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Towards a comprehensive and integrated sex therapy information system

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TOWARDS A COMPREHENSIVE AND INTEGRATED SEX THERAPY INFORMATION SYSTEM

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PREFACE

While studying sex education and therapy from Drs. Anne Juhasz and Domeena Renshaw respectively, I happened to be gainfully employed as an information systems professional. I originally began working in that field simply because it had compensated me well enough to pay for my schooling, and I liked helping clinicians conduct research with the aid of computers. When I first planned the various stages of conducting my own research using data from Dr. Renshaw's Sexual Dysfunction Clinic, the data were available largely as paper forms stored in filing cabinets. As an information systems professional, my natural inclination was to automate the entry and retrieval of the data. It was at that time that systems integration finally took hold in the computing industry.

As a result of these simultaneous events and melding of backgrounds, I had an idea of developing a comprehensive and integrated sex therapy information system. Since this represented a considerable amount of scientific and technical effort, I asked that much of it be considered as fulfillment of my doctoral requirements. Fortunately, the members of my committee were, and are still, the types of persons who can change with the times—they are innovators all. Always thinking of their students' best interests, they also recognized that the combination of information systems and sex therapy would move me one step closer in becoming a knowledge engineer—a profession that is in much

demand. Thus, they agreed to accept a prototype system and some demonstration research as my dissertation work—a major departure from conventional doctoral requirements.

Also, as I planned the writing of my dissertation, I knew then that I wanted to publish my work. However, the conventional dissertation format did not seem to lend itself to publication. If I had used the conventional format, I would have had to convert the dissertation to APA style in order to get it published, which seemed like double work. Fortunately again, my advisor, Dr. Anne Juhasz, and the Dean of the Graduate School, Dr. Francis Catania, strongly supported my efforts to publish, and allowed me to write in the format of the journals in which I hope to publish.

Thus, this dissertation is organized as a series of four chapters written in APA style, with an introduction section that ties the chapters together and shows the dissertation's unity of purpose. I thank my committee members, as well as Dr. Catania, for adding value to this dissertation.

ACKNOWLEDGEMENTS

I owe a great deal of thanks to the members of my committee. They helped me more than they know. Dr. Juhasz, my committee chair, but most of all, my teacher, mentor and friend, supported me in various ways. She was always there to give me an encouraging word. Her insights and helpful comments on my drafts helped make this a better product than it would otherwise have been.

Dr. Renshaw taught me everything I know as a sex counselor, for which I am truly thankful. She gave me, and continues to give me, every opportunity to work in her clinic and expand my knowledge and skills as a counselor and co-supervisor. It is not only a pleasure to see her train other therapists, it is a learning experience as well. I also thank her for being extremely patient with me while computerizing the sex clinic, and for being always, always positive in her encouragement.

When I met him, I was still in the Dark Ages of Computing with Punched Cards. Dr. Hoover brought me out of that world and into the world of mainframe terminals. (This was before personal computers existed, to show you how far back we go.) From that experience, I was able to land my first job in information services. What I learned in information services allowed me to blend systems and technology with sex therapy in order to create this paper. I don't think I would even have had a career in information

services, and thus write this paper this way, had it not been for Dr. Hoover. He understood the difficulties I faced in building a vision for a comprehensive and integrated system. For that I truly thank him.

Someday, I would like to repay my committee members by doing something noteworthy in my career so that they can proudly say I was one of their students.

I also owe many thanks to my wonderful wife, Karen, for supporting me throughout this entire process. Together, we worked out the times so that I could work on this dissertation; and while I worked on it, she played with the kids, and took care of so many other things so that I would not be distracted. Most of all, she remained her sweet, loving self, which made me feel very secure and happy in our relationship. That helped me through a lot of trying times. Now it is her turn to pursue an advanced degree. I only hope that I can support her as well as she supported me.

In Loving Memory

of My Father

Who, along with my mother:

Taught me the meaning of hard work

and the dignity derived from it;

Had the personal strength and confidence

to encourage all of their children to do better

than they did;

Showed me that building relationships,

working with people,

and keeping the family strong

are important in life;

And encouraged me to dream,

to shoot for the stars.

This is the result of their teachings

and their love,

and my love for them.

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CHAPTER I

INTRODUCTION

Sex therapy is an information-intensive process. In every aspect of the practice—treatment, research and administration—data must be manipulated and transformed into meaningful information. Frequently, the same data are used for multiple purposes. For example, during intake, history, treatment and follow-up, multidisciplinary data are gathered and later used to aid in diagnosis, therapy, research, program evaluation, and practice management. Linking the data collection, analysis, and report generation processes together to satisfy each purpose is a formidable task. Manual methods for processing information, though often effective, are time consuming and may be less productive than computerized methods. With the existence of powerful personal computers and increasingly sophisticated software, computerized information management may now be feasible for a large segment of sexual scientists.

The purposes of this dissertation are twofold: (1) To demonstrate how information systems and technology (IST) can be applied to sex therapy from a technical standpoint, and (2) explain how IST can add value to the clinician's services by improving the quality of therapy, facilitating clinical and administrative decision making, and increasing the operational efficiency of therapy, research, as well as the practice.

In explaining how IST can help achieve these benefits, I describe a comprehensive and integrated model, following the path described below.

In the second chapter, I: (1) define the concept of a comprehensive and integrated sex therapy information system as having three components—therapy, research, and practice management, (2) discuss its inherent complexities, offering them as reasons why a comprehensive and integrated sex therapy information system has yet to be built, and (3) review how information systems and technology have been applied to psychotherapy. By transferring the concepts and functions of computer-mediated psychotherapy to a sex therapy information system, one of its components, therapy, can be developed based on the works of others.

In the third chapter, I discuss how future advances in information technology might influence the incremental development of a comprehensive and integrated sex therapy information system. In that chapter, I integrate the computer applications in therapy reviewed in the second chapter with that of research and practice management. The goal of this endeavor is to create a vision from which a long term strategy for developing a comprehensive and integrated sex therapy information system can be generated. I also discuss how information technology can add value to the clinician's services.

In actuality, the vision and strategy discussed in the third chapter were used to develop the initial functions of a prototype Sex Therapy Information System (STIS), described in the fourth chapter. That chapter outlines how research can be facilitated, as well as how operational efficiency can be increased, by the functions built into

clinical, therapist, academic, and administrative subsystems of the STIS, a personal computer-based system. I also review how its user interface of menus and dialog boxes result in ease of use, and how other features, such as error checking and masking, help to ensure the accuracy of the data upon entry. Lastly, I provide three examples of research that could possibly be facilitated by the system.

In the fifth, and last, chapter, I report some findings based on analysis of data downloaded into the STIS. The retrospective study, which investigated the difference in outcomes and follow up status between couples presenting with a single dysfunction versus multiple dysfunctions, is actually one of the examples offered in the fourth chapter.

CHAPTER II

STATE OF THE ART

Sex Therapy as An Information-Intensive Process

Sex therapists, in their various roles (Green, 1983), perform a myriad of tasks which require the processing of raw data into accurate, useful information. As clinicians, for example, therapists synthesize numerous medical, physiological, psychological and sociological data to perform a diagnosis, assess the acuity of a symptom, provide treatment, and monitor client progress. As researchers, therapists retrieve and statistically analyze data on various dysfunctional groups in order to report the effectiveness of treatment, and identify factors associated with successful outcome.

As administrators of a practice, therapists manipulate client data in a variety of ways to satisfy a wide range of business requirements. For marketing or funding purposes, for instance, the data are frequently reported in client benefit terms to regulatory or reimbursement agencies, foundations, auditors, referral agencies, or to couples seeking therapy. In addition, certain data elements, such as the number of visits

and laboratory tests provided, must be integrated with billing and accounting functions in order to maintain routine office procedures.

