

Research on Internet Recruiting and Testing:
Current Status and Future Directions

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Introduction

Over the last decade the Internet has had a terrific impact on modern life. One of the ways in which organizations are applying Internet technology and particularly World Wide Web (WWW) technology is as a platform for recruiting and testing applicants (Baron & Austin, 2000; Brooks, 2000; C.I. Greenberg, 1999; Harris, 1999, 2000). In fact, the use of the Internet for recruitment and testing has grown very rapidly in recent years (Cappelli, 2001). The increasing role of technology in general is also exemplified by the fact that in 2001 a technology showcase was organized for the first time during the Annual Conference of the Society for Industrial and Organizational Psychology. Recently, the American Psychological Association also endorsed a Task Force on Psychological Testing and the Internet.

It is clear that the use of Internet technology influences heavily how recruitment and testing are conducted in organizations. Hence, the emergence of Internet recruitment and Internet testing leads to a large number of research questions, many of which have key practical implications. For example, how do applicants perceive and use the Internet as a recruitment source or which Internet recruitment sources lead to more and better-qualified applicants? Are web-based tests equivalent to their paper-and-pencil counterparts? What are the effects of Internet-based testing in terms of criterion-related validity and adverse impact?

The rapid growth of Internet recruitment and testing illustrates that the answers to these questions have typically been taken for granted. Yet, in this chapter we aim to provide empirically-based answers by reviewing the available research evidence. A second aim of our review consists of sparking future research on Internet-based recruitment and testing. Despite the fact that there exist various excellent reviews on recruitment (e.g.,

Barber, 1998; Breugh & Starke, 2000; Highhouse & Hoffman, 2001) and selection (e.g., Hough & Oswald, 2000; Salgado, 1999; Schmitt & Chan, 1998) in a traditional context, no review of research on Internet-based recruitment and testing has been conducted. An exception is Bartram (2001) who primarily focused on trends and practices in Internet recruitment and testing.

This chapter has two main sections. The first section covers Internet recruitment, whereas the second one deals with Internet testing. Although we recognize that one of the implications of using the Internet is that the distinction between these two personnel management functions may become increasingly intertwined, we discuss both of them separately for reasons of clarity. In both sections, we follow the same structure. We start by enumerating common assumptions associated with Internet recruitment (testing) and by discussing possible approaches to Internet recruitment (testing). Next, we review empirical research relevant to both of these domains. On the basis of this research review, the final part within each of the sections discusses recommendations for future research.

Internet Recruitment

Assumptions Associated with Internet Recruitment

Internet recruitment has, in certain ways at least, significantly changed the way in which the entire staffing process is conducted and understood. In general, there are five common assumptions associated with Internet recruitment that underlie the use of this approach as compared to traditional methods. A first assumption is that persuading candidates to apply and accept job offers is as important as choosing between candidates. Historically, the emphasis in the recruitment model has been on accurately and legally assessing candidates' qualifications. As such, psychometrics and legal orientations have dominated the recruitment field. The emphasis in Internet recruitment is on attracting candidates. As a result, a marketing orientation has characterized this field.

A second assumption is that the use of the Internet makes it far easier and quicker for candidates to apply for a job. In years past, job searching was a more time-consuming

activity. A candidate who wished to apply for a job would need to first locate a suitable job opportunity, which often involved searching through a newspaper or contacting acquaintances. After locating potentially suitable openings, the candidate would typically have to prepare a cover letter, produce a copy of his or her resume, and mail the package with the appropriate postage. By way of comparison, the Internet permits a candidate to immediately seek out and search through thousands of job openings. Application may simply involve sending a resume via email. In that way, one can easily and quickly apply for many more jobs in a far shorter period of time than was possible before Internet recruitment was popularized. In fact, as discussed later, an individual perusing the Internet may be drawn quite accidentally to a job opening.

Third, one typically assumes that important information about an organization may be obtained through the Internet. The use of the Internet allows organizations to pass far more information in a much more dynamic and consistent fashion to candidates than was the case in the past. Candidates may therefore have much more information at their disposal before they even decide to apply for a job than in years past. In addition, candidates can easily and quickly search for independent information about an organization from diverse sources, such as chatrooms, libraries, and so forth. Thus, unlike years past where a candidate may have applied for a job based on practically no information, today's candidate may have reviewed a substantial amount of information about the organization before choosing to apply.

A fourth assumption is that applicants can be induced to return to a web site. A fundamental concept in the use of the Internet is that web sites can be designed to attract and retain user interest. Various procedures have been developed to retain customer interest in a web site, such as cookies that enable the web site to immediately recall a customer's preferences. Effective Internet recruitment programs will encourage applicants to apply and return to the web site each time they search for a new job.

A final assumption refers to cost issues, namely that Internet recruitment is far less expensive than traditional approaches. Although the cost ratio is likely to differ from situation to situation, and Internet recruitment and traditional recruitment are not monolithic approaches, a reasonable estimate is that Internet recruitment is 1/10 of the cost of traditional methods and the amount of time between recruitment and selection may be reduced by as much as 25% (Cober, Brown, Blumental, Doverspike, & Levy, 2000).

Approaches to Internet Recruitment

We may define Internet recruitment as any method of attracting applicants to apply for a job that relies heavily on the Internet. However, it should be clear that Internet recruitment is somewhat of a misnomer because there are a number of different approaches to Internet recruitment. The following describes five important Internet recruitment approaches. We start with some older approaches and gradually move to more recent ones. This list is neither meant to be exhaustive nor comprehensive as different approaches to Internet recruitment are evolving regularly.

Company web sites. Company web sites represent one of the first Internet-based approaches to recruiting. Many of these web sites also provide useful information about the organization, as well as a mechanism for applying for these jobs. A study in 2001 by iLogos showed that of the Global 500 companies, 88% had a company Internet recruitment site, reflecting a major surge from 1998, when only 29% of these companies had such a web site. Almost all North American Global 500 companies (93%) have a company Internet recruitment site. Most applicants would consider a medium- to large size company without a recruitment web site to be somewhat strange; indeed, one report indicated that of 62,000 hires at nine large companies, 16% were initiated at the company Internet recruitment site (Maher & Silverman, 2002). Given these numbers, and the relatively low cost, it would seem foolish for an organization to not have a company Internet recruitment site.

Job boards. Another early approach to Internet-based recruiting was the job board. Monster Board www.monster.com was one of the most successful examples of this approach. Basically, the job board is much like a newspaper listing of job opportunities, along with resumes of job applicants. The job board's greatest strength is the sheer numbers of job applicants listing resumes; it has been estimated that they contain 5 million unique resumes (Gutmacher, 2000). In addition, they enable recruiters to operate 24 hours a day, examine candidates from around the world, and are generally quite inexpensive (Boehle, 2000). A major advantage of the job board approach for organizations is that many people post resumes and that most job boards provide a search mechanism so that recruiters can search for applicants with the relevant skills and experience. A second advantage is that an organization can provide extensive information, as well as a link to the company's web site for further information on the job and organization.

The extraordinary number of resumes to be found on the web, however, is also its greatest weaknesses; there are many recruiters and companies competing for the same candidates with the same access to the job boards. Thus, just as companies have the potential to view many more candidates in a short period of time, candidates have the opportunity to apply to many more companies. Another disadvantage is that having access to large numbers of candidates means that there are potentially many more applicants that have to be reviewed. Finally, many unqualified applicants may submit resumes, which increases the administrative time and expense. As an example, Maher and Silverman (2002) reported one headhunter who posted a job ad for an engineering vice president on five job boards near the end of the day. The next morning, he had over 300 emailed resumes, with applicants ranging from chief operating officers to help-desk experts. Despite the amount of attention and use of job boards, relatively few jobs may actually be initiated this way; combined together, the top four job boards produced only about 2% of actual jobs for job hunters (Maher & Silverman, 2002).

e-Recruiting. A completely different approach to Internet-based recruiting focuses on the recruiter searching on-line for job candidates (Gutmacher, 2000). Sometimes referred to as a “meta crawler” approach (Harris & DeWar, 2001), this approach emphasizes finding the “passive” candidate. In addition to combing through various chat rooms, there are a number of different techniques that e-Recruiters use to ferret out potential job candidates. For example, in a technique called “flipping,” recruiters use a search engine, like Altavista.com, to search the WWW for resumes with links to a particular company’s web site. Doing so may reveal the resumes, email addresses, and background information for employees associated with that web site. Using a technique known as “peeling,” e-recruiters may enter a corporate web site and “peel” it back, to locate lists of employees. (Silverman, 2000).

