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2.31
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2.31.1 INTRODUCTION

The contemporary practice of psychology requires a prudent balance of traditional and emerging communication methods. Interpersonal interactions in the context of human relationship (e.g., speech, emotional expressions, and nonverbal gestures) have been a vital part of emotional healing throughout many centuries, and research findings in the 1990s underscore the importance of relational factors in effective psychological interventions (Whiston & Sexton, 1993). In addition to the time-honored interpersonal communication methods of professional psychology, rapid technological advances have propelled psychologists into another sphere of communication. Today's professional psychologist is increasingly expected to attain mastery in both of these communication methods—the very old and the very new.

It appears likely that technological changes will continue at a rapid or even an accelerating pace in the years ahead. This rapid rate of change suggests an ongoing need for psychologists to keep abreast of technological advances and the implications of these advances for professional practice. To this end, the American Psychological Association (APA) has published three editions of a software directory (Stoloff & Couch, 1992), the APA Practice Directorate has published *Organizing Your Practice Through Automation* (1996), national and international conferences have been established, and many

journal articles and books on the topic have been published. Internet discussion groups regarding psychology and mental health practices abound, and the APA has charged the Media Psychology/New Technologies Committee of the Media Psychology Division to consider the implications of virtual reality, artificial intelligence, and other computer technologies. Psychologists are attempting to hold on to the value of established professional practices and communication methods while seeking the advantages available through technological advances.

Previous authors have distinguished between first- and second-wave innovations. First-wave technology allows for efficiency in maintaining records and office procedures but has little direct impact on clinical services. These technologies are now well-established and commonly used in the practice of psychology. They include office management computer software as well as facsimile, telephone answering, and voice mail services. Second-wave technologies have a greater direct impact on patient care and should be considered partially established in that many psychologists already use these technologies, though they will become increasingly prevalent in coming years. These include computerized assessment and interviewing tools, computerized therapeutic applications, telephone consultations, electronic mail, and clinical databases that directly impact patient care. Because of rapid technological changes, a third wave of technological advances must also be considered. This third-wave includes emerging innovations that have only started to affect the practice of psychology. Third-wave advances include teleconferencing, global networking environments (World Wide Web and Internet), virtual reality as a treatment tool, and innovative computer applications in training.

2.31.2 WELL-ESTABLISHED PRACTICE TECHNOLOGIES

A number of technological advances are now well-established as routine (first-wave) resources for professional psychologists. These include computerized office management systems, facsimile capabilities, and telephone answering and voice mail systems. The benefits and potential liabilities of each of these technologies are discussed below and summarized in Table 1.

2.31.2.1 Computerized Office Management

As early as 1987 a surprisingly high rate (90%) of psychologists surveyed in Canada were using computers for tasks indirectly related to clinical services including word processing, billing systems, and database management (Pollock & Maenpaa, 1990). It should be noted that the low response rate obtained in this survey research (23%) may have produced a spurious estimate of the number of psychologists using computers. Nonetheless, a decade has passed since the survey, and it is undoubtedly true that an increasing number of psychologists use computers in routine tasks associated with professional practice.

Word processing software allows a psychologist to reduce the time required for repetitive narrative. For example, a psychologist may use similar language in certain parts of clinical reports or treatment authorization requests. Rather than producing the narrative for each report, a template can be stored on computer disk and adapted for each individual report. Mailing merge options allow for personalized letters to be sent to various addresses for purposes of promotion or information. Also, word processing may improve the accuracy of written correspondence and reports. With tools such as spell checking, electronic thesaurus, and grammar checking, written documents can be scrutinized closely before leaving the psychologist's office. Word processing also allows for the evolving nature of forms and documents: For example, psychologists occasionally need to revise informed consent forms, release forms, or promotional statements. Word processing allows for such changes without requiring retyping.

Electronic billing software allows for the automation of the once tedious process of billing patients and health insurance carriers. Rather than typing or writing the patient's name, address, birthdate, and diagnosis on each bill, this identifying information can be stored electronically and automatically printed on a computer-generated billing form. Standard insurance forms are included in many software programs and printed onto plain paper with an inkjet or laser printer. In other cases the insurance forms are purchased separately and the printer is used to fill in the various fields in the standardized form. Most current billing programs and insurance companies also provide the option of electronic claims filing where the claim is filed via modem and no paper is transferred from the psychologist to the insurance company. Electronic billing promises to reduce much of the paper use traditionally associated with the billing process. Additional practice management software allows psychologists to keep electronic records of patient information, progress notes, financial records, accounts payable, payroll, and appointment scheduling (APA Practice Directorate, 1996).