Clearly, there is a practical need for efficient information processing in all aspects of practice. In the last forty years, professionals in such allied disciplines as psychology, psychiatry, and social work, have used information systems and technology (IST) to help achieve that efficiency. Clinically, for example, IST has been used to: (1) automate or perform assessment and diagnosis, (2) provide computer-assisted patient education, (3) provide computer-assisted therapy, or (4) perform computerized therapy.

To facilitate research, IST has helped clinicians: (1) automate the program evaluation process, (2) perform statistical analysis, and (3) search and collect bibliographic references. Finally, across clinical, research, and practice management purposes, IST has helped automate such mundane and repetitive tasks as: (1) writing and editing text (e.g., reports, manuscripts, grants, and correspondence), and (2) patient accounting.

Time and again, the advantages of using IST in all of the above areas have been documented (e.g., see Aradi, 1985; Erdman, Klein, & Greist, 1985; Green & Atkisson, 1981; Hartman, 1986; Hug, 1990; Lawrence, 1986; Murphy & Pardeck, 1986; Mutschler, 1990; Nurius, 1990; Plutchik & Karasu, 1991; Robinson, 1990). The benefits of using IST are now generally accepted for all aspects of practice, except for perhaps computer-assisted therapy and computerized therapy, where some controversy still exists (Colby, 1986; Colby, Gould, & Aronson, 1989; Ghosh & Greist, 1988).

However, while the technology is available, comprehensive and integrated information systems dedicated to supporting sex therapy are not—at least in the mass

market. As discussed below, attempts to develop systems to support individual stages of sex therapy have been made, but products were never brought to market. If a sex therapy information system did exist today, what might it contain? How would it be upgraded over time, so that eventually it will be both comprehensive and integrated? In this series of chapters, I will attempt to answer these questions.

I will begin, in this chapter, by defining a comprehensive and integrated sex therapy information system. Then, I will briefly discuss the complexities inherent in its three components—therapy, research, and practice management. Lastly, I will concentrate on the therapy component, wherein I will review the ways in which IST has been applied to psychotherapy. By seeing what other systems can do, we can create a reasonable target of what the therapy component of a sex therapy information system might do as well. Issues in implementing these systems will not be discussed in great detail because such information can be found in existing reviews, which will be referred to at appropriate points in this chapter. The last two components, research and practice management, will not be reviewed because the information systems and technology used to support those areas (e.g., billing systems, or statistical analysis and word processing packages) are already proven, and most clinicians by now are very aware of them and how they operate.

Defining a Comprehensive and Integrated Sex Therapy Information System

A comprehensive and integrated sex therapy information system contains three components: therapy, research, and practice management. (For those clinicians who are faculty at an educational institution, there might even be a fourth component, education.) A fully comprehensive system computerizes all appropriate functions within the three major aspects of practice, and, where it is not appropriate to let the computer completely handle the process, the computer is used as an adjunct. Likewise, a fully integrated system captures data at their points of origin, and makes the data available to all related downstream functions within and across the three components. The goals of such a system are to: (1) improve, monitor, and measure the quality of therapy, and (2) improve the operational efficiency of therapy and research, as well as the practice.

Complexities Inherent in a Comprehensive and Integrated Information System

Under this definition, a fully comprehensive and integrated system does not exist in any human service, much less for sex therapy. Moreover, due to its inherent complexity, it is unlikely that a fully comprehensive and integrated system will be in existence for another five to seven years. As shown in Table 1, the three components

Table 1

Differences in the Nature of the Work, the Computing Technology, the Users, and System Purpose Between the Areas of Practice

	Therapy	Research	Practice Management
Nature of the Work	• Idiographic • Symbolic problem solving; searches for solutions using rules, theories, definitions • Unstructured, semi-structured decision making	• Nomothetic • Automates repetitive tasks; reduces solutions to mathematical formulas using numerical data • Semi-structured, structured decision making	• Nomothetic • Automates repetitive tasks; reduces solutions to mathematical formulas using numerical data • Structured decision making

Table 1 (cont.)

Differences in the Nature of the Work, the Computing Technology, the Users, and System Purpose Between the Areas of Practice

	Therapy	Research	Practice Management
Computing Technology, Software	• Artificial intelligence, expert systems • Computer-assisted instruction • Intelligent tutoring • Data base management	• Statistics • Text retrieval • Graphics • Word processing • Data base management	• Accounting systems • Spreadsheets • Graphics • Word processing • Data base management
Traditional Users	Therapists	Researchers	Administrators, clerical staff
Purpose/Type of System	Clinical decision support	Academic computing	Management information system; administrative decision support

differ in: (1) the nature of the work within each component, (2) the type of computing tools necessary to support the nature of the work, (3) who uses the respective computing tools, and (4) the purpose of the systems that have been traditionally built to support the users. (See Mutschler, 1990, for an elaboration on the last point.)

For example, in both research and practice management, solutions can often be found by applying a mathematical formula on numerical data (e.g., calculating a t-test or a client's bill). Consequently, such number crunching tools as statistical packages or accounting systems are appropriate to support those areas. However, in therapy, determining a diagnosis or a treatment alternative, and other like tasks, cannot be reduced to a mathematical formula. Rather, they require symbolic problem solving—the simultaneous processing of rules, theories, and definitions—for which artificial intelligence tools are apt.

To be sure, some system integration has been achieved thus far. Since the nature of the work in research is quite similar to that in practice management (see Table 1), the same tools have been used to satisfy the work requirements for both components. Indeed, many systems containing this level of integration are in existence. The missing piece, of course, is the therapy component. Until recently, the therapy component has been difficult to integrate because the nature of its work, and the tools to support it have been very different from that of the other two components. However, the computing tools to support therapy can now store and retrieve data to and from standard data bases. This capability allows data first encountered and collected in therapy to be passed onto the research and practice management components in the numerical format required.

Now, all the pieces to the puzzle are in place for the design and evolutionary development of a comprehensive and integrated sex therapy information system to begin.

Nevertheless, integrating all of the functions among the three components will be a formidable task. As I will describe in the third chapter, an evolutionary approach to design and development is needed. Before moving on to the third chapter, it is necessary to review some clinical applications of computers in psychotherapy. By studying how these applications have been developed in a kindred discipline, we can: (1) identify similar functions that ought to be included in the sex therapy component of a comprehensive and integrated system, (2) understand how those functions can be integrated with the research and practice management components, and (3) where feasible, transfer their design and development concepts into the evolution of a sex therapy information system.

IST Applied to Therapy: A Review of the Literature

Computer-Mediated Assessment and Diagnosis

Computer-mediated assessment and diagnosis began almost forty years ago, when Meehl (1954) demonstrated that computers, using a limited set of data, could classify a patient's profile equally as well as, and perhaps better than, clinicians. Sparking a debate on clinical versus statistical prediction, his findings have been corroborated over the years by Sawyer (1966), Stroebel and Glueck (1972), and Sines (1980). Since Meehl's ground breaking work, computers have been used in assessment and diagnosis to: (1)

record intake and history data following the interviews, (2) conduct the interviews simply to gather data about the client, (3) conduct the interviews not only to gather data, but generate a diagnosis as well, and (4) administer, score, and interpret psychological tests.

Intake and History Interviews. In the first approach, the therapist conducts the intake and history interviews as usual. Later, the data are key entered from the paper history forms into a data base using custom screens generated by a computer program. Typically, data are retrieved and clinical reports are generated by menu selections displayed on the screen. This approach is not very controversial. It maintains human client-therapist interaction, and its automation of records management and reporting increases productivity and facilitates research. However, it is susceptible to transcription and data entry errors.