The major advantage of this technique is the potential to find outstanding passive candidates. In addition, because the e-recruiter chooses whom to approach, there will be far fewer candidates and especially far fewer unqualified candidates generated. There are probably two disadvantages to this approach. First, because at least 50,000 people have been trained in these techniques, and companies have placed firewalls and various other strategies in place to prevent such tactics, the effectiveness of this technique is likely to decline over time (Harris & DeWar, 2001). Second, some of these techniques may constitute hacking, which at a minimum may be unethical and possibly could be a violation of the law.

Relationship recruiting. A potentially major innovation in Internet recruitment is called relationship recruiting (Harris & DeWar, 2001). A major goal of relationship recruiting is to develop a long-term relationship with “passive” candidates, so that when they decide to enter the job market, they will turn to the companies and organizations with which they have developed a long-term relationship (Boehle, 2000). Relationship recruitment relies on Internet tools to learn more about web visitors’ interests and experience and then email regular updates about careers and their fields of interest.

When suitable job opportunities arise, an email may be sent to them regarding the opportunity. For an interesting example, see www.futurestep.com. Probably the major advantage of this approach is that passive applicants may be attracted to jobs with a good fit. Over time, a relationship of trust may develop that will produce candidates who return to the web site whenever they are seeking jobs, thus creating a long term relationship. At this point, it is unclear what disadvantages, if any, there are to relationship recruitment. One possibility may be that relationship recruitment may simply fail to generate enough applicants for certain positions.

Surreptitious approaches. Perhaps the most recent approach to Internet recruitment is the surreptitious or indirect approach. The best example is provided by www.salary.com, which provides free salary survey information. Because the web site enables one to request information by job title and geographic location, information about potential job opportunities can be automatically displayed. This site provides additional services (e.g., a business card, which can be sent with one's email address, to potential recruiters) that facilitate recruitment efforts. We imagine that if it isn't happening yet, "pop-up" ads for jobs may soon find their way to the Internet. Although it is too early to assess the strengths and weaknesses of surreptitious approaches to recruitment, they would appear to be a potentially useful way to attract passive job applicants. On the other hand, some of these techniques may be perceived as being rather offensive and overly direct.

Previous Research

Despite the rapid emergence of Internet recruitment approaches, research studies on Internet recruitment are very sparse. To the best of our knowledge, the only topic that has received some empirical research attention is how people react to various Internet-based recruitment approaches.

Weiss and Barbeite (2001) focused on reactions to Internet-based job sites. To this end, they developed a web-based survey that addressed the importance of job site

features, privacy issues, and demographics. They found that the Internet was clearly preferred as a source of finding jobs. In particular, respondents liked job sites that had few features and required little personal information. Yet, older workers and women felt less comfortable disclosing personal information at job sites. Men and women did not differ in terms of preference for web site features, but women were less comfortable providing information online. An experimental study by Zusman and Landis (in press), who compared potential applicants' preferences for web-based versus traditional job postings, did not confirm the preference for web-based job information. Undergraduate students preferred jobs on traditional paper-and-ink materials over web-based job postings.

Zusman and Landis also examined the extent to which the quality of an organization's web site attracted applicants. In this study, poor quality web sites were defined as those using few colors, no pictures, and simple fonts, whereas high quality web sites were seen as the opposite. Logically, students preferred jobs on high quality web pages to those on lower quality pages. Scheu, Ryan, and Nona (1999) confirmed the role of web site aesthetics. In this study, impressions of a company's web site design were positively related to intentions to apply to that company. It was also found that applicant perceptions of a company changed after visiting that company's web site.

Rozelle and Landis (in press) gathered reactions of 223 undergraduate students to the Internet as a recruitment source and more traditional sources (i.e., personal referral, college visit, brochure about university, video about university, magazine advertisement). On the basis of the extant recruitment source literature (see Zottoli & Wanous, 2000, for a recent review), they classified the Internet as a more formal source. Therefore, they expected that the Internet would be perceived to be less realistic, leading to less positive post-selection outcomes (i.e., less satisfaction with the university). Yet, they found that the Internet was seen as more realistic than the other sources. In addition, use of the university web page as a source of recruitment information was not negatively correlated with satisfaction with the university. According to Rozelle and Landis, a possible

explanation for these results is that Internet recruitment pages are seen as less formal recruitment sources than, for example, a brochure because of their interactivity and flexibility.

Whereas the previous studies focused on web-based job postings, it is also possible to use the Internet to go one step further and to provide potential applicants with realistic job previews (Travagline & Frei, 2001). This is because Internet-based realistic job previews can present information in a written, video or auditory format. Highhouse, Stanton, and Reeve (forthcoming) examined reactions to such Internet-based realistic job previews (e.g., the company was presented with audio and video excerpts). Interestingly, Highhouse et al. did also not examine retrospective reactions. Instead, they used a sophisticated micro-analytic approach to examine on-line (i.e., instantaneous) reactions to positive and negative company recruitment information. Results showed that positive and negative company information in a web-based job fair elicited asymmetrically-extreme reactions such that the intensity of reactions to positive information were greater than the intensity of reactions to negative information on the same attribute.

Dineen, Ash, and Noe (in press) examined another aspect of web-based recruitment, namely the possibility to provide tailored online feedback to candidates. In this experimental study, students were asked to visit the career web page of a fictitious company that provided them with information about the values of the organization and with an interactive “fit check” tool. In particular, participants were told whether they were a “high” or a “low” fit with the company upon completion of a web-based person-organization fit inventory. Participants receiving feedback that indicated high P-O fit were significantly more attracted to the company than participants receiving no feedback. Similarly, participants receiving low fit feedback were significantly less attracted than those receiving no feedback.

Finally, Elgin and Clapham (2000) did not investigate applicant reactions to Internet-based recruitment but concentrated on the reactions of recruiters. The central

research question was whether recruiters associated different attributes with job applicants with an electronic resume versus job applicants with paper resumes. Results revealed that the electronic resume applicant was perceived as possessing better overall qualifications than the applicants using paper resumes. More detailed analyses further showed that the paper resume applicant was perceived as more friendly, whereas the electronic resume applicant was viewed as significantly more intelligent and technologically advanced.

Although it is difficult to draw firm conclusions due to the scarcity of research, studies generally yield positive results for the Internet as a recruitment mechanism. In fact, applicants seem to react favorably to Internet job sites and seem to prefer company web pages over more formal recruitment sources. There is also initial evidence supporting other aspects of Internet-based recruitment such as the possibility of offering realistic job previews and online feedback.

Recommendations for Future Research

Because of the apparent scarcity of research on Internet-based recruitment, the following section discusses several promising routes for future research, namely applicant decision processes in Internet recruitment (i.e., decisions regarding which information to use and how to use that information), the role that the Internet plays in recruitment, and the effects of Internet recruitment on the turnover process.

