$)

Perceptual Affinity (Gilly et al., 1998; Wolfinger & Gilly, 1993)

- Considering your outlook on life, how similar are you and John? ($1 = \text{not at all similar}$, $7 = \text{extremely similar}$)
- Considering your likes and dislikes, how similar are you and John? ($1 = \text{not at all similar}$, $7 = \text{extremely similar}$)
- Considering your values and experiences, how similar are you and John? ($1 = \text{not at all similar}$, $7 = \text{extremely similar}$)
- To the best of your knowledge, how similar are John's tastes in products compared to yours? ($1 = \text{not at all similar}$, $7 = \text{extremely similar}$)

Demographic Similarity

- What is your sex? What is John's sex? (*male, female*)
- How much younger or older are you compared to John? ($1 = \text{I am much younger}$, $4 = \text{same age}$, $7 = \text{I am much older}$)
- How similar are the occupations that you and John have? ($1 = \text{not at all similar}$, $7 = \text{Extremely similar}$)
- Do you and John have the same level of education (e.g., high school diploma, technical or career college degree, bachelor's degree, master's degree, doctorate)? ($1 = \text{yes}$, $2 = \text{more or less}$, $3 = \text{no}$)

Source Expertise

- I am very knowledgeable about the Internet. (*yes, kind of, no*)
- I often influence other people in their usage or opinions about the Internet. (*yes, kind of, no*)
- My friends see me as a good source of information about the Internet. (*yes, kind of, no*)

Appendix B. Sequential logit model specification

Consider the following:

- $Y = 1$ if the recipient has not opened the e-mail.
- $Y = 2$ if the recipient has opened the e-mail but not visited the website.
- $Y = 3$ if the recipient has visited the website but not completed the survey.
- $Y = 4$ if the recipient has completed the survey.

The probabilities can be written as follows (Amemiya, 1975):

$$\begin{aligned}
 P_1 &= F(\beta_1 x) \\
 P_2 &= [1 - F(\beta_1 x)] F(\beta_2 x) \\
 P_3 &= [1 - F(\beta_1 x)] [1 - F(\beta_2 x)] F(\beta_3 x) \\
 P_4 &= [1 - F(\beta_1 x)] [1 - F(\beta_2 x)] [1 - F(\beta_3 x)]
 \end{aligned}$$

The parameters β_1 are estimated on the entire sample by dividing the sample into those who opened the e-mail and those who did not. The parameters β_2 are estimated from the subsample of recipients who opened the e-mail by dividing it into two groups: those who visited the website and those who did not. The parameters β_3 are estimated from the subsample of recipients who visited the website by dividing the subsample into two groups: those who completed the survey and those who did not.

The likelihood functions for the above sequential logit model can be maximized by sequentially maximizing the likelihood functions of the three dichotomous models (Maddala, 1983).

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