Of the numerous systems taking this approach (e.g., Green & Atkisson, 1981; Kahn, Ramm, & Gianturco, 1981; Mead, Cain, & Steele, 1985; Olson, 1985), only one program (Mason, 1986) was found that supports sex history data collection, storage, retrieval, and reporting in this fashion. The developers of these programs appeared to have used either a programming language (e.g., BASIC, Pascal, C) or a fourth generation language tied to a data base management system. (For a discussion on computer languages, see Hicks, 1990).

In the second approach, the client interacts directly with a computer program as the means to conduct the intake or history interview. Essentially, the client responds to questions generated by a program. Typically, the answers are in a fixed format (e.g., yes-no, multiple choice, Likert or Guttman scale) and displayed as a menu on the screen.

The client then selects an answer by either: (1) pressing the key corresponding to the selection, (2) highlighting the selection and pressing a mouse button, or (3) touching the selection on the screen with a finger or lightpen. If a question requires a short answer, the client types the response on the keyboard.

Based on how the client responds to questions in the interview, the program either "branches" to, or skips, certain parts of the interview. For example, if the client answers yes to the question, "Have you ever been raped?", the program will proceed to ask relevant questions regarding the rape incident(s). After exploring the incident(s), the branching is discontinued and the client is returned to the main body of the program. If the client answers no, probing questions regarding rape will be skipped. For validation purposes, the question about whether the client has ever been raped may be asked a couple of different ways in the main body of the program. Affirmation on any one of the ways the question is asked triggers the branching.

Of the numerous programs that perform direct client interviewing as a means for gathering data (for reviews or listings, see Erdman et al., 1985; Hedlund, Evenson, Sletten, & Cho, 1980; Nurius, 1990; Saris, 1991; and Space, 1981), one, developed by Millstein and Irwin (1983), collected sex history data.

The third approach is very similar to the second, but goes one step further: After interviewing the client, the computer program generates a diagnosis. The clinician then consults the computer-generated diagnosis before making his or her clinical judgment. (For a discussion on issues involved in computer-generated, sometimes called computer-consulted, diagnoses, see Erdman, 1988.)

There are quite a few computer-consulted diagnostic programs in existence (again, see Erdman et al., 1985; Hedlund et al., 1980; Nurius, 1990; Saris, 1991; and Space, 1981), though not as many as in the first and second approaches. Two systems, developed by Binik, Servan-Schreiber, and their colleagues (Binik, Servan-Schreiber, Freiwald, and Hall, 1988; Servan-Schreiber & Binik, 1989) and Greist and Klein (1980), were found to assess and diagnose sex dysfunctions.

Computerized interviews that gather data (approach 2) or generate diagnoses (approach 3) are far more complex in nature, and therefore, are more difficult to develop than data base-oriented systems that simply record data (approach 1). Not only must computer-mediated interviews simulate human client-therapist dialogue, they must approximate a human interviewer's expert knowledge base and ability to make clinical judgments. The latter is extremely important for generating diagnoses. Authoring systems (e.g., AuthorWare, IconAuthor, Toolbook) or artificial intelligence (AI) languages (e.g., LISP, PROLOG) are best suited for developing these "expert systems." (For excellent descriptions of AI languages and tools, see the appendices in Benfer, Brent, & Furbee, 1991; Waterman, 1986).

In such a system, human expert knowledge is captured in a series of if-then rules. For example, a simple rule might be, "If the client is able to have morning erections, then secondary, but not primary, erectile dysfunction is a possibility." After the client answers all of the questions in the computerized interview, using artificial intelligence's "inference engine," the responses are compared against the knowledge base (i.e., the if-then rules), and a diagnosis is generated. (For excellent expositions on artificial

intelligence, see Butterfield, 1988; Servan-Schreiber, 1986. For discussions on expert systems, see Benfer, Brent, & Furbee, 1991; Gingerich, 1990a, 1990b; Scheurman, Mullen, Stagner, & Johnson, 1987; Schoech, Jennings, Schkade, & Hooper-Russell, 1985; Waterman, 1986.)

The second and third approaches are more controversial than the first. (For more in-depth discussion of the points that follow, see Colby, 1980; Erdman & Foster, 1988; Erdman et al., 1985; Hudson, Nurius, & Reisman, 1988; Nurius, 1990; Space, 1981). Opponents say computerized interviews: (1) are impersonal, inhumane, and unethical, (2) make violating confidentiality easier, (3) are not individualized to the client (i.e., everyone gets the same interview), (4) cannot understand natural language, nor pick up important non-verbal cues and client affect, (5) cannot re-word questions as well as a human interviewer to ensure that questions are understood, (6) require the client to read too much text (i.e., the questions and the computer's part of the dialogue), (7) cannot distinguish between client errors (i.e., hitting the wrong key) and pathological responses, and (8) because some programs acquire information by chaining together facts obtained one question at a time, many questions have to be asked to yield the same information that can be stated in one response of a few sentences to a human interviewer.

Proponents counter with a number of arguments. (Again, see Colby, 1980; Erdman & Foster, 1988; Erdman et al., 1985; Hudson et al., 1988; Nurius, 1990; Space, 1981). For many of the criticisms against computerized interviews, what really is being addressed, proponents say, is not the technology itself or its effectiveness, but the lack of understanding regarding the application of technology, and its consequent misuse.

Regarding its effectiveness, researchers found, after evaluating demonstrated systems, that: (1) clients are highly receptive of computerized interviews, (2) since clients may be less embarrassed, and more open, with a computer than with a clinician, clients reported more problems in a computerized interview than in a human interview, (3) because computerized interviews were standardized, with experimenter effects minimized, client response variability due to these factors was reduced, (4) computerized interviews collected some important data which clinicians failed to obtain, (5) data collected through computerized interviews were more reliable and accurate than that collected through human interviews, and (6) reports generated from computerized interviews were more complete and detailed than those written after human interviews.

It is true that computerized interviews cannot satisfactorily reproduce natural language, nor accept it as input, as well as humans. That remains the biggest technical obstacle to overcome before normal dialogue can occur between client and computer; but in time, with advancements in artificial intelligence, linguistics, and intelligent computer-assisted instruction (discussed below), even this obstacle may fall. Regarding the notion that a computer cannot detect nonverbal cues or client affect, Erdman et al. (1985) cited computer programs that measured response latency, pressure in striking keys on the keyboard, and heart rate. Though very rudimentary, these programs demonstrate future promise in this area.

In response to the charge that computerized interviews are not individualized to the client, developers of such systems point out that with the myriad decision points confronting the client in the interview, it is highly unlikely that any two clients would

make the same pattern of decisions. As a result, branching in the interview would be different for each client. Thus, computerized interviews are individualized in practice.

Other intuitive benefits have been stated, but have not been verified through empirical research. Developers of computerized interviews claim that productivity can be increased. For example, since the interview is conducted by the computer program, therapist time is saved. Further, since client answers are entered directly into a data base at the time of the interview, clerical staff time is saved, and research is facilitated because the data are now more easily accessible. Lastly, the increased productivity may in turn reduce the cost of services. Thus, therapists can offer more cost effective services to current clients, as well as more services to those who would not otherwise be able to afford them.

Interestingly, the authors who developed computerized sex therapy assessment and diagnosis programs reported results consistent with the above findings. Millstein and Irwin (1983) found that, of three methods for obtaining a sex history, adolescent girls preferred the computer interview over a self-report questionnaire and a clinician interview, in that order. The participants thought the computer interview was fun, interesting, confidential, and easy to use. In addition, when asked whether or not they had engaged in eight different sexual behaviors (e.g., petting, masturbation, oral sex, intercourse), the computer group denied engaging less in six of those behaviors, while the clinician interview group denied most in seven.

In both anecdotal and controlled studies, Binik, Servan-Schreiber, and their colleagues obtained similar results. They found that couples who interacted with their

program thought the interview was "logical, appropriate, and intelligent...[Further], none complained about the length of the session (60 to 90 minutes), nor the amount of text to be read" (Binik et al., 1988, p. 398). Moreover, the couples demonstrated a positive attitude shift towards computer-mediated sex therapy (Binik, Westbury, & Servan-Schreiber, 1989).