How do applicants decide which sources to use? Although there is a relatively large literature concerning applicant source (e.g., newspaper, employee referral) and applicant characteristics in the broader recruitment literature (Barber, 1998; Zottoli & Wanous, 2000), there is practically no research on how applicants perceive different Internet sources. In other words, do applicants perceive that some Internet sources of jobs are more useful than others? Several factors may play a role here. One factor, not surprisingly, would be the amount of available information and the quality of the jobs. A second factor may be the degree to which confidentiality and privacy is perceived to exist (for more

information and discussion of this topic, see the part about privacy in the section on Internet-based testing) (see the aforementioned study of Weiss & Barbeite, 2001). A third factor may be aesthetic qualities, such as the attractiveness of the graphics (see Scheu et al., 1999; Zusman & Landis, in press). Technical considerations, such as the quality of the search engines, the speed with which the web site operates, and related issues (e.g., frequency of crashes), comprise the fourth factor.

Cober, Brown, Blumental, and Levy (2001) presented a three-stage model of the Internet recruitment process. The first stage in the model focuses on persuading Internet users to review job opportunities on the recruitment site. The model assumes that at this stage in the process, applicants are primarily influenced by the aesthetic and affective appeal of the web site. The second stage of the process focuses on engaging applicants and persuading them to examine information. This stage in turn comprises three sub-stages: fostering interest, satisfying information requirements, and building a relationship. At this stage, applicants are primarily swayed by concrete information about the job and company. The final stage in this model is the application process, wherein people decide to apply online for a position. Cober et al. (2001) rated a select group of companies' recruitment web sites on characteristics such as graphics, layout, key information (e.g., compensation), and reading level. Using this coding scheme, they reported that most of these companies had at least some information on benefits and organizational culture. Relatively few of these companies provided information about such items as vision or future of the organization. The estimated reading level was at the 11th grade level. Interestingly, reading level was negatively correlated with overall evaluation of the company's recruitment web site. The more aesthetically pleasing the web site, the more positively it was rated as well. Given the typology developed by Cober et al., the next logical step would be to study the effect on key measures such as number of applicants generated, how much time was spent viewing the web site, and the number of job offers accepted.

We believe that certain factors may moderate the importance of the things that we have already mentioned. One moderator may be the reputation of the organization; individuals may focus more on one set of factors when considering an application to a well-regarded organization than when viewing the site of an unknown organization. We also suspect that factors that initially attract job seekers may be different than the factors that encourage candidates to return to a web site. Specifically, while aesthetic and technical factors may initially affect job seekers, they are likely to play a less prominent role as job seekers gain experience in applying for jobs. Cober et al.'s (2001) model and typology appears to be a good way to begin studying applicant decision processes.

Resource exchange theory (Brinberg & Ganesan, 1993; Foa, Converse, Tornblom, & Foa, 1993) is another model that may be helpful in understanding the appeal of different Internet-based recruitment sites. Yet, to our knowledge, this theory has not been extensively applied in the field of I/O psychology. Briefly stated, resource exchange theory assumes that all resources (e.g., physical, psychological, etc.) can be sorted into six categories: information, money, goods, services, love, and status. Moreover, these six categories can be classified along two dimensions: particularism and concreteness. Particularism refers to the degree to which the source makes a difference - love is very high on particularism because it is closely tied to a specific source (i.e., person), while money is very low on particularism because it is the same, not matter what the source. Services, on the other hand, are higher on particularism than goods. The second dimension, concreteness, refers to the degree to which the resource is symbolic (e.g., status) or tangible (e.g., goods). Not surprisingly, status and information are the most symbolic, while goods and services are the most concrete (see Foa et al., 1993, for a good background to this theory).

Beyond the classification aspect of the theory, there are numerous implications. For present purposes, we will focus on some of the findings of Brinberg and Ganesan

(1993), who applied this theory to product positioning, which we believe is potentially relevant to understanding job seeker use of Internet recruitment. Specifically, Brinberg and Ganesan examined whether the category in which a consumer places a specific resource can be manipulated. For example, jewelry described to a subject as a way to show someone that he or she cares, was more likely to be classified as being in the “love” category than was jewelry described to a subject as serving many practical purposes for an individual, which was more likely to be classified as being in the “service” category. Based on the assumption that the perceived meaning of a particular product, in this case an Internet recruitment site, affects the likelihood of purchase (in this case, joining or participating), resource exchange theory may provide some interesting predictions. For example, by selling an Internet recruitment site as a service (which is more particularistic and more concrete) rather than information, job seekers may be more likely to join. Thus, we would predict that the greater the match between what job seekers are looking for in an Internet site (e.g., status and service) and the image that the Internet site offers, the more likely job seekers will use the Internet site.

Finally, the elaboration likelihood model (Larsen & Phillips, 2001; Petty & Cacioppo, 1986) may be fruitfully used to understand how applicants choose Internet recruitment sites. Very briefly, the elaboration likelihood model separates variables into central cues (e.g., information about pay) and peripheral cues (e.g., aesthetics of the web site). Applicants must be both able and motivated to centrally process the relevant cues. When they are either not motivated or not able to process the information, they will rely on peripheral processing and utilize peripheral cues to a larger extent. Furthermore, decisions made using peripheral processing are more fleeting and likely to change than decisions made using central processing. We would expect that aesthetic characteristics are peripheral cues and that their effect is often fleeting. In addition, we would expect that first-time job seekers use peripheral processing more frequently than do veteran job

seekers. Clever research designs using Internet sites should be able to test some of these assertions.

How is Internet-based information used by applicants? As described above, one key assumption of Internet recruiting is that important information about an organization can be easily and quickly obtained through the use of search engines, as well as company-supplied information. A number of interesting research questions emanate from this assumption. First, there are many different types of web sites that may contain information about an organization. We divide these into three types: official company web sites, news media (e.g., www.lexisnexis.com), and electronic bulletin boards (e.g., www.vault.com). Paralleling earlier research in the recruitment area (Fisher, Ilgen, & Hoyer, 1979), it would be interesting to determine how credible each of these sources is perceived to be. For example, information from a chatroom regarding salaries at a particular organization may be considered more reliable than information about salaries offered in a company-sponsored web site. Likewise, does the source credibility depend upon the facet being considered? For example, is information regarding benefits considered more credible when it comes from official company sources, while information about the quality of supervision is perceived to be more reliable when coming from a chatroom?

A related question of interest is what sources of information candidates actually do use at different stages in the job search process. Perhaps certain sources are more likely to be tapped than others early in the recruitment process, whereas different sources are likely to be scrutinized later in the recruitment process. It seems likely, for example, that information found on the company web site may be weighted more heavily in the early part of the recruitment process (e.g., in the decision to apply) than in later stages of the process (e.g., in choosing between different job offers). In later stages of the recruitment process, particularly when a candidate is choosing between competing offers, perhaps electronic bulletin boards are more heavily weighted. Longitudinal research designs, which

have already been used in the traditional recruitment domain (e.g., Barber, Daly, Giannantonio, & Phillips, 1994; Saks & Ashforth, 2000), should be used to address these questions.

Finally, researchers should explore the use of Internet-based information versus other sources of information about the organization (see Rozelle & Landis, in press). Besides the Internet, information may be obtained from a site visit of the organization, where candidates speak with their future supervisor, coworkers, and possibly with subordinates. How information from those sources is integrated with information obtained from the Internet should be studied more carefully, particularly when contradictory information is obtained from multiple sources. Again, longitudinal research using realistic fields settings is needed here.