Table 1 First-wave technologies: benefits and potential liabilities.

Technologies	*Benefits*	*Potential liabilities*
Computerized office management	Reduces time required for repetitive tasks Improves accuracy of written work Allows for evolving forms (e.g., informed consent) Billing efficiency, including reduced paper use Efficient management of patient records	Patient perceptions of increased bureaucracy Ease of duplication may compromise confidentiality and privacy rights In-session use of computers may inhibit patient–psychologist relationship
Facsimile	Immediate transfer of information (e.g., patient records)	Compromised patient confidentiality
Telephone answering and voice mail	Receive phone messages at any time without the expense of added secretarial support or answering services	Compromised patient privacy Technology failure may result in miscommunications

Although the use of first-wave computer software is commonplace in psychological practice, it remains important to consider the potentially negative effects of office computerization for patients. Because patients are generally less concerned about clerical efficiency than the nature of interpersonal interactions and quality of clinical services provided, some may experience highly visible computers as a bureaucratic hindrance or potential violation of privacy. Indeed, with the ease of duplicating electronic records there may be some legitimate basis for concern about violations of privacy and confidentiality. Also, some preliminary evidence from medical practice suggests that it may be important to avoid using computers for record keeping during the consultation itself. Physicians in the UK showed a diminished capacity to relate with patients when using a computer rather than pen and paper to issue prescriptions (Greatbatch, Heath, Campion, & Luff, 1995). Although this finding cannot be directly translated to psychological interventions, it is likely that using a laptop or notebook computer to take notes during a therapy session has an inhibiting effect on the human interactions that play an essential role in services provided by professional psychologists.

2.31.2.2 Facsimile

Facsimile (fax) machines are used to electronically transfer information to or from a remote site. The primary benefit of fax transmission is the immediacy with which information can be transfered. For example, a release form can be faxed to the office of another health care provider before holding a conversation about the patient, or patient records from a previous treatment can be instantly provided to the treating psychologist. Similarly, clinical reports can be faxed from a psychologist's office directly to the hospital floor or the referring professional's office. Contemporary computer software can make such transmissions paperless, with communications flowing from one computer to another.

The primary concern with fax transmission is the risk of compromising patient confidentiality. If a patient report is inadvertently sent to an incorrect fax station, for example, the psychologist has violated the patient's ethical and legal rights to confidentiality. This is especially likely with computer software that allows fax numbers to be stored in an electronic phonebook. Simply selecting the incorrect fax listing on the computer screen (with a single mouse click or keystroke) could result in sending a document to the wrong party and, therefore, in a violation of patient confidentiality. Even if the fax arrives at the correct office, the location and availability of the fax machine to office staff and others may compromise patient records. Because of these concerns, some jurisdictions have passed laws controlling fax transmissions of confidential materials. Thus, it is important for psychologists to know the legal guidelines of their regional or national jurisdictions. If faxing is legally permitted, it is incumbent on the psychologist to double-check the telefax number being used and to have a

clear understanding of how the fax transmission will be handled on the receiving end.

2.31.2.3 Telephone Answering and Voice Mail Systems

Telephone answering systems allow callers to leave messages which can later be retrieved at the receiving end. The first generation telephone answering systems, usually depending on a cassette or microcassette recording of the incoming message, have become commonplace in many professional offices. This allows psychologists to receive incoming calls day or night without adding secretarial staff. In some cases psychologists use answering machines in lieu of an answering service. For emergency needs, an alternative phone number or electronic pager number can be left on the recorded greeting message.

The potential liabilities of using an answering machine for incoming messages include problems with patient privacy and technological failure. The patient may leave a message for the psychologist assuming the psychologist is the only one listening, especially if the greeting message is recorded by the psychologist. If a staff member or another professional in the office then listens to the recorded message, the patient may have disclosed information that was not intended for others in the office. Also, because low-cost answering machines have a relatively high failure or error rate, a patient or consulting professional may leave a message which the psychologist never receives. This breakdown in communication, caused by an uninformed faith in technology, can compromise patient care or even result in negligence in urgent situations.

Computerized voice mail systems have helped with both of these potential liabilities. Most voice mail systems have individual voice mail "boxes" which can be selected by the calling party. In addition, these boxes are usually password protected. These innovations reduce the inadvertent violations of patient privacy that frequently occur with low-cost answering machines. Computerized voice mail systems also reduce the likelihood of technological error because they depend on highly dependable digital technology rather than the mechanical and analog technologies used in free-standing answering machines.