Finally, in a preliminary study, Greist and Klein (1980) reported that randomly selected participants were more likely to indicate they had sex problems when interacting with a computerized interview than with a psychiatrist, even when the psychiatrist was of the same sex.

Psychological Testing. The best uses of early information technology were for automating repetitive tasks. Thus, automating the administering, scoring, and interpreting of psychological tests was a logical occurrence, beginning in the mid-1960's when Rome, Mataya, Pearson, and Brannick (1965) first computerized the MMPI. Since that time, a bevy of psychological tests have been automated. For example, there are multiple versions of an automated MMPI. In addition, automated California Personality Inventory (CPI), Cattell's 16 Personality Factors (16PF), Strong-Campbell Interest Inventory, Beck Depression Inventory, Hamilton Depression Rating Scale, Rorschach, and other tests abound. (For reviews, see Fowler, 1980, and Hedlund & Vieweg, 1988). Unfortunately, no automated sexuality-related measures were found.

As with computerized assessment and diagnostic interviews, automated psychological testing has a couple of different implementation approaches. In one approach, the client reads items from a booklet, and with pencil, records his or her

answers on mark sense forms. These forms can either then be sent to a central service, or remain at the local institution, to be processed. Whichever path is taken, the forms are then read by an optical scanning device, putting the responses in a data base. Next, a computer program is run, which generates the report on the client. In a second approach, the client takes the test by interacting directly with the computer, which captures responses immediately. Thus, an intermediate step—reading the data via optical scanning devices—is bypassed.

As might be expected, the pros and cons of automated psychological testing have been widely discussed. (For more discussion of these points, see Hartman, 1986; Hedlund & Vieweg, 1988.) On a favorable note, clinicians who have used automated tests reported: (1) general client acceptance of both the procedure and the psychological interpretations it generated, (2) overall cost effectiveness of this method, and (3) moderately high agreement between clinician and computer-generated profiles or interpretations. In addition, Space (1981) argued that automated psychological testing can potentially increase test reliability by reducing variability in test administration as well as influences from experimenter effects.

However, there are some scientifically important concerns. For example, in some studies clinical judgments were made after the clinicians had already reviewed computer-generated interpretations. Since the two were not independent, there may be some confounding in the agreement between clinical judgment and computer-generated interpretations. Thus, it is difficult to determine the extent to which invalid computer-

generated interpretations exist. More importantly, there is potential for harm if invalid interpretations are reviewed with the client by an untrained person.

Inadequate psychometric research is another major concern. Automated tests using the second approach typically display questions one at a time (i.e., per screen). Paper and pencil tests, on the other hand, are often in booklet form, with multiple questions per page. Thus, test takers of the paper and pencil format can review questions within the context of nearby questions, whereas those of the automated format cannot. It is not clear how this subtle difference in the interview experience impacts both client orientation to the testing situation and affect while emitting response behaviors.

Lastly, since many automated tests are products of commercial services, their scoring procedures and interpretative rules are proprietary. As a result, it is not possible to determine their scientific, as well as clinical, strengths and weaknesses.

Computer-Mediated Patient Education

Computer-assisted instruction (CAI), the information technology supporting education, has been widely used in academic settings, from elementary schools to universities. Recently, sex education via CAI has been introduced. Charlton (1992), for example, developed a program that provided sex education to elementary and secondary school students.

In reviewing existing research, Flynn & Kuczeruk (1984) and Sampson (1986) summarized the advantages of CAI, many of which are desirable in the clinical setting. For example, the authors noted that with CAI: (1) learning outcomes were equal to, and

sometimes better than, traditional instruction, (2) learning time was shorter than traditional instruction, and (3) the time saved allowed instructors to spend more time dealing with other participant concerns that affect learning.

Other advantages were discussed. Though not empirically tested, they still have important clinical implications. For instance, the authors agreed that if CAI is well-written (i.e., not electronic page turners): (1) participants are active learners, who can work at their own pace, (2) the program is impartial, (3) participants are given immediate feedback, and (4) participants are directly responsible for their learning or behavior change.

Yet, for all of these advantages, CAI has not been widely used to support patient education in clinical practice. Ironically, with the structure that can be imposed on the delivery of instruction, and the ability to implement it using current authoring languages, computers are well-suited to provide patient education—with few of the ethical concerns that confront computerized interviews or computerized psychotherapy. As Flynn and Kuczeruk (1984) and Sampson (1986) suggested, some practical reasons account for this. For example, since assessment, diagnosis, and treatment typically receive higher priority, resources are often directed towards those functions, not patient education. Further, the lack of quality CAI software, the lack of practitioner training in the use of such software, as well as high development and implementation costs, have also hindered the progress of CAI in clinical practice.

Currently, there are two types of CAI, tutorials and simulations, with a third type, intelligent CAI (ICAI), now emerging. As described by Sampson (1986),

> "Tutorials...present concepts, describe relevant examples, provide questions to evaluate understanding, present feedback based on the learner's responses, and suggest further instructional strategies...[while] simulations...require the learner to apply a series of constructs to a 'real world' situation in order to make decisions and solve problems" (Sampson, 1986, p. 7).

ICAI (sometimes referred to as intelligent tutoring) blends artificial intelligence, and the use of natural language expression and understanding, with traditional CAI in order to approximate a human tutor. (Servan-Schreiber, 1986, and Anderson, Boyle, & Reiser, 1985, discuss ICAI in more detail.) Simply stated, ICAI programs must: (1) understand a content area, (2) know how to teach that content to the participant in order to effect behavior or cognitive change, and (3) model the participant's understanding of the material that was taught. The last point is complex, but very important, because based on the participant's level of understanding, an ICAI program has to dynamically adjust the level of material it teaches, as well as its method for teaching it.

In the clinical setting, tutorial type CAI programs have focused on training clients on specific procedures. For example, Erdman et al. (1985) cited two programs that appear to be of this type—one trained clients on giving uncontaminated urine specimens, the other on using tricyclic antidepressants. However, it is important to note that tutorial type CAI programs need not be confined to training. Sampson (1986), for example, outlined how CAI can be used as a component of therapy. For instance, CAI can be

used to orient clients to the assessment and therapeutic processes, or to help them gain an understanding of how personal, social, and environmental factors contribute to their problem.

CAI simulation programs, on the other hand, have concentrated on educating clients about a theory or model of behavior change, before helping them to identify and modify inappropriate cognitions or behaviors. Thus, both patient education and treatment are combined in one program. This pairing of CAI technology with the therapeutic process is both natural and desirable, since learning is such an integral part of behavior change. However, since the CAI simulation programs that have been developed are more treatment than education, I will address them in the section on computer-mediated therapy.

In CAI, the instructional material consists of text (e.g., questions, feedback, and problem solving situations), as well as graphics displayed on the computer screen. In addition, sound may be produced using a speaker inside the computer. More sophisticated CAI programs may coordinate image or graphic display via slide projector, or a combination of television and video recorder or videodisc, all of which are cable connected to the computer. The latter devices can also be used to present animation and full motion video. Similarly, coordinated sound may also be produced from audiotape or audio disc connected to professional-quality speakers, rather than the primitive one found inside the computer.

CAI is not without its disadvantages. Flynn and Kuczeruk (1984) state that the effectiveness of the approach is dependent upon the participant's reading and comprehen-

sion abilities, as well as his or her intrinsic motivation. Moreover, the education is only as good as the material programmed into it, and as a corollary, the participant can learn only as much as has been programmed. On balance, however, the advantages clearly outweigh the disadvantages.