What role does the Internet play in recruitment? Given the number of resumes online and use of Internet recruitment sites, one may conclude that the Internet plays a major role in recruitment. Yet, surveys indicate that networking is still by far the most common way to locate a job. There are several questions that should be investigated regarding the role of the Internet in recruitment. First, how are job seekers using the Internet - is the Internet their first strategy in job search? Is it supplanting other methods, such as networking? Second, it seems likely that a host of demographic variables will affect applicant use of the Internet versus other recruitment methods. Sharf (2000) observed that there are significant differences in the percentage of households possessing Internet access, depending on race, presence of a disability, and income. Organizations may find that heavy dependence on Internet recruitment techniques hampers their efforts in promoting workforce diversity (Stanton, 1999). Finally, more research should be performed comparing the different methods of Internet recruitment. For instance, e-recruiting should be compared to traditional headhunting methods. We suspect that applicants may prefer e-recruiting over face-to-face or even telephone-based approaches. First, email is perceived to be more private and anonymous in many ways as compared to

the telephone. Second, unlike the telephone, email allows for an exchange of information even when the sender and recipient are not available at the same time. Whether or not different Internet recruitment methods have different effects on applicants remains to be studied.

The effects of Internet recruitment on the turnover process. To date, there has been little discussion about the impact of Internet recruitment on the turnover process. However, we believe that there are various areas where the use of Internet recruitment may affect applicants' decision to leave their present organization, including the decision to quit, the relationships between withdrawal cognitions, job search, and quitting, and the costs of job search.

With regard to the decision to quit, there has been a plethora of research. The most sophisticated models of the turnover process include job search in the sequence of events (Hom & Griffeth, 1995). One of the most recent theories, known as the unfolding model (Lee & Mitchell, 1994), posits that the decision by an employee to leave his or her present organization is based on one of four "decision paths". Which of the four "decision paths" is chosen depends on the precipitating event that occurs. In three of the decision paths, the question of turnover is raised when a shock occurs. A shock is defined as "a specific event that jars the employee to make deliberate judgments about his or her job" (Hom and Griffeth, 1995, p. 83). When one's company is acquired by another firm, for example, this may create a shock to an employee, requiring the employee to think more deliberately about his or her job. According to Mitchell, Holtom, and Lee (2002), Path 3 leavers often initiate the turnover process when they receive an unsolicited job offer. It seems plausible, then, that with the frequency of individuals using Internet recruitment, there will be a significant increase in the number of individuals using the third decision path. As explained by Mitchell et al., individuals using the third path are leaving for a superior job. Thus, individuals who read Internet job postings may realize that there are better job alternatives, which to use Lee and Mitchell's terminology, prompts them to

review the decision to remain with their current employer. Research is needed to further understand the use of Internet recruitment and turnover processes, using the unfolding model. Are there, for example, certain Internet recruitment approaches (e.g., e-recruiting) that are particularly likely to induce Path 3 processes? What type of information should these approaches use to facilitate turnover?

A second area relates to the relationships between withdrawal cognitions, job search, and quitting. As discussed by Hom and Griffeth (1995), one of the debates in the turnover literature concerns the causal paths among withdrawal cognitions, job search, and quitting. Specifically, there have been different opinions as to whether employees decide to quit and then go searching for alternative jobs, or whether employees first go searching for alternative jobs and then decide to quit their present company. Based on the existing evidence, Hom and Griffeth argue for the former causal ordering. However, using the assumption of Lee and Mitchell that different models of turnover may be relevant for different employees, it seems plausible that individuals using Internet recruitment might follow the latter causal order. In other words, individuals reviewing Internet job postings “just for fun” may locate opportunities of interest, which compare more favorably than their current position. The existence of Internet recruitment may therefore affect the relationship between withdrawal cognitions, job search, and quitting.

The costs of job search constitute a third possible area where the use of Internet recruitment may affect applicants' decision to leave their present organization. As we noted above, the use of the Internet may greatly reduce the cost of job searching. Although there has been little research done on job search activity by I/O psychologists, it seems reasonable that the expectancy model, which includes an evaluation of the costs and benefits and the likelihood of success, will determine the likelihood of one engaging in job search behavior. Given that the use of Internet recruitment can greatly reduce the costs to a job searcher, it seems reasonable to assume that individuals will be more likely to engage in a job search on a regular basis than in the past. Models of the turnover

process in general, and the job search process in specific, should consider the perceived costs versus benefits of job hunting for the employee. In all likelihood, as the costs decline, employees would be more likely to engage in job hunting.

In sum, there are some interesting possible effects of Internet recruitment on turnover processes. In general, research linking recruitment theories and turnover theories appears to be lacking. It is time to integrate these two streams of research.

Internet Testing

Common Advantages Associated with Internet Testing

The use of the Internet is not only attractive for recruitment purposes. There are also a number of factors that lead organizations to invest in the web for testing purposes. On the one hand, testing candidates through the Internet builds further on the advantages inherent in computerized testing. Similar to computerized testing (McBride, 1998), Internet testing involves considerable test administration and scoring efficiencies because test content can be easily modified, paper copies are no longer needed, test answers can be captured in electronic form, errors can be routinely checked, tests can be automatically scored, and instant feedback can be provided to applicants. This administrative ease may result in potentially large savings in costs and turnaround time, which may be particularly important in light of tight labor markets. Akin to computerized testing, Internet-based testing also enables organizations to present items in different formats and to measure other aspects of applicant behavior. In particular, items might be presented in audio and video format, applicants' response latencies might be measured, and items might be tailored to the latent ability of the respondents.

On the other hand, web-based testing has also various additional advantages over computerized testing (Baron & Austin, 2000; Brooks, 2000). In fact, the use of the web for presenting test items and capturing test-takers' responses facilitates consistent test administration across many divisions/sites of a company. Further, because tests can be administered over the Internet, neither the employer nor the applicants have to be

present in the same location, resulting in increased flexibility for both parties. Hence, given the widespread use of information technology and the globalization of the economy, Internet-based testing might expand organizations access to other and more geographically diverse applicant pools.

Approaches to Internet Testing

Because of the rapid growth of Internet testing and the wide variety of applications, there are many ways to define Internet-based testing. A possible straightforward definition is that it concerns the use of the Internet or an intranet (an organization's private network) for administering tests and inventories in the context of assessment and selection. Although this definition (and this chapter) focus only on Internet-based tests and Internet-based inventories, it is also possible to use the Internet (through videoconference) for conducting employment interviews (see Straus, Miles, & Levesque, 2001).

The wide variety in Internet-based testing applications is illustrated by looking at two divergent examples of current Internet-based testing applications. We chose these two examples for illustration purposes because they represent relative extremes. First, Baron and Austin (2000) developed a web-based cognitive ability test. This test was a timed numerical reasoning test with business-related items and was used after an on-line application and before participation in an assessment center. Applicants could fill in the test whenever and wherever they wanted to. There was no test administrator present. The test was developed according to item response theory principles so that each applicant received different items tailored to his/her ability. In addition, there existed various formats (e.g., text, table, or graphic) for presenting the same item content so that it was highly improbable that candidates received the same items. Baron and Austin (2000) built also other characteristics into the numerical reasoning test to counter user identification problems and possible breaches to test security. For example, the second part of the test was administered later in the selection process in a supervised context so that the results

of the two sessions could be compared. In addition, applicants were required to fill in an honesty contract, which certified that they and nobody else completed the web-based test. The system also allowed candidates to take the test only once and encrypted candidate responses for scoring and reporting.

Second, C.I. Greenberg (1999) presented a radically different application of Internet testing. Probably, this application is more common in nowadays organizations. Here applicants were not allowed to log on where and when they wanted to. Instead, applicants were required to log on to a web site from a standardized and controlled setting (e.g., a company's test center). A test administrator supervised the applicants. Hence, applicants completed the tests in structured test administration conditions.

Closer inspection of these examples and other existing web-based testing applications illustrates (e.g., Coffee, Pearce, & Nishimura, 1999; Smith, Rogg, & Collins, 2001) that web-based testing can vary across several categories/dimensions. We believe that at least the following four dimensions should be distinguished: (1) the purpose of testing, (2) the selection stage, (3) the type of test, and (4) the test administration conditions. Although these four dimensions are certainly not orthogonal, we discuss each of them separately.