2.31.3 PARTIALLY ESTABLISHED PRACTICE TECHNOLOGIES

A second group of technological advances are already used by many psychologists but will become more prominent in professional psychology. These second-wave technologies have more direct impact on clinical services than first-wave technologies, and thus also hold greater benefits and potential liabilities. Second-wave technologies, summarized in Table 2, include computerized assessment tools, computerized interviewing and diagnosis, computerized therapy tools, telephone consultations, electronic mail, and clinical databases.

2.31.3.1 Computerized Assessment Tools

In a survey of members of the Society for Personality Assessment and members of the Clinical Psychology Division of the APA, almost two-thirds of the respondents indicated that they use computers to assist with psychological testing (Ball, Archer, & Imhof, 1994). Over half used computers to help with test scoring and approximately one-third used computers to assist with test interpretation. Fewer than 10% used computers for test administration.

Many software programs are available for automated test scoring and interpretation. Among the most prominent test scoring and interpretation software is the Microtest Q system which generates reports for many tests, including the Minnesota Multiphasic Personality Inventories and the Millon Clinical Inventories. Two Rorschach software products are also widely used: the Rorschach Scoring Program (RSP) and the Rorschach Interpretative Assistance Program (RIAP).

One advantage of computerized test scoring for objective personality tests is improved accuracy. When Allard, Butler, Faust, and Shea (1995) had eight trained technicians and professionals hand score 43 protocols from the Personality Diagnostic Questionnaire-Revised (PDQ-R), they found 53% of the resulting profiles contained errors. Nineteen percent contained errors significant enough to affect clinical diagnosis—an alarming number of hand scoring errors. Hand scoring errors presumably affect other objective personality tests similarly, though it should be noted that the PDQ-R involves more complex hand scoring procedures than many other objective personality tests. In contrast to this high rate of human error, the error rate of computerized scoring is negligible (assuming correct data entry and software development).

Computers may also improve scoring accuracy of projective personality tests. Rorschach software such as the RSP and the RIAP provide algorithms to check for scoring inconsistencies. For example, a person may have coded both a whole blot response and a white space integra-

Table 2 Second-wave technologies: benefits and potential liabilities.

Technologies	*Benefits*	*Potential liabilities*
Computerized assessment tools	Greater accuracy in scoring	Unwarranted perception of interpretive accuracy
	Increases time efficiency	Use among unqualified users
	Access to interpretive expertise through expert system software	Changing professional identity
		Standardization assumptions may not hold with computer-administered tests
Computerized interviewing and diagnosis	More candid responses from patients	Greater difficulty in describing feelings and ideas
	Increases time efficiency	Possibility of excessive false positive diagnoses
	Increases screening of mental health needs in primary care	Must be quickly adapted to DSM changes
Computerized therapy tools	Used as an adjunctive tool for patient education, play therapy, cognitive rehabilitation, and behavior modification	Perceived as dehumanizing and reductive to those who view the human relationship as the essential ingredient of therapy
Telephone consultation	Immediate access to services	Lack of effectiveness data
	Decreases power differential between therapist and patient	Lack of nonverbal cues may inhibit emotional exploration or cause distractibility during session
	Gives privacy (or anonymity) to patient	May add to a sense of social alienation or dehumanization and thereby contribute to psychosocial problems
Electronic mail	As with telephone therapy	As with telephone therapy
		Unclear parameters for professional regulation
Clinical databases	Maintain personal outcome data to demonstrate effectiveness	Expense of equipment and on-line services
	Ready access to literature searches	Time required to input practice data

tion response but neglected to code the higher of the two z-scores. Rorschach software products detect scoring errors such as this and alert the psychologist or technician to the problem.

Computerization also reduces the time required for scoring psychological tests (Alexander & Davidoff, 1990). Whereas it might take 30–45 minutes to hand score a Millon Clinical Multiaxial Inventory, it can be computer scored in approximately five minutes. Similarly, the structural summary calculations for a Rorschach protocol may take almost an hour with a pocket calculator but only a few minutes with the appropriate software.

Test interpretation software provides psychologists with access to the interpretative expertise of test developers. Such software has been labeled "expert system" because it allows the computer to serve as an expert consultant to the psychologist. For example, Dr. John Exner has developed both the Comprehensive System for Rorschach scoring and the RIAP software that helps clinicians interpret Rorschach results. Similarly, Dr. Theodore Millon has been involved in the development of the various Millon tests (Millon Clinical Multiaxial Inventories, Millon Adolescent Clinical Inventory, and others) and in the development of the Microtest Q interpretive software. Automated interpretative systems such as these magnify the availability of experts for each test.