Computer-Mediated Psychotherapy

Interest in computer-mediated psychotherapy began over thirty five years ago, when Weizenbaum (1966), a computer scientist, developed a system called ELIZA. Given the state of information technology in the mid-1960's, Weizenbaum only wanted to demonstrate that conversation, at that time, could only be superficial between man and machine. However, as it was deliberately programmed to do so, ELIZA responded with statements typically used by therapists from various schools of psychology, including Rogerian, Rational-Emotive, Gestalt, and Transactional Analysis (DeMuth, 1984). Further, persons who interacted with the computer exhibited many of the same transference behaviors as would occur in human delivered therapy. Seeing the potential of this approach, others (e.g., Colby, Watt, & Gilbert, 1966) thought that computer-mediated psychotherapy might be possible, and thus, began to develop such systems.

Early efforts to simulate psychotherapy were not very sophisticated or successful primarily because the programs were incapable of understanding and expressing natural language, which caused frustration in clients taking computerized psychotherapy. However, in the 1970's and 1980's, the confluence of artificial intelligence, linguistics, cognitive therapy, and intelligent computer-assisted instruction broke down some

obstacles to natural language and helped refine computer-mediated psychotherapy. In this time period, a number of computerized psychotherapy programs were developed, including a host of ELIZA variants (DeMuth, 1984) and one that treated sex dysfunction (Binik et al., 1988).

Computerized psychotherapy programs are very similar to the computer-generated diagnosis programs discussed above. In both types of programs, (1) the computer obtains data from the client by asking questions, (2) the client responds by making a menu selection or typing in a short answer, and (3) a diagnosis is usually generated. However, computerized psychotherapy programs go a step further, simulating statements a human therapist would make in: (1) correcting misperceptions, (2) educating the client about the treatment process, or the symptom being treated, (3) reinforcing attitudes, cognitions, and behaviors, (4) providing feedback, (5) helping the client with problem solving and decision-making, and so on.

The following quote, taken from a program that treated sex dysfunction (Binik et al., 1988), is illustrative of how a computer therapist "talks" to clients—in this case, to a couple who presented with primary anorgasmia.

> "It is...commonly thought that the inability to experience orgasm reliably has become a less frequent problem since the sexual revolution. This...appears to be incorrect since recent surveys and those carried out since the 1920's have shown that approximately the same percentage of women—about 10%—have never experienced orgasm.

> "Mary, despite the fact that you haven't reliably experienced orgasm, the chances of your regularly experiencing orgasm are excellent.
>
> "Another promising aspect of your situation is that your desire for sex is intact and your ability to get sexually aroused with John is also intact" (p. 396).

Computerized psychotherapy continues to be a hotly debated topic. The debate centers around the question of morality, not technical feasibility; for almost everyone agrees that computerized psychotherapy is possible. Weizenbaum (1976) strongly rejected computerized psychotherapy as immoral and unethical, stating that human feelings, such as respect, understanding, and love, ought not to be substituted by a computer. Colby (1980) countered, stating that:

> "To denounce [computerized psychotherapy] as immoral without spelling out which moral or ethical principle is being violated is simply pseudo-moral sloganizing in which personal distastes and esthetic sensibilities are confused with moral sanctions" (pp. 111-112).

In further rebuttal, proponents of computerized psychotherapy (Colby, 1980; Erdman & Foster, 1988; Erdman et al., 1985) raise an ethical question of their own: Given that a computer program can cost-effectively provide psychotherapy, and that there

are countless persons who cannot afford conventional forms of therapy, isn't it better to provide these individuals with some form of help than no help at all?

Yet, the claim that computerized psychotherapy is cost-effective requires further examination. Similar to automated assessment and diagnosis, the claim appears to be largely an intuitive one. Few developers have actually stated their costs. However, one group which did provided a fairly impressive cost-benefit justification. In a study predicting suicide risk, Erdman, Greist, Gustafson, Taves, and Klein (1987) found that their system was significantly better in identifying attempters, while clinicians were better at predicting nonattempters. Their computerized interview took approximately 40 minutes, at a cost of less than one 1986 U.S. dollar.

In any event, it is clear that the notion of computerized psychotherapy touches a nerve more so than any other computer-mediated aspect of practice. Recently, computer-assisted therapy programs have been developed, which because of their nature, do not seem to raise as much emotion. Whereas computerized therapy always implied (to some) that a human therapist could be substituted by a computer, in computer-assisted therapy the computer is clearly used as an adjunct to a human therapist. The clinician's interaction thus preserves the human ingredients of the therapeutic process.

The computer-assisted therapy program developed by Colby et al. (1989) is an excellent example. The intent of their therapy was to help adults understand how childhood beliefs can adversely affect adult decision-making processes. Procedurally, a group of clients met with a human therapist, who discussed the concept behind each of the eight steps of the authors' computer program, and then showed them how to use

it. After a client finished a step, the computer program generated a printout. The therapist then reviewed its contents with the client in a group setting. Through group therapy, the client worked on developing more adult decision-making processes and behaviors.

To be sure, other issues surrounding computerized, and computer-assisted, psychotherapy have been discussed in the literature, but not as fervently as the moral debate. These issues are essentially the same as those for computer-mediated assessment and diagnosis, reviewed above. Thus, they will not be reiterated here.

If any types of computer-mediated psychotherapy will succeed from a development standpoint, experts (e.g., Colby, 1980; Erdman et al., 1985; Greist, 1989) agree it will probably be the cognitive and behavioral therapies. (This augurs well for the development of computer-mediated sex therapy since, as McCarthy (1992) and Hawton (1991) point out, cognitive-behavioral interventions are frequently used in sex therapy.) These therapies are narrow in focus; thus, programming, even with all of its branching, will be less work. Further, they are structured, making them easier to program. In short, programming these therapies is more "doable", with excellent quality control potential.

In terms of programming, the trend clearly has been the use of computer-assisted instruction, artificial intelligence, and intelligent tutoring to integrate learning and behavior change principles. For example, Reitman (1984), using simulation CAI concepts more than technology, developed a program that educated clients on secondary

erectile dysfunction, and then provided exercises and assignments to help them regain their erections.

Selmi, Klein, Greist, Sorrell, and Erdman (1990) used both simulation CAI concepts and technology to develop their computer-administered therapy. Their program taught depressed participants about the relationship between dysfunctional automatic thoughts and feelings, assigned homework, and provided cognitive-behavioral treatment over six sessions. The expert system developed by Binik, Servan-Schreiber and their colleagues (Binik et al., 1988; Servan-Schreiber & Binik, 1989), which assessed and treated sex dysfunction, used artificial intelligence and intelligent tutoring concepts and technology.

Concluding Remarks

I began this chapter by asking two questions: What would a sex therapy information system contain if one existed today?, and How would it be upgraded over time, so that eventually it will be both comprehensive and integrated? Obviously, given the programs reviewed above, the therapy component can contain automated functions in all stages of therapy. However, it is important to note that, if these functions were transferred as is to a sex therapy information system, they would be limited in their comprehensiveness, and would certainly not be integrated with each other, much less with the computerized functions required for research and practice management. Nevertheless, there is sufficient evidence that developing a therapy component can be done. By comparison, melding it with the already proven approaches in research and practice management is a simpler task.

To be sure, the therapy component must be better developed before a comprehensive and integrated system can be widely used in clinical practice. To that end, a number of things must happen. First, the demonstration stage must be left behind; to move forward, higher quality and more completely functional and integrated computer-mediated therapy programs must be developed using advanced information technology. Second, these higher quality programs must withstand the rigors of scientific testing and evaluation. Third, the programs must demonstrate their business value.