Regarding the first dimension of test purpose, Internet testing applications are typically divided into applications for career assessment purposes versus applications for hiring purposes. At this moment, tests for career assessment purposes are abundant on the Internet (see Lent, 2001; Oliver & Whiston, 2000, for reviews). These tests are often provided for free at the general public, although little is known about their psychometric properties. The other side of the continuum consists of organizations that use tests for hiring purposes. Given this consequentiality, it is expected that these tests adhere to professional standards (Standards for Educational and Psychological Testing, 1999) so that they have adequate psychometric properties.

A second question deals with the stage in the selection process wherein organizations are using Internet testing. For example, some organizations might use Internet-based testing applications for screening (“selecting out”) a large number of applicants and for reducing the applicant pool to more manageable proportions. Conversely, other organizations might use Internet-based testing applications at the final stage of the selection process to “select in” already promising candidates.

A third dimension pertains to the type of test administered through the WWW. In line with the computerized testing literature, a relevant distinction opposes cognitive-oriented measures versus noncognitive-oriented measures. Similarly, one can make a distinction between tests with a correct answer (e.g., cognitive ability tests, job knowledge tests, situational judgment tests) versus tests without a correct answer (e.g., personality inventories, vocational interest inventories). At this moment, organizations most frequently seem to use noncognitive-oriented web-based measures. In fact, Stanton and Rogelberg (2001a) conducted a small survey of current web-based hiring practices and concluded that virtually no organizations are currently using the Internet for administering cognitive ability tests.

The fourth and last dimension refers to the test administration conditions and especially to the level of control and standardization by organizations over these conditions. Probably, this dimension is the most important because it is closely related to the reliability and validity of psychological testing (Standards for Educational and Psychological Testing, 1999). In Internet testing applications, test administration conditions refer to various aspects such as the time of test administration, the location, the presence of a test administrator, the interface used, and the technology used. Whereas in traditional testing, the control over these aspects is typically in the hands of the organizations, this is not necessarily the case in Internet testing applications. For example, regarding the time of test administration, some organizations enable applicants to log on whenever they want to complete the tests (see the example of Baron & Austin,

2000). Hence, they provide applicants with considerable latitude. Other organizations decide to exert a lot of control. In this case, organizations provide applicants access to the Internet test site only at fixed predetermined times.

Besides test administration time, test administration location can also vary in web-based testing applications. There are organizations, which allow applicants to log on where they want. For example, some applicants may log on to the web site from their home, others from their office, and still others from a computing room. Some people may submit information in a noisy computer lab, whereas others may be in a quiet room (Buchanan & Smith, 1999a; Davis, 1999). This flexibility and convenience sharply contrast to the standardized location (test room) in other web-based testing applications. Here, applicants either go to the company's centralized test center or to the company's multiple geographically-dispersed test centers or supervised kiosks.

Another aspect of test administration conditions of Internet testing applications refers to the decision as to whether or not a test administrator is used. This dimension of web-based testing is also known as proctored (supervised) versus unproctored (unsupervised) web-based testing. In some cases, there is no test administrator to supervise applicants. When no test administrator is present, organizations lack control over who is conducting the test. In addition, there is no guarantee that people do not cheat by using help from others or reference material (Baron & Austin, 2000; C.I. Greenberg, 1999; Stanton, 1999). Therefore, in most Internet-based testing applications, a test administrator is present to instruct testees and to ensure that they do not use dishonest means to improve their test performance (especially on cognitive-oriented measures).

In web-enabled testing, test administration conditions also comprise of the type of user interface that organizations use (Newhagen & Rafaeli, 2000). Again, the type of interface used may vary to a great extent across Internet-based testing applications. At one side of the continuum, there are Internet-based testing applications that contain a

very restrictive user interface. For example, some organizations decide to increase standardization and control by heavily restricting possible applicant responses such as copying or printing the items because of test security reasons. Other restrictions consist of requirements asking applicants (a) to complete the test within a specific time limit, (b) to complete the test in one session, (c) to fill in all necessary information on a specific test form prior to continuing, and (d) to neither skip nor backtrack items. When applicants do one of these things, a warning message is usually displayed. At the other side of the continuum, some organizations decide to give applicants more latitude in completing Internet-based tests.

Finally, the WWW technology is also an aspect of test administration conditions that may vary substantially across Internet-based testing applications. In this context, we primarily focus on how technology is related to test administration conditions (see Mead, 2001, for a more general typology of WWW technological factors). Some organizations invest in technology to exert more control and standardization over test administration. For example, to guarantee to applicants that the data provided are 'secure' (are not intercepted by others), organizations may decide to use encryption technology. In addition, organizations may invest in computer and network resources to assure the speed and reliability of the Internet connection. To ensure that the person completing the test is the applicant, in the near future organizations may decide to use web cams, typing patterns, fingerprint scanning, or retinal scanning (Stanton & Rogelberg, 2001a). All of these technological interventions are especially relevant when organizations have no control over other aspects of the web-based test administration (e.g., absence of test administrator). Other organizations may decide not to invest in these new technologies. Instead, they may invest in a proctored test environment (e.g., use of a test administrator to supervise applicants).

Taken together, these examples and this categorization of Internet testing highlight that Internet-based testing applications may vary considerably. Unfortunately, no

data have been gathered about the frequency of use of the various forms of web-based testing in consultancy firms and companies. In any case, all of this clearly shows that there is no 'one' way of testing applicants through the Internet and that web-based testing should not be regarded as a monolithic entity. Hence, echoing what we have said about Internet recruitment, we believe that the terms 'Internet testing' or 'web-based testing' are misnomers and should be replaced by 'Internet testing applications' or 'web-based testing applications'.

Previous Research

Although research on Internet testing is lagging behind Internet testing practice, the gap is less striking than for Internet recruitment research. This is because empirical research on Internet testing has proliferated in recent years. Again, most of the studies that we retrieved were in the conference presentation format and had not been published yet. Note also that only a limited number of research topics have been addressed. The most striking examples are that, to the best of our knowledge, neither the criterion-related validity of Internet testing applications nor the possible adverse impact of Internet testing applications have been put to scrutiny. Moreover, most studies have treated Internet testing as a monolithic entity, ignoring the multiple dimensions of Internet testing discussed above. The remainder of this section summarizes the existing studies under the following two headings: measurement equivalence and applicant perceptions.

Measurement Equivalence. In recent years, a sizable amount of studies have examined whether data collected through the WWW are similar to data collected via the traditional paper-and-pencil format. Three streams of research can be distinguished. A first group of studies investigated whether Internet data collection was different from 'traditional' data collection (see Stanton and Rogelberg, 2001b and Simsek & Veiga, 2001, for excellent reviews). Strictly speaking, this first group of studies dealt not really with Internet testing application because most of them were not conducted in a selection context. Instead, they focused on data collection of psychosocial data (Buchanan & Smith,

1999a, 1999b; Davis, 1999; Joinson, 1999; Pasveer & Ellard, 1998; Pettit, 1999), survey data (Burnkrant & Taylor, 2001; Hezlett, 2000; Magnan, Lundby & Fenlason, 2000; Spera & Moye, 2001; Stanton, 1999), or multisource feedback data (Fenlason, 2000). In general, no differences or minimal differences between Internet-based data collection and traditional (paper-and-pencil) data collection were found.