Despite these advantages of computerized test scoring and interpretation, legitimate concerns have been raised about these products and practices, especially regarding interpretative software. First, a computer printout may leave the psychologist with an unwarranted perception of accuracy. Although the scoring accuracy of well-reputed commercial products may generally be assumed, the interpretative accuracy may be suspect because the software developer has neither met the client being assessed nor had access to concurrent test results. Further, the interpretative narratives

are often based on an expert clinician's personal experience with a test more than empirically validated results. Second, computerized test interpretation systems may unwittingly encourage the use of psychological tests among unqualified users. For example, a physician, marriage and family counselor, attorney, or social worker may attempt to bypass a psychologist's consulting services by gaining access to test interpretation software for the Minnesota Multiphasic Personality Inventory. To guard against misuse, test publishers closely monitor the qualifications of those who purchase test supplies and software. However, the publishers cannot monitor who actually uses the software once it is sold to the psychologist placing the order. Third, there is some risk that automated interpretative systems may move the identity of the professional psychologist toward that of a technician. At worst, a psychologist might administer tests, use computer-based interpretations, and write a report which includes much of the computer-generated narrative. This might involve little or no critical analysis and consideration of idiographic variables. The psychologist then would sign this report, thus taking legal and ethical responsibility for its contents, yet the computer-generated interpretative report on which the psychologist's report is based is not signed by a professional willing to share responsibility for the psychologist's conclusions and recommendations.

Lively interaction and debate will continue to play an important role in the development of professional standards for using technology in psychological assessment. Psychologists must collectively consider empirical evidence for computerized test interpretation and move forward with technological advances in a prudent manner.

Technological advances have shifted the debate from test interpretation software to automated administration of psychological tests. At the center of this debate is the question of test validity and standardization assumptions when administered by computer rather than pencil and paper.

It is unclear whether tests administered by computer produce comparable results to tests administered with pencil and paper. Sawyer, Sarris, and Baghurst (1991) reported only minor differences in Child Behavior Checklist scores when administered via computer, yet Davis and Cowles (1989) reported a greater tendency to "fake good" on a variety of personality tests administered by computer.

The burden to demonstrate that automated assessments do not significantly violate standardization assumptions rests on the profession of psychology and the individual test users. Under optimal circumstances each test would be restandardized and normative data collected for computer administration. A monumental task such as this would require many years and tremendous financial resources. But even this optimal solution may not completely address the problem because at least one study has found sizable differences among patients in the ways they respond to automated assessments (Spinhoven, Labbe, & Rombouts, 1993). Thus, renorming a test for computer administration may mask the significant individual differences in response styles. Spinhoven et al. (1993) recommend that a preassessment interview be used to determine if a patient is a good candidate for automated assessment.

The limited scope of this chapter does not permit a thorough analysis of other forms of computer-administered psychological testing. Promising areas of automated assessment include computer-assisted functional assessment (Smith, 1993), unobtrusive measurement (Meier & Wick, 1991), and behavioral assessment (Farrell, 1991).

2.31.3.2 Computerized Interviewing and Diagnosis

A variety of innovative diagnostic tools have been developed up to 1997. Some software is designed to be used as an adjunctive tool for diagnosis outside of the actual patient—psychologist interaction. Other software requires the computer to be used directly with the patient as a means for collecting information.

Software designed as an adjunctive tool for diagnosis is developed as an expert system in order to provide a structured algorithm for psychiatric diagnosis. First et al. (1993) report evidence of the effectiveness of the "DTREE: The *DSM* Expert," a computer-based expert system that guides clinicians through a series of decisions based on *Diagnostic and statistical manual of mental disorders* (*DSM*) criteria. Diagnoses obtained through a computerized system were compared with traditional diagnoses made during a case conference, resulting in a high rate of agreement, especially for patients with schizophrenia and major depression.

Software designed for direct patient use involves using the computer as interviewer in a screening interview. The self-administered Computerized Diagnostic Interview Schedule (C-DIS) is an adaptation of the original DIS, a standardized interview administered with pencil and paper. Preliminary research findings suggest that the computerized DIS produces data comparable to the original DIS (Bucholz et al., 1991; Erdman et al., 1992) and that adult

(Erdman et al.) and adolescent (Kight-Law, Mathisen, Calandra, Evans, & Salierno, 1989) patients respond favorably to computerized interviews. Additionally, there is evidence that patients disclose their concerns and symptoms more candidly in a computerized interview than in a traditional interview (Ferriter, 1993) and find a computerized interview less embarrassing (Erdman et al.).