Moving Forward

To move forward, we must go beyond the demonstration stage, in which volunteers or samples of convenience, as well as prototype systems, were oftentimes used. Higher quality computer-mediated therapy programs must now be developed and tested in both clinical and analog settings. These higher quality programs must contain: (1) more functions vertically (i.e., within one stage of therapy) and horizontally (i.e., completing development of stages that are not currently automated), (2) better screen presentation to the user, (3) better data handling, and (4) better integration among all functions. Such programs are needed because, at some point in time, we must be able to say that treatment effects from computer-mediated therapy are not from a prototype, but from a program that very closely simulates much that goes on in human conducted therapy.

In terms of vertical development, we will need to build upon the work of Mason (1986), Millstein and Irwin (1983), Greist and Klein (1980), and Binik et al. (1988), who demonstrated computer-mediated sex dysfunction history-taking, assessment, diagnosis, and treatment capabilities. For a couple of reasons, developing a relatively full featured computer-mediated sex history interview, including computer-generated diagnosis, appears to be feasible. First, sex therapy is behaviorally based. As Greist (1989) pointed out, behavioral therapies are characterized by

> "careful selection of [clients] for treatment, clear specification of treatment steps and techniques and measurement of change on relevant dimen-

sions...[all of which] lend themselves to automation in computer programs" (p. 270).

Second, there are a number of excellent examples of sex histories (Pomeroy, Flax, & Wheeler, 1982; LoPiccolo & Heiman, 1978; Masters & Johnson, 1970; Munjack & Oziel, 1980) and diagnostic methodologies (Kaplan, 1983; Schover, Friedman, Weiler, Heiman, & LoPiccolo, 1982) in existence. These examples show that the sex history interview and diagnostic process is a well-defined, structured, yet flexible, activity which is amenable to programming and branching logic.

Horizontally, the stages that appear to be missing—automated testing, as well as computer-mediated patient education and follow up—must also be developed. (To be fair, no one has developed computer-mediated follow up.) Developing automated sexuality-related tests has the promise of being a successful effort. In reviewing a number of sexuality-related measures (Davis, Yarber, & Davis, 1988), it appears as though their structure and answer format make many of them highly amenable for automation. As for patient education, using existing high quality CAI programs as models (e.g., Charlton, 1992), there is no reason to believe that computer-mediated patient education in sex therapy should not be equally as successful, as long as sound development methods are used.

The Need for Further and More Rigorous Evaluation

Once these programs have been developed, they must be evaluated in the same manner as any new psychological test or treatment modality. Heretofore, evaluation research on existing demonstration systems focused on establishing concurrent validity. However, as Erdman et al. (1985) encouraged, developers should now seek to establish predictive validity and reliability as well.

Further, we need no longer ask, "Does it work?", for that question is as meaningless now in computer-mediated therapy as it was for psychotherapy twenty five years ago (Paul, 1967), and sex therapy a decade ago (LoPiccolo, 1981). Given the findings from available research, there is sufficient evidence that computer-mediated therapy, in all stages, works.

Rather, the more important question to ask is the one posed by Paul (1967): "*What* treatment, by *whom*, is most effective for *this* individual with *that* specific problem, and under *which* set of circumstances?"

That multifaceted question is important because, beyond general findings, we do not know specifically:

(1) What the "active ingredients" or the "inert fillers" (LoPiccolo, 1981) are in computer-mediated therapy that result in successful client outcomes, nor how they interact with therapist and client variables.

(2) What computer, as well as human, therapist variables are important for successful client outcomes, nor how they interact in the computer-mediated therapy process.

Studying human therapist variables will be important for those times when the computer is used as an adjunct. Cruickshank (1985) and Brownbridge, Herzmark, and Wall (1985) found that the clinician's skill and comfort in using the computer, as well as his or her ability to stay calm, be attentive, and explain things well, were important to the process. However, their studies used patient perceptions of doctors as the dependent variables, not personal attributes of the clinicians themselves. Since we do not have systematic information on human therapist variables, we do not know what type of clinician is best suited to use the computer as an adjunct.

When the computer is not an adjunct, but conducts the interview or therapy itself, some therapist variables, such as age, sex, race, and status, may no longer be pertinent since the computer bears none of these attributes. On the other hand, other variables, such as lexical characteristics, have a whole new dimension added to them. Consider, for a moment, the various ways a computer therapist can "talk" to a client. Is there a difference in the client's attitude, cognition, or behavior when he or she hears the computer therapist's words through an audio speaker as opposed to seeing them displayed on a screen? If displayed on a screen, does placement or color cause different reactions in the client? What is suggested here is that many of the same lines of investigation that have been conducted on human therapist variables (as reviewed by Beutler, Crago & Arizmendi, 1986) should be done substituting computer therapist variables.

(3) What client variables are important for successful outcomes, nor again how they interact in the computer-mediated therapy process.

Many of the programs that were developed for demonstration purposes, in addition to using volunteers and samples of convenience, did not evaluate the effects of subject variables. Other studies that used conventional methods of experimental control and statistical analysis to evaluate their programs focused on showing treatment effects, and likewise did not systematically examine client variables.

One variable that has been the subject of much conjecture, but no formal evaluation, is the client's skill and comfort with computers. Would clients with higher skill and comfort levels do better than those with lower levels? Would clients who have more experience with computers find computer-mediated therapy less novel than those who have less experience?

Without empirical data on these and other variables, we do not know what type of clients computer-mediated therapy programs are best suited, nor how to select them for that mode of therapy. Patient selection guidelines exist (Zarr, 1984). However, while these guidelines are sensible (e.g., computer-mediated therapy is not indicated for clients who are resistant to it), they do not cover the client variables that have been researched in human delivered therapy (as reviewed by Garfield, 1986), nor have they been empirically tested.

Demonstrating Business Value

Practically speaking, products and services will increase their chances of success when they can demonstrate their business value. As in any other human service or industry, in terms of business value, benefits to the client are always considered first. Thus, it must be shown that high quality computer-mediated sex therapy programs truly are cost-effective.

For the clinician, computer-mediated sex therapy programs must add value to his or her current set of services. For example, one value added feature might be the storing of all data into an integrated data base that serves a number of purposes. First, it can facilitate both outcome research and clinical decision making. This is not a trivial task since such an integrated data base must be flexible enough to handle the demands of two dissimilar processes—idiographic for clinical decision making and nomothetic for research. Second, the integrated data base might be used to monitor clinical quality indicators, as required by the Joint Commission on Accreditation of Healthcare Organizations (JCAHO), for those who will be so impacted by their Agenda for Change program.

Lastly, it has been demonstrated many times over that information technology can help institutions gain competitive advantage (Cole, 1985; McFarlan, 1984; Parsons, 1983; Porter & Millar, 1985). The concepts of competitive strategy (Porter, 1979) and competitive advantage (Porter, 1985) can be carried over into a private practice just as easily as they are used in institutional settings. Thus, in employing these concepts, if computer-mediated sex therapy programs are shown to be cost-effective, then a clinician

can use the programs to help him or her compete on either cost or differentiation of services.

Towards a Comprehensive and Integrated Sex Therapy Information System

As we have seen from the above discussion, developing a comprehensive and integrated sex therapy information system can be done. However, it will be at least five to seven years before real products can be distributed for use in clinical settings.

In that time, considerable effort will have to be expended. For example, Erdman et al. (1985) reported that approximately 100 hours of design, programming, and testing time is required for every one hour of automated interview time. Binik et al. (1988) reportedly wrote approximately 2200 rules and 200 pages of text to create their expert system.

In that same time period, information technology will continue to advance at a very rapid pace, forcing the developer of a sex therapy information system to deal with constant change in the computing environment. The developer will have to: (1) identify which technologies will be important to the continuing enhancement of a sex therapy information system, (2) predict when those technologies will turn into real products, (3) predict the actual capabilities those products will provide (versus market hype), and (4) turn those capabilities into actual functions that increase the comprehensiveness and integration of the system. Based on this work, a vision and a long term strategy for developing a sex therapy information system can be created. In the next chapter, I will review such a vision and strategy.