A second group of studies did focus on selection instruments. Specifically, these studies examined the equivalence of selection instruments administered in either web-based versus traditional contexts. Mead and Coussons-Read (2002) used a within-subjects design to assess the equivalence of the 16PF Questionnaire. Sixty-four students were recruited from classes for extra credit and completed first the paper-and-pencil version and about two weeks later the Internet version. Cross-mode correlations ranged between .74 to .93 with a mean of .85, indicating relatively strong support for equivalence. Although this result is promising, a limitation is that the study was conducted with university students. Two other studies examined similar issues with actual applicants. Reynolds, Sinar, and McClough (2000) examined the equivalence of a biodata-type instrument among 10,000 actual candidates who applied for an entry-level sales position. Similar to Mead (2002), congruence coefficients among the various groups were very high. However, another study (Ployhart, Weekley, Holtz, & Kemp, 2002) reported somewhat less positive results with a large group of actual applicants for a teleservice job. Ployhart et al. used a more powerful procedure such as multiple group confirmatory factor analysis to compare whether an Internet-based administration of a Big Five-type personality inventory made a difference. Results showed that the means on the web-based personality inventory were lower than the means on the paper-and-pencil version. Although the factor structures took the same form in each administration condition, the factor structures were partially invariant, indicating that factor loadings were not equal across administration formats.

Finally, a third set of studies concentrated on the equivalence of different approaches to Internet testing. Oswald, Carr, and Schmidt (2001) manipulated not only test administration format but also test administration setting to determine their effects on measurement equivalence. In their study, 410 undergraduate students completed ability tests (verbal analogies and arithmetic reasoning) and a Big Five personality inventory (a) either in paper-and-pencil or Internet-based format and (b) either in supervised or unsupervised testing settings. Oswald et al. (2001) hypothesized that ability and personality tests would be less reliable and have a less-clear factor structure under unsupervised and therefore less standardized conditions. Preliminary findings of multiple group confirmatory factor analyses showed that for the personality measures administered in supervised conditions, model fit tended to support measurement invariance. Conversely, unsupervised measures of personality tended not to show good fit, lending support to the original hypothesis. Remarkably, for cognitive ability measures, both supervised and unsupervised conditions had a good fit. In another study, Beaty, Fallon, and Shepherd (2002) used a within-subjects design to examine the equivalence of proctored (supervised) versus unproctored (unsupervised) Internet testing conditions. So, interestingly, these authors did also not treat Internet-based testing as a monolithic entity. Another interesting aspect of the study was that real applicants were used. First, applicants completed the unproctored test at home or at work. Beaty et al. found that the average score of the applicants was 35.3 ($SD = 6.5$). Next, the best 76 candidates were invited to complete a parallel form of the test in a proctored test session. The average score for these candidates in the proctored testing session was 42.2 ($SD = 2.0$). In comparison, this same group had an average test score of 44.1 ($SD = 4.9$) in the unproctored test session ($t = 3.76$, $p < .05$). Although significant, the increase in test scores in unsupervised web-based testing environments (due to cheating such as having other people fill in the test) seems to be less dramatic than could be anticipated.

In short, initial evidence seems to indicate that measurement equivalence between web-based and paper-and-pencil tests is generally established. In addition, no large differences are found between supervised and unsupervised testing. Again, these results should be interpreted with caution because of the small number of research studies involved.

Applicant Perceptions. Because test administration in an Internet-based environment differs from traditional testing, research has also begun to examine applicant reactions to Internet-based assessment systems. Mead (2001) reported that 81% of existing users were satisfied or quite satisfied with an on-line version of the 16PF Questionnaire. The most frequently cited advantage was the remote administration, followed by the quick reporting of results. The reported rate of technical difficulties was the only variable that separated satisfied from dissatisfied users. Another study by Reynolds et al. (2000) confirmed these results. They found more positive perceptions of actual applicants towards Internet-based testing than towards traditional testing. However, a confound was that all people receiving the web-based testing format, had opted for this format. Similar to Mead (2001), Reynolds et al. noted a heightened attention of applicants to technological and time-related factors (e.g., speed) when testing via the Internet as compared to traditional testing. No differences in applicant reactions across members of minority and non-minority groups were found.

Sinar and Reynolds (2001) conducted a multi-stage investigation of applicant reactions to supervised Internet-based selection procedures. Their sample consisted of applicants for real job opportunities. They first gathered open-ended comments from applicants to Internet-based testing systems. About 70% of the comments obtained were positive. Similar to Reynolds et al. (2000), the speed and the efficiency of the Internet testing tool was the most important consideration of applicants, especially if the speed was slow. Many applicants also commented on the novelty of Internet-based testing. User-friendliness (e.g., ease of navigation) was another theme receiving substantial attention.

Sinar and Reynolds also discovered that comments about user friendliness, personal contact provided, and speed/efficiency were linked to higher overall satisfaction with the process. Finally, Sinar and Reynolds explored whether different demographic groups had different reactions to these issues. Markedly, there were more positive reactions for racial minorities, but user-friendliness discrepancies for females and older applicants. It is clear that more research is needed here to confirm and explain these findings.

In light of the aforementioned dimensions of Internet-based testing, a noteworthy finding of Sinar and Reynolds (2001) was that, on average, actual applicants reported a preference for the proctored (supervised) web-based setting instead of taking the web-based assessment from a location of their choice (unsupervised). Perhaps applicants considered the administrator's role to be crucial in informing applicants and providing help when needed. It is also possible that candidates perceived higher test security problems in the unsupervised web-based environment.

Other research focused on the effects of different formats of Internet-based testing on perceptions of anonymity. However, a drawback is that this issue has only been investigated with student samples. Joinson (1999) compared socially desirable responding among students, who either completed personality-related questionnaires via the web (unsupervised) or during courses (supervised). Both student groups were required to identify themselves (non-anonymity situation), which makes this experiment somewhat generalizable to a personnel selection context. Joinson found that responses of the unsupervised web group exhibited significantly lower social desirability than people completing the questionnaires during supervised courses. He related this to the lack of observer presence inherent in unsupervised Internet-based testing. In a similar vein, Oswald et al. (2001) reported greater feelings of anonymity for completing personality measures in the web/unsupervised condition versus in the web/supervised condition. Oswald et al. suggested that students felt probably more anonymous in the unsupervised

setting because this setting was similar to surfing the Internet in the privacy of one's home.

Taken together, applicant perceptions of Internet-based testing applications seem to be favorable. Yet, studies also illustrate that demographic variables, technological breakdowns, and an unproctored test environment impact negatively on these perceptions.

Recommendations for Future Research

Given the state-of-the art of research on Internet testing applications, this last section proposes several recommendations for future research. In particular, we posit that future research should (1) learn from the lessons of the computer-based testing literature, (2) draw on psychological theories for examining Internet-enabled testing applications, and (3) address questions of most interest to practitioners.

Be aware of the lessons from computer-based testing research. As already mentioned, some Internet testing applications have a lot of similarities to computerized testing. Therefore, it is important that future research builds on this body of literature (Bartram, 1994; Burke, 1993; McBride, 1998, for reviews). Several themes may provide inspiration to researchers.

Measurement equivalence is one of the themes that received considerable attention in the computerized testing literature. On the one hand, there is evidence in the computerized testing literature that the equivalence of computerized cognitive ability measures to traditional paper-and-pencil measures is high. Mead and Drasgow's (1993) meta-analysis of cognitive ability measures found average cross-mode correlations of .97 for power tests. On the other hand, there is considerable debate whether computerized noncognitive measures are equivalent to their paper-and-pencil versions (King & Miles, 1995; Richman, Kiesler, Weisband, & Drasgow, 1999). This debate about the equivalence of noncognitive measures centers on the issue of social desirability. A first interpretation is that people display more candor and less social desirability in their responses to a

computerized instrument. This is because people perceive computers to be more anonymous and private. Hence, according to this interpretation, they are more willing to share personal information. A second interpretation posits that people are more worried when interacting with a computer because they fear that their responses are permanently stored and can be verified by other parties at all times. In turn, this leads to less self-disclosure and more socially desirable responding. Recently, Richman et al. (1999) meta-analyzed previous studies on the equivalence of noncognitive measures. They also tested under which conditions computerized noncognitive measures were equivalent to their paper-and-pencil counterparts. They found that computerization had no overall effect on measures of social desirability. However, they reported that being alone and having the opportunity to backtrack and to skip items resulted in more self-disclosure and less social desirable responding among respondents. In more general terms, Richman et al. (1999) concluded that computerized questionnaires produced less social desirability when participants were anonymous and when the questionnaire format mimicked that of a paper-and-pencil version.

Although researchers have begun examining the measurement equivalence issue in the context of web-based testing, we believe that researchers may go even further because the computerized testing literature on measurement equivalence has important implications for future studies on web-based testing. First of all, it does not suffice to examine measurement equivalence per se. The literature on computerized testing teaches us that it is crucial to examine under which conditions measurement equivalence is reduced or increased. Along these lines, several of the conditions identified by Richman et al. (1999) have direct implications for web-enabled testing. For example, being alone relates to the web-based test administration dimension 'no presence of test administrator' that we discussed earlier. So, future research should examine the equivalence of web-based testing under different test administration conditions. Especially lab research may be useful here. Second, the fact that Richman et al. (1999) found different equivalence

results for noncognitive measures in the anonymous versus the non-anonymous condition, calls for research in situations in which test results have consequences for the persons involved. Examples include field research with real applicants in actual selection situations or laboratory research in which participants receive an incentive to distort responses. Third, prior studies mainly examined the construct equivalence of web-based tests. To date, no evidence is available as to how Internet-based administration affects the criterion-related validity of cognitive and noncognitive tests. Again, the answer here may depend on the type of Internet-based application.

Another theme from the computerized testing literature pertains to the impact of demographic variables on performance on computerized instruments (see Igbaria & Parasuraman, 1989, for a review). In fact, there is meta-analytic evidence that female college students have substantially more computer anxiety (Chua, Chen, & Wong, 1999) and less computer self-efficacy (Whitley, 1997) than males. Regarding age, computer confidence and control seems to be lower among persons above 55 years (Czaja & Sharit, 1998; Dyck & Smither, 1994). In terms of race, Badagliacco (1990) reported that whites had more years of computer experience than members of other races and Rosen, Sears, and Weil (1987) found that white students had significantly more positive attitudes toward computers. Research has begun to investigate the impact of these demographic variables in an Internet context. For example, Schumacher and Morahan-Martin (2001) found that males had higher levels of experience and skill using the Internet. In other words, as could be expected, the initial findings suggest that the trends found in the computerized testing literature (especially those with regard to gender and age) generalize to Internet-based applications. Although definitely more research is needed here, it is possible that Internet-enabled testing would suffer from the so-called digital divide because some groups (females and older people) are disadvantaged in Internet testing applications. For practitioners, the future challenge then consists of implementing Internet tests that produce administrative and cost efficiencies and at the same time ensure fairness (Stanton

& Rogelberg, 2001a). Researchers should study differential item/scale/test functioning across web-based testing and traditional paper-and-pencil administrations. In addition, they should investigate which forms of web-based testing produce less adverse impact. For example, it is likely that there is an interaction between the web-based testing conditions and the occurrence of adverse impact. In particular, when organizations do not restrict the time and location of web-based testing so that people can complete tests in each Internet-enabled terminal (e.g., in libraries, shopping centers), we expect that adverse impact against minority groups will be less as compared to proctored web-based testing applications.

Finally, we believe that research on web-based testing can learn from the history of computer-based testing. As reviewed by McBride (1998), the first wave of computerized testing primarily examined whether using a computerized administration mode was cost-efficient, whereas the second wave focused on converting existing paper-and-pencil instruments to a computerized format and studying measurement equivalence. According to McBride (1998), only the third wave of studies investigated whether a computerized instrument can actually change and enhance existing tests (e.g., by adding video, audio). Our review of current research shows that history seems to repeat itself. Current studies have mainly concentrated on cost savings and measurement equivalence. So, future studies are needed that examine how use of the Internet can actually change the actual test and the test administration process.

Draw on psychological theories to examine Internet-based testing applications. Our review of current research on Internet-based testing illustrated that few studies were grounded on a solid theoretical framework. However, we believe that at least the following two theories may be fruitfully used in research on Internet-based testing, namely organizational privacy theory and organizational justice theory. Although both theories are related (see Bies, 1993; Eddy, Stone, & Stone, 1999; Gilliland, 1993), we discuss their potential benefits in future research on Internet-based testing separately.

Organizational privacy theory (Stone & Stone, 1990) might serve as a first theoretical framework to underpin research on Internet-based testing applications. Privacy is a relevant construct in Internet-based testing because of several reasons. First, Internet-based testing applications are typically non-anonymous. Second, applicants are often asked to provide personal and sensitive information. Third, applicants know that the information is captured in electronic format, facilitating multiple transmissions over the Internet and storage in various databases (Stanton & Rogelberg, 2001a). Fourth, privacy concerns might be heightened when applicants receive security messages (e.g., secure server probes, probes for accepting cookies, etc.). Although Bartram (2001) argued that these security problems are largely overstated, especially people, who lack Internet experience, Internet self-efficacy, or the belief that the Internet is secure, may worry about them.

So far, there has been no empirical research on the effects of web-based testing on perceptions of invasion of privacy. Granted, there is some evidence that people are indeed more wary about privacy when technology comes into play, but these were purely descriptive studies. Specifically, Eddy et al. (1999) cited several surveys, which found that public concern over invasion of privacy was on the rise. They linked this increased concern over privacy to the recent technological advances that have occurred. Additionally, Cho and LaRose (1999) cited a survey in which seven out of ten respondents to an online survey worried more about privacy on the WWW than through the mail or over the telephone (see also Hoffman, Novak, & Peralta, 1999; O'Neil, 2001).

In the privacy literature, there is general consensus that privacy is a multifaceted construct. For example, Cho and LaRose (1999) made a useful distinction between physical privacy (i.e., solitude), informational privacy (i.e., the control over the conditions under which personal data are released), and psychological privacy (i.e., the control over the release of personal data). In a similar vein, Stone and Stone (1990) delineated three main themes in the definition of privacy. A first form of privacy is related to the notion of

information control, which refers to the ability of individuals to control information about them. This meaning of privacy is related to the psychological privacy construct of Cho and LaRose (1999). Second, Stone and Stone (1990) discuss privacy as the regulation of interactions with others. This form of privacy refers to personal space and territoriality (cf. the physical privacy of Cho and LaRose, 1999). A third perspective on privacy views it in terms of freedom from the influence or control by others (Stone & Stone, 1990).

Several studies in the privacy literature documented that especially the perceived control over the use of disclosed information is of pivotal importance to the notion of invasion of privacy (Fusilier & Hoyer, 1980; Stone, Gueutal, Gardner, McClure, 1983; Stone & Stone, 1990). This perceived control is typically broken down into two components, namely the ability to authorize disclosure of information and the target of disclosure. There is also growing support for these antecedents in the context of the use of information technology. For instance, Eddy et al. (1999) examined reactions to human resource information systems and found that individuals perceived a policy to be most invasive when they had no control over the release of personal information and when the information was provided to parties outside the organization.

How can privacy theory advance our understanding of applicants' view of web-based testing? First, we need a clear understanding of which forms of privacy are affected by web-based testing. Studies are needed to examine how the different forms of web-based testing outlined above affect the various forms of privacy. Second, we need studies to shed light into the antecedents of applicants' privacy concerns. Studies are needed to confirm whether applicants' perceived decrease of control over the conditions under which personal information might be released and over the organizations that subsequently might use it are the main determinants to trigger privacy concerns in web-based testing applications. Again, it would be interesting to examine this for the various dimensions of web-enabled testing. Third, future studies should examine the consequences of applicants' privacy concerns in web-based testing. For example, when

privacy concerns are heightened, do applicants engage in more socially desirable responding and less self-disclosure? What are the influences on their perceptions of the web-based testing application? A final avenue for future research consists of investigating under which conditions these privacy concerns might be reduced or alleviated. To this end, research could manipulate the various dimensions of web-based testing and examine their impact on different forms of privacy. For example, does a less restrictive interface reduce privacy concerns? Similarly, how do technology and disclaimers that guarantee security and confidentiality affect applicants' privacy concerns? What roles do the type of test and the kind of information provided play? What is the influence of the presence of a test administrator? As mentioned above, there is some preliminary evidence that applicants feel more (physical) privacy and provide more candid answers when no test administrator is present (see Joinson, 1999; Oswald et al., 2001). Such studies might contribute to our general understanding of privacy in technological environments but might also provide concrete recommendations for improving current web-based testing practices.

A second theoretical framework that may be relevant is organizational justice theory (Gilliland, 1993; J. Greenberg, 1990). Organizational justice theory in general and a justice framework applied to selection in particular are relevant here because applicants are likely to compare the new web-based medium to more traditional approaches. Hence, one of applicants' prime concerns will be whether this new mode of administration is more or less fair than the traditional ones. Gilliland (1993) presented a model that integrated both organizational justice theory and prior applicant reactions research. Two central constructs of the model were distributive justice and procedural justice, which both had their own set of distinct rules (e.g., job-relatedness, consistency, feedback, two-way communication). Gilliland (1993) also delineated the antecedents and consequences of possible violation of these rules.

Here we only discuss the variables that may warrant special research attention in the context of web-based testing. First, Gilliland's (1993) model should be broadened to include technological factors as possible determinants of applicants' fairness reactions. As mentioned above, initial research on applicant reactions to web-based testing suggests that these reactions are particularly influenced by technological factors such as slowdowns in the Internet connection or Internet connection crashes. Apparently, applicants expect these technological factors to be flawless. If the technology fails for some applicants and runs perfectly for others, fairness perceptions of web-based testing are seriously affected. Gilliland's (1993) model should also be broadened to include specific determinants to computerized/web-based forms of testing such as Internet/computer anxiety and Internet/computer self-efficacy. Second, web-based testing provides excellent opportunities for testing an important antecedent of the procedural justice rules outlined in Gilliland's (1993) model, namely the role of 'human resource personnel' (e.g., test administrators). As mentioned above, in some applications of web-based testing, the role of test administrators is reduced or even discarded. The question remains how this lack of early stage face-to-face contact (one of Gilliland's, 1993, procedural justice rules) affects applicants' reactions during and after hiring (Stanton & Rogelberg, 2001a). On the one hand, applicants might perceive the web-based testing situation as more fair because the user interface of a computer is more neutral than a test administrator. On the other hand, applicants might regret that there is no 'live' two-way communication, although many user interfaces are increasingly interactive and personalized. An examination of the effects of mixed mode administration might also clarify the role of test administrators in determining procedural justice reactions. Mixed mode administration occurs when some tests are administered via traditional means, whereas other tests are administered via the Internet. We believe that these different modalities of web-based testing offer great possibilities for studying specific components of Gilliland's justice model and for contributing to the broader justice literature. Third, in current web-based testing

research, applicants' reactions to web-based testing are hampered by the 'novelty' aspect of the new technology. This novelty aspect creates a halo effect so that it is difficult to get a clear insight into the other bases of applicants' reactions to web-based testing applications. Therefore, future research should pay particular attention to one of the moderators of Gilliland's model, namely applicants' prior experience. In the context of web-based testing, this moderator might be operationalized as previous work experience in technological jobs or prior experience with Internet-based recruitment/testing.

Address questions of interest to practitioners. The growth of Internet-based testing opens a window of opportunities for researchers as many organizations are asking for suggestions and advice. Besides answering questions that are consistent with previous paradigms (see our first two recommendations), it is equally important to examine the questions, which are on the top of practitioners' minds.

When we browsed through the popular literature on Internet-based testing, cost benefits and concerns definitely emerged as a prime issue. To date, most practitioners are convinced of the possible benefits of Internet recruitment. Similarly, there seems to exist general consensus that Internet testing may have important advantages over paper-and-pencil testing. This is also evidenced by case studies. Baron and Austin (2000) reported results of a case study in which an organization (America Online) used the Internet for screening out applicants in early selection stages. They compared the testing process prior and after the introduction of the Internet-based system on a number of ratios. Due to Internet-enabled screening the time per hire decreased from 4 hours and 35 minutes to 1 hour and 46 minutes so that the whole process was reduced by 20 days. Sinar and Reynolds (2001) also referred to case studies that demonstrated that companies can achieve hiring cycle time reductions of 60% through intensive emphasis on Internet staffing models. A limitation of these studies, however, is that they evaluated the combined impact of Internet-enabled recruitment and testing (i.e., screening), making it difficult to understand the unique impact of Internet testing.

More skepticism, though, surrounds the incremental value of supervised Internet-based testing over “traditional” computerized testing within the organization. In other words, what is the added value of having applicants complete the tests at various test centers versus having them complete tests in the organization? The obvious answer is that there is increased flexibility for both the employer and the applicant and that travel costs are reduced. Yet, not everybody seems to be convinced of this. A similar debate exists about the feasibility of having an unproctored web-based test environment (in terms of user identification and test security). Therefore, future studies should determine the utility of various web-based testing applications and formats. To this end, various indices can be used such as time and cost savings and applicant reactions (Jayne & Rauschenberger, 2000).

A second issue emerging from popular articles about Internet selection processes relates to practitioners’ interest as to whether use of web-based testing has positive effects on organizations’ general image and their image as employers particularly. Although no studies have been conducted, prior studies in the broader selection domain support the idea that applicants’ perceptions of organizational image are related to the selection instruments used by organizations (e.g., Macan, Avedon, Paese, & Smith, 1994; Smither et al., 1993). Moreover, Richman-Hirsch, Olson-Buchanan, and Drasgow (2000) found that an organization’s use of multimedia assessment for selection purposes might signal something about an organization’s technological knowledge and savvy. Studies are needed to confirm these findings in the context of web-based testing. Again, attention should be paid here to the various dimensions (especially technology and possible technological failures) of web-based testing as potential moderators of the effects.

Conclusion

The aim of this chapter was to review existing research on Internet recruitment and testing and to formulate recommendations for future research. A first general conclusion is that research on Internet recruitment and testing is still in its early stages.

This is logical because of the relatively recent emergence of the phenomenon. Because only a limited number of topics have been addressed, many issues are still open. As noted above, the available studies on Internet recruitment, for example, have mainly focused on applicant (student) reactions to the Internet as a recruitment source, with most studies yielding positive results for the Internet. However, key issues such as the decision making processes of applicants and the effects of Internet recruitment on post-recruitment variables such as company image, satisfaction with the selection process, or withdrawal from the current organization have been ignored so far.

As compared to Internet-based recruitment, more research attention has been devoted to Internet testing. Particularly, measurement equivalence and applicant reactions have been studied, with most studies yielding satisfactory results for Internet testing. Unfortunately, some crucial issues remain either unresolved (i.e., the effects of Internet testing on adverse impact) or unexplored (i.e., the effects of Internet testing on criterion-related validity).

A second general conclusion is the lack of theory in existing research on Internet testing and recruitment. To this end, we formulated several suggestions. As noted above, we believe that the elaboration likelihood model and resource exchange theory may be fruitfully used to better understand Internet job site choice. We have also advocated that organizational privacy theory and organizational justice theory might advance existing research on Internet testing.

Finally, we acknowledge that it is never easy to write a review of an emerging field such as Internet-based recruitment and testing because at the time this chapter goes to print, new developments and practices will have found inroad in organizations and new research studies will have been conducted. Again, this shows that for practitioners and researchers the application of new technologies such as the Internet to recruitment and testing is both exciting and challenging.

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