Mini-SCID is a self-administered computerized adaptation of the Structured Clinical Interview for *DSM-III-R* (SCID) that can be used in screening for Axis I disorders. Unlike the C-DIS, Mini-SCID must be used in conjunction with the expert system DTREE (First, 1994).

A computerized version of the Diagnostic Interview for Children and Adolescents-Revised (DICA-R) has also been developed. Initial findings suggest that children find the computerized interview enjoyable and easy to use, and that reliability of results is respectable (Reich, Cottler, McCallum, Corwin, & VanEerdewegh, 1995). Comparability between the original and computerized versions of the DICA-R has not been reported up to 1997.

In addition to the obvious benefit of time efficiency and the benefit of increased patient candor discussed previously, a significant advantage of computer-based psychiatric diagnostic screening interviews is that they may ultimately help identify mental health needs earlier and more thoroughly. For example, if computerized psychiatric interviews were incorporated into primary medical care, it is likely that the mental health needs of patients would be more clearly and readily identified (Lewis, 1992).

One concern about computerized diagnostic interview tools is that patients report being better able to describe feelings and ideas to a human interviewer than to a computer (Erdman et al., 1992). In gaining efficiency with computerized interviews, there is some risk of losing the humanizing factors that have allowed professional psychology to prosper. A second concern is that the comparability of computerized interview data and human interview data has not been definitively established. Whereas two studies have shown comparability between the C-DIS and the DIS (Bucholz et al., 1991; Erdman et al.), a third study suggests that the C-DIS shows poor concurrence with the original (noncomputerized) SCID (Ross, Swinson, Larkin, & Doumani, 1994). Of particular concern is the high rate of false positive diagnoses made by the C-DIS. Finally, it should be noted that computerized interviews must be quickly adaptable to changes in *DSM* criteria. The computerized interviews described here were developed to fit *DSM-III-R* criteria, and will undoubtedly be adapted for *DSM-IV* criteria. Unfortunately, the process of changing the software could render obsolete much of the data supporting their usefulness.

2.31.3.3 Computerized Therapy Tools

Given the complexities of human interaction that are involved in effective psychotherapy, it is unimaginable to some psychologists that computers could ever be used effectively for psychotherapeutic interventions. Nonetheless, computer applications in psychotherapy have been steadily developing since the 1960s and are now used in some therapeutic contexts. The least controversial of these applications involves adjunctive educational programs to help prevent self-destructive behaviors and enhance desirable behaviors (Bloom, 1992). To illustrate, while waiting for an appointment with a psychologist a patient may find it helpful to participate in a educational computer simulation designed to enhance self-esteem, facilitate responsible sexual choices, or reduce alcohol consumption.

Others have found computers helpful to use adjunctively during the therapy session. For example, Kokish (1994) reports using a microcomputer as part of play therapy with children. Similarly, neuropsychologists and rehabilitation psychologists have found utility in using computer rehabilitation programs to restore executive functioning (Gianutsos, 1992; Giaquinto & Fiori, 1992).

Most controversial are the applications designed to replace or replicate part of the therapeutic intervention. Several programs have been designed to deliver behavioral and cognitive behavioral interventions (Bloom, 1992; Kenardy & Adams, 1993). These include the Dilemma Counseling System, designed to help patients choose between two unwanted alternatives, the Therapeutic Learning Program, used to reduce stressful interpersonal problems in the context of an educational group therapy setting, and a variety of specifically focused behavior modification programs used to treat depression, anxiety disorders, behavioral excesses, sexual dysfunction, and other problems. Some of these programs have been used in outcome studies that support their usefulness in providing therapeutic services.

Opinions about computer therapy tools will be partially determined by theoretical orientation. Those who see the human relationship as an essential part of the psychotherapeutic process are not likely to see great value in further developing therapeutic software. Moreover, they express concern that using computers as a substitute for human therapists is dehu-

manizing and harmful, robbing psychotherapy of the healing interpersonal process. Those who see the delivery of structured techniques as the active ingredient in psychotherapy are likely to be more encouraged by these recent software developments.

2.31.3.4 Telephone Consultation

Although telephones have been commonly available and an integral part of professional psychology for many years, interest in using telephones to deliver clinical services is a relatively recent phenomenon that is quickly gaining the attention of psychologists and professional organizations such as the APA. In a review of the literature, Haas, Benedict, and Kobos (1996) distinguish between telephone use as an adjunctive tool in therapy and telephone-only therapy. With regard to using the telephone as an adjunctive tool, telephones have been used for crisis intervention purposes, referral and screening purposes, and to provide services to established therapy clients when circumstances prevent face-to-face interactions. There is more controversy surrounding telephone-only therapy, which can involve either conventional therapeutic relationships conducted by telephone or pay-per-call services where the client is charged per minute of phone use.

One advantage is that telephone services can be obtained immediately. Rather than calling a psychologist's office to set an appointment several days or weeks in the future, a distressed patient can often make immediate contact with a psychologist offering phone services. Widespread availability of low cost cellular phone services further enhances the psychologist's availability to patients or potential patients. A second advantage is that the power differential between patient and therapist is reduced in a telephone exchange. No diplomas are visible, the patient has the power to hang up at any time, and the emotional intimacy is reduced by the absence of visual cues. Third, telephone therapy adds privacy (or anonymity, if desired) to the therapeutic encounter for those who might be concerned about being seen in the waiting room of a psychologist's office.

Each of these advantages has a corresponding disadvantage. Although there is little or no wait for telephone therapy, one might question the effectiveness of the treatment. Immediate ineffective treatment is no better than waiting for treatment. In the absence of compelling empirical effectiveness data, the question of whether or not telephone therapy works is largely determined by one's theoretical views of therapy. Second, though therapy may reduce the emotional intimacy and power differential of traditional therapy, it does so at the cost of eliminating virtually all nonverbal cues. Distractibility may be a greater problem without visual cues, and neither the therapist nor patient is able to experience the expressions or posture of the other. These factors may limit the emotional depth of exploration as well as understanding of transference and countertransference responses in the therapy process. Finally, although privacy and anonymity may be desirable to clients, one must contemplate the larger sociological dynamics that prompt this preference. Might the desire for anonymity (and the possibility that anonymous therapy can now be purchased) speak to a larger problem of social alienation and dehumanization that contributes to the same emotional problems that telephone psychologists purport to treat?

Several intriguing and promising applications for telephone therapy have been reported, including linking people with AIDS via conference calls (Rounds, Galinsky, & Stevens, 1991), providing support services for older adults (King, 1991), and even doing long-term intensive psychodynamic therapy by telephone (Spiro & Devenis, 1991). However, it is important that psychologists offering services by telephone observe all relevant ethical standards that pertain to providing psychological services. The long-term acceptability of telephone therapy will undoubtedly require persuasive empirical evidence of its efficacy.

2.31.3.5 Electronic Mail

The advent of electronic mail (e-mail), which consists of one person sending a message to another by way of a computer network, raises questions similar to those just discussed regarding telephone services. The Internet has made e-mail communication an easily accessible and global phenomenon. It is conceivable, for example, that a recognized expert in Rorschach interpretation could have a world wide consultation and supervision practice whereby psychologists from all over the world sent Rorschach protocols via e-mail and received interpretative assistance from the expert psychologist. Similarly, a psychologist might keep contact via e-mail with certain patients between therapy sessions, especially in rural settings where the traveling distances between patients and psychologists sometimes necessitate infrequent visits.

Most the advantages and disadvantages pertaining to telephone therapy also apply to e-mail services, except that even fewer cues can be retrieved from e-mail communications than from telephone (i.e., voice tone and inflection can be determined on the telephone). An

additional problem, one that also applies to interstate or international telephone therapy, is the problem of professional regulation. When a psychologist in Switzerland offers supervision to a psychologist in the UK or direct services to a patient in the USA, in which country must the psychologist be licensed? To which national and state organizations is the psychologist accountable?

2.31.3.6 Clinical Databases

Although database computer software is commonly used by many psychologists to maintain patient and treatment information, additional clinical applications using database software are increasingly utilized in the practice of psychology. An excellent example is found among psychologists who maintain empirical outcome data for patients they treat (Clement, 1996). Although such databases do not lend themselves to controlled, double-blind outcome studies, they can be very useful in evaluating one's treatment efficacy with various disorders and types of clients. Moreover, as managed health care companies insist on assembling panels of competent therapists, the psychologist with positive outcome results will more likely be included on panels. Literature-based databases, such as PsychLit or various on-line services, are increasingly available for microcomputer use and can be very helpful in searching the literature for previous treatment approaches used for specific disorders. The variety and availability of other clinically relevant databases will expand exponentially as the Internet and World Wide Web grow in coming years. Potential concerns with clinical databases are limited to the expense of equipment plus on-line charges and the time required to input practice data.

2.31.4 EMERGING PRACTICE TECHNOLOGIES

In addition to the technologies discussed thus far, several other emerging technological advances may affect the practice of psychology in coming years. Third-wave technologies, summarized in Table 3, include teleconferencing, global networking environments (World Wide Web and Internet), virtual reality, and training innovations.

2.31.4.1 Teleconferencing

Teleconferencing, also known as videoconferencing, allows for visual and auditory communication through television monitors. Advances in electronics have made teleconferencing equipment increasingly affordable, resulting in experimental uses of teleconferencing among the health care professions. Whereas earlier prototypes required a satellite connection between television monitors, telecommunications can now be transmited much more economically through telephone lines.

Telecommunications are being used to offer medical care to some patients in rural areas of the USA. Technicians lead patients through diagnostic exercises while a physician observes and directs the examination from a remote location. Telemedicine saves travel time and money for many patients and makes medical care available to underserved areas. A similar concept has been developed at the University of Kansas (USA) to deliver neuropsychological services to rural areas. A master's level psychometrician leads a patient through diagnostic procedures while a neuropsychologist at the University observes and supervises the interaction. Patients have expressed satisfaction with the telecommunications services provided (Tröster, Paolo, Glatt, Hubble, & Koller, 1995). A similar strategy has also been used for remote cognitive testing of psychiatric patients in the UK (Ball, Scott, McLaren, & Watson, 1993). Teleconferencing also promises to provide an innovative means for continuing education for professional psychologists.

The primary benefit of telecommunication services is the availability of services and professional expertise to remote areas. Additionally, teleconferencing may enhance the availability of professional expertise around the world. For example, a patient in one part of the world may soon be able to consult with a leading expert in another part of the world about the symptoms he or she is experiencing. Similarly, psychologists throughout the world may participate in continuing education teleconferences with experts in various fields, thus raising the global level of professional expertise.

The main concern with teleconferencing relates to the setup costs. Although the telephone line costs of $10 to $35 per hour are not prohibitive, the site setup costs of $100 000 makes the widespread use of teleconferencing unlikely for most psychology practices, at least until the end of the twentieth century. Also, because most teleconferencing services are not yet covered by health insurance companies, there is little financial incentive for purchasing the necessary equipment.

2.31.4.2 Global Networking Environments

Computer networking allows one computer to communicate with another. The Internet is a

Table 3 Third-wave technologies: benefits and potential liabilities.

Technologies	*Benefits*	*Potential liabilities*
Teleconferencing	Can provide services to remote areas	Setup costs are high
	Will heighten the availability of professional expertise	Not yet covered by most health insurance companies
Global networking environments	May heighten awareness of mental health issues and resources	As with telephone therapy and e-mail (see Table 2)
	May provide mechanism for supervision and consultation with other professionals	
Virtual reality	Provides the experience of *in vivo* exposure for phobias without having to leave the consulting office	Unknown generalizability of symptom relief
Training innovations	Promises to enhance learning and promote technological skills	Need to demonstrate didactic effectiveness

rapidly growing global network that allows communication among computers throughout the world. It is the electronic skeleton that allows for global e-mail communications and for the advent and growth of the World Wide Web. The World Wide Web is made possible by software innovations that allow information to be organized into "pages" which may contain text, graphics, video clips, sound, and connections with other web pages. Connections with other web pages, known as "links," usually appear as standard text printed in a distinct color. Thus, with a single mouse click the user can move from one web page to another. Because it is a global network, the user may (without knowing) be moving from a page in Australia to a page in Germany, then a page in the UK, then the USA and so on. This has led to the terms "web surfing" and "browsing." The software used to access the World Wide Web is called a web browser. Examples of web browsers include Netscape and Explorer.

With the growing use of the Internet and the user-friendly interface of the World Wide Web, many commercial services are now marketed on the Web, including psychological services. For example, Shrink-Link comprises a group of psychologists offering advice over the Internet for $20 per question.

In addition to direct services offered for profit, a number of no-cost resources are accessible through the Web. Newsgroups facilitate discussions among a variety of computers users throughout the world. Here one can find support groups for a variety of problems including depression, loneliness, addictions, and shyness. Professionals can subscribe to newsgroups or e-mail groups (called listserves) to discuss a variety of professional issues such as rural care, research funding, clinical training issues, and professional organizations. PsychNET, a service of the APA, provides free information on a variety of psychological disorders, lists and addresses of mental health organizations, and strategies for choosing a psychologist. Other organizations offer free self-help pages on a variety of topics. Some magazines and journals are available on the World Wide Web as well.

Because of the novelty and rapid growth of the World Wide Web, it is difficult to anticipate all the benefits and potential liabilities that will be forthcoming. What is clear is that the World Wide Web will continue to grow and will be a major technological influence on contemporary societies. Among the benefits for psychologists, it seems likely that the World Wide Web will make mental health information accessible to those who might not otherwise seek it. This heightened awareness of mental health needs may increase utilization of psychological services. Also, the Internet may become a mechanism for supervision and consultation among psychologists and other mental health professionals (Myrick & Sabella, 1995). The greatest liabilities of the Internet will probably be related to those who offer direct mental health services. All the concerns listed previously for telephone and e-mail consultations also apply for Internet consultations.

2.31.4.3 Virtual Reality

Virtual reality combines computer hardware and software to simulate real life experiences by presenting computer-generated graphics and sounds that are responsive to the movements and responses of the individual using the software. When using virtual reality, one wears a helmet that presents a visual field while simultaneously monitoring head movements. Moving one's head to the left, for example, would result in the visual field shifting accordingly. Many virtual reality systems also include gloves to monitor hand movements. In this way the user can pick up objects or move other objects aside while moving through the visual field.

Two reports of using virtual reality to treat acrophobia have recently been published (Rothbaum et al., 1995a, 1995b). By simulating graded exposure to heights, the researchers successfully provided many of the same benefits associated with *in vivo* graded exposure. Unlike *in vivo* interventions, virtual reality allows the treatment to occur in the office or laboratory while giving the psychologist greater control over the stimulus conditions. This appears to be a promising technology for psychology, with the only known liability being the uncertainty of generalizability to real life situations. Other applications of virtual reality in the practice of psychology are likely to be forthcoming.

2.31.5 TRAINING INNOVATIONS

Clinical training in psychology has already been influenced by the technological advances introduced by microcomputers, and it is inevitable that training advances will proliferate in the years ahead. Three types of training innovations are described here, though the list is not comprehensive.

First, one US university has developed a World Wide Web site for psychiatrists planning to take board certification examinations. The site provides sample questions and provides immediate notification of test results. A similar site for the Examination for Professional Practice in Psychology (EPPP) or other certification examinations would be helpful.

Second, a variety of simulations are available in which psychology students observe a situation on interactive videodisk and then are given options of how to best respond (see Engen, Finken, Luschei, & Kenney, 1994; Maple, 1994). Based on the option selected, they are then given more information and more choices. This type of learning environment is private enough to allow students to experiment with questionable options and observe the effects of their actions—something that would not be encouraged in real life practicum training. Many simulations are now available for training purposes, and many more are sure to come by the end of the 1990s. With the ease of newer object-oriented programming languages it is increasingly possible for psychology faculty to develop their own simulations without needing advanced programming expertise.

Third, expert system-based, computer-assisted training programs (ESCATs) utilize artificial intelligence technology to model the decision-making processes of experts in a particular subspecialty. Many aspects of professional training can be facilitated by ESCATs. For example, McMinn and Scanish (1996) developed The Rorschach Trainer, a feedback-rich tutorial program to help students master the scoring variables in Exner's Comprehensive System. There are varying levels of feedback that can be determined by the student or instructor. The Rorschach Trainer allows students to master much of the scoring system outside of the classroom, leaving more classroom time for teaching Rorschach interpretation. Todd (1996) describes the development and validation of an ESCAT to train clinicians to accurately diagnose eating disorders. As additional ESCATs are developed, specialized training may become much more interactive and practical than current lecture-oriented curriculum and continuing education programs. This could be especially important for psychologists practicing in remote areas where continuing education and in-person supervision are not readily obtained.

Appropriate and effective technological methods promise to enhance learning for students while simultaneously equipping them with technological skills to enter the changing mental health marketplace. With the rapid pace of technological advances, the biggest challenge for those developing training software will be to demonstrate the didactic effectiveness of the new training materials.

2.31.6 CONCLUSION

The tools of professional psychology are rapidly evolving in the midst of accelerating technological changes. Many new technologies can enhance the training and professional services offered by psychologists, especially for those who remain commited to the traditional tools, values, and standards of the profession.

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