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CHAPTER III

FUTURE DIRECTIONS

In the second chapter, I defined a concept of a comprehensive and integrated sex therapy information system. Under that definition, I stated that a comprehensive and integrated system contained at least three components—therapy, research, and practice management. I also described the complexities inherent in such a system, offering them as reasons why a system as defined does not currently exist.

I then reviewed some clinical applications of computers in psychotherapy, noting that: (1) the aggregate functions from such applications could essentially comprise the therapy component, if these functions were similarly implemented in a sex therapy information system, and (2) by combining the therapy component with the already proven technology and computerized functions that have long supported research and practice management, a comprehensive and integrated system could be developed. Lastly, I stated that, because of the considerable effort and resources needed to develop such a system, an evolutionary approach must be used.

An evolving comprehensive and integrated system requires, first and foremost, a vision of how it will change over time, as well as a strategy for accommodating those changes. Thus, the purpose of this chapter is to describe: (1) how a number of factors influence the strategy for developing and upgrading a comprehensive and integrated system, and (2) what such a system might look like in the short and long term. In describing the system as it might appear over the next few years (purpose 2), I will outline how a system can add value to the clinician's services.

In the process of describing the factors (purpose 1), I will explain why an evolutionary approach to systems development is best suited to the task. Understanding the evolutionary approach, as well as how the factors vary in their impact from one setting to the next, helps in formulating a development strategy that fits the unique needs of an institution or practice. Thus, the discussion of the factors will be presented more as a guideline, rather than as a recommendation for a particular strategy. In the next chapter, I will describe the initial functions of a system currently being developed for an academic medical center-based sex dysfunction clinic, wherein the development strategy for that practice can be gleaned.

The description of a comprehensive and integrated system will be slanted towards the personal computer platform because that level of computing not only blends a high degree of functionality, ease of use, and ease of development, it may also be the most affordable for many practitioners. In describing the system, I will focus on how advances in information technology can: (1) add value to the services offered by the clinician by improving the quality of therapy, and by increasing efficiency in the practice,

and (2) increase the system's ease of use, performance, or functionality as it is enhanced over time. A variety of technologies, such as pen-based and multimedia personal computers, will be mentioned. However, it would be too lengthy, technical and unnecessary to describe the various technologies in great detail when other works that represent them better exist. (These works can be frequently found in popular computer magazines.)

For brevity, I will use examples where the application of technology is most clear or effective. Though the same technology can be used in other places in the therapy, research, or practice management processes, it would be too repetitive to explain every instance where it applies. In addition, I may not use every alternative technology has to offer because exhausting the dizzying array of options would prove far too lengthy and potentially confusing.

Before proceeding, however, a few caveats are in order. Given the many computerized functions described below—especially those in direct interviewing or treatment, it may seem as though I am unabashedly promoting the computer as a substitute for a human therapist, raising the ethical question discussed in the second chapter once more. I would like to make it clear that, while the functions may be technologically possible now or at some point in the future, I am merely suggesting instances where they can be used. Indeed, not all functions need be computerized. The decision as to which functions to computerize is an individual one. It depends upon the mission, needs, and goals of the institution or practitioner, the factors described below,

the level of acceptance by the clients, and perhaps most directly, the ethical standards adhered to by the therapist.

Until the professional community sets ethical standards against, or the clients heavily resist, automation of certain aspects of practice, development of computer functions should continue. The exceptions are those applications, such as covert job performance monitoring, where the computer is used without the user's knowledge or permission. On this point, developers of computer-mediated therapy applications themselves agree that such functions are unethical. (See Erdman & Foster, 1988, for an excellent review of ethical issues.) No such applications will in the least bit be intimated in this paper.

I agree with others (Greist, 1989; Sampson, 1986) that computers should be used as tools to assist clinicians, not as substitutes for them. When used jointly, the computer can perform many, if not all, of the information dissemination and data gathering tasks, and serve as an adjunct to the decision making process; while the human therapist, combining data and decision support from the system with his or her affective and cognitive skills, can facilitate behavior change. Further, as outlined in the second chapter, I believe that computerized functions should not even be used in clinical practice unless they have withstood the same rigorous testing as any new treatment modality. It is in this spirit that I discuss the vision and guidelines for development strategy below.

Factors Influencing Development and Upgrade Strategy

Assuming its value, a number of factors must be considered when developing and upgrading a comprehensive and integrated system. Among them include: (1) its inherent complexity, (2) the sheer number of computerized functions that must be developed, (3) the rapid rate of change in information technology, (4), the level of resources, effort, and skills needed to develop the system, and their related costs, (5) business issues, such as affordability and return on investment, and (6) the rate at which users accept the system and its changes over time.

In considering these factors, it is clear that the best systems development approach is an evolutionary one. The traditional approach—where all of the requirements for the system are taken, and the entire system is programmed before it is delivered to the user—is unsuitable. Programming a large set of complex functions, such as that required by expert systems and relational data base applications, in itself takes considerable time. Attempting to do it in a short time with a large body of highly skilled information systems specialists is usually impractical and unaffordable.

In addition, constantly changing technology presents a "moving target." Trying to incorporate every appropriate advancement in technology before releasing the system to the user is an interminable process. If and when a system is delivered, the user will have waited too long before reaping the benefits the system may provide. Moreover, the extended time frame will cause user excitement to wane, breeding cynicism, which in turn, affects acceptance of the system.

In the evolutionary approach, a smaller set of functions is initially developed within a set time frame, using cost-effective resources and existing technology that implements those functions well. New functions are added, and existing functions are enhanced, as technology advances, as users accept changes to the system, and as it becomes cost-effective to do so.

The set of functions targeted for initial development are determined by how well they support the mission, needs, or goals of the institution or practice, as well as through conventional cost-benefit analyses. Functions from each of the therapy, research, and practice management components might be included in the initial set, but one component might have more emphasis than the others. For example, a sex dysfunction clinic based in an academic medical center might emphasize research functions in its initial set because making the data easily available to faculty and students facilitates their research, and thus, helps in fulfilling the institution's research and teaching missions.

Though patient care may be the primary mission in an academic medical center, many computer-mediated therapy functions may actually be of lesser importance in the initial set. For example, if there are sufficient colleagues and faculty to help clinicians and students respectively with clinical decision making, development of certain computer-mediated therapy functions can wait without negatively impacting the patient care mission. In addition, even though computer-assisted clinical decision making might be extremely useful, developing the expert system to provide those capabilities might have a lower cost-benefit ratio.

Practice management functions might be least important for an academic medical center-based sex dysfunction clinic. Except for integration with office automation, functions such as billing and accounting might be unnecessary if the hospital or university provides them. In this case, a comprehensive and integrated system merely needs to transfer data to the hospital's or university's financial systems.

Within the evolutionary approach, balancing the factors is key to successful development and implementation. Consider, for example, a number of reasons why it might not be wise to incorporate new technology into the system as soon as is technically possible, even though that advancement may add value to the clinician's services, or increase the ease of use, performance, or functionality of the system. First, the cost of incorporating that increment in technology might not outweigh the increased benefits. Usually, this situation occurs when breakthrough technology is first introduced. Such technology is typically expensive at that point. In addition, since technology itself has a growth cycle, its early forms might not have as full functionality as its later versions. Thus, integrating new technology shortly after its introduction may make the enhancement unaffordable, or not worth its incremental cost. Furthermore, the computer-mediated therapy function may not be implemented well because it is based on immature technology.

Second, the return on existing investment might not yet be fully realized. Oftentimes, if the purchaser of a system (i.e., the private practitioner or the administrator) feels that there has not been sufficient return on existing investment, his or her

perceived value of the system will decline. Consequently, that person will not continue to invest in the system.

Third, the number, or the rapid rate, of changes in the system as a result of new technology might be more than the users are ready to accept. Constantly changing the system just as users are getting comfortable with existing functions can overwhelm them, which in turn, may adversely affect both their perception and use of, as well as their skill with, the system. The latter point is particularly important. As shown by Cruickshank (1985), ineptness with a computer during an encounter may actually be a distraction and, therefore, detrimental to client-therapist interaction. (For further discussion on factors related to acceptance of automation, see Hammer & Hile, 1986; Levitan & Willis, 1985; Sines, 1980.)

To summarize, in an evolutionary approach, an initial core set of functions is developed, and upgrades are released thereafter in reasonable intervals. Further, the upgrades contain a manageable number of new or improved, but cost-effective, features and functions, using existing technology that implements them well. In the next section, I will outline some functions in a comprehensive and integrated system that can be developed in the short term, and describe how those functions might change as a result of advancements in technology.

Vision of a Comprehensive and Integrated Sex Therapy Information System

Orientation to the Practice

Oftentimes, before intake occurs, a couple may seek preliminary information in order to select a therapist or dual sex therapy team (hereafter, I will use the dual sex model and will refer to the clinicians as team or as cotherapists), or to decide whether or not they want to take the next step (intake) in the process. They may request information regarding the team's theoretical orientation, qualifications, failure rate, fee schedule, insurance reimbursement procedures, office hours, and length of appointments, among other things. Yet, the couple does not want to feel that, by simply requesting information, they will automatically be clients of that particular team. As Sampson (1986) suggested, a tutorial-type computer-assisted instruction (CAI) program could be used to disseminate this information in a relatively non-aggressive manner.

Though personal contact is certainly preferable over an automated option, especially in this first encounter, having such information imparted through a computer program has its advantages. As some have suggested (Erdman, Klein, & Greist, 1985; Nurius, 1990), clients who are too embarrassed to talk with a therapist may be willing to interact with a computer. Thus, having a CAI orientation program available on a walk-in basis might be helpful for those couples. For those who own a computer and a modem—the number of whom might increase because of the proliferation of home computers—the orientation program can be made available on a dial-up basis. Through

this option, the couples can obtain orientation information within the privacy of their own homes.

Regardless of where they interact with the computer, the orientation program can conclude by asking the couple whether or not they would like to take the next step, or whether they would like more time to decide. Since clients tend to feel more honest and less inhibited in interacting with a computer than with a human therapist (Erdman et al., 1985; Nurius, 1990), the couple might feel quite comfortable "saying" no, they would not like to continue on to the next step, to the computer program. If that is their response, the couple can leave freely, as usual (or disconnect if the couple has dialed up).

If the couple answers yes, the program can both inform them about the intake process, and preregister them by collecting as much intake data as possible. The data can be stored in the system's integrated data base, to be accessed at intake. If the couple decides they would like more time, the program can simply inform them of how to contact the therapist, and what information they should have ready to provide. For their convenience, such information can be printed for the couple to take with them.

The Intake Process

Having decided to seek therapy, the couple then calls someone in the practice, usually one of the cotherapists or an intake coordinator, to begin the intake process. Without a computer, the screening process might proceed in the following manner: Using an intake form, the cotherapist or coordinator collects data on the couple's

presenting problem(s), previous therapy, demographics, and insurance over the phone. At some point, the cotherapist or coordinator determines the couple's appropriateness for sex therapy. If appropriate, appointments for the couple are scheduled.

With a computer, the basic process need not change. By simply substituting the intake form with the computer, the cotherapist or coordinator can enter the data directly into the integrated data base just as easily as writing it on paper (assuming proper training), while talking to the couple on the phone. Those couples who preregistered using the CAI orientation program above will have much of this information already entered into the integrated data base; the previously collected data merely needs to be verified or corrected, with only the missing data to be gathered. In any case, the couple's appointment times can be determined by matching the couple's schedule with the team's, which resides in the system. If a form summarizing the intake encounter is needed, one can be printed; if not, the information can be accessed and viewed on the computer's screen at any time.

In this approach, there would be a considerable increase in efficiency or value added for the clinician. Data collected at intake can be verified, but not duplicated, in the first session. Centralized scheduling can be performed. Lastly, the data are available for clinical decision making or research. All the while, the computer remains fairly unobtrusive.

An expert system can also be used to help decide whether or not the couple should be accepted for sex therapy. However, while determining the couple's appropriateness for therapy requires some clinical judgment, that decision is not as

complex, for example, as assessing the couple and determining the correct diagnosis and treatment plan. For less complicated decisions, an expert system may not be indicated. (Criteria for selecting a suitable problem for expert systems development are discussed by Gingerich, 1990; Waterman, 1986.) Human decision making is sufficient. Furthermore, the data base application above might be simpler, easier to develop, and more cost-effective than the expert system.

Therapy

Orientation to Therapy. Early in the first session, the couple's orientation to therapy is typically conducted. Again, tutorial CAI programs can provide some assistance at this point. In addition to reviewing the procedures disseminated in the orientation to the practice step above (if necessary), Sampson (1986) suggested that a program can then discuss such things as theory-based assumptions for behavior change, confidentiality between therapist and client, and informed consent. Further, after informed consent has been reviewed, an actual form can be printed for the couple to sign. Of course, before the form is signed, the team can follow up by answering any questions or by discussing things further.

Over and above that which has been suggested by Sampson, the program might also gather data from the couple regarding their expectations of the team and of therapy, why they selected the team, and why they decided to actually seek therapy. Such data may be valuable for a variety of reasons. The data can be used for: (1) market

research, (2) process and outcome evaluation, and (3) identifying the "active ingredients" versus the "inert fillers" of sex therapy.

The last point is particularly noteworthy. In order to identify active ingredients and inert fillers, data on how the couple responds to each step in the therapeutic process must be gathered (LoPiccolo, 1981). This operation can be quite arduous without computers. A CAI program thus provides an efficient way of both gathering data on the orientation step, and storing it in the system's integrated data base.

The History-Taking Process. In the first two appointments, the cotherapists and the couple engage in roundtable discussions, followed by the sex history and physical. Each cotherapist conducts part of the history with the same sex marital partner in a separate room, using a structured form. Later, the cotherapists switch, conducting the remaining part of the history with the opposite sex member in the couple. Following the history, each member in the couple is given a physical, where again, a structured form is used. The history and physical forms are then filed in the couple's folder.

Now picture the varying degrees of change in this process with the use of computers. If history and physical data are entered into a data base application during non-therapy time (option 1), there would be no change in the process whatsoever, at least from what the couple can see. The only difference is outside of therapy, when the cotherapists or clerical staff must enter the data. The advantages of this option are that it: (1) makes quantitative data available for research or future clinical decision making, (2) saves therapist time in retrieving the data, and (3) ensures the accuracy of the retrieved data (assuming that "edit checks" of the data are part of the input process).

However, there are two problems with option 1. First, therapist or clerical time for data entry might increase. Second, there is no opportunity for the computer to provide immediate assistance in assessment and clinical decision making. One way to address these problems without changing much of the basic process is to put local area networked (LAN) personal computers in the separate offices where the histories and physicals are performed, and have the clients or the cotherapists interact with either an expert system or a data base application (option 2).

As has been demonstrated by Greist and Klein (1980) and Millstein and Irwin (1983), clients can interact quite well with a program that conducts a sex history. If the program were an expert system (option 2a) or a CAI program (option 2b), it could review the purpose of the history before actually conducting it. Alternatively, the cotherapists can conduct the history as usual, but instead of writing on the forms, they enter the data directly into an expert system (option 2c), or a data base application (option 2d).

Under option 2, neither therapist nor clerical time for data entry would increase since it is occurring in the session. In addition, transcription errors, susceptible in option 1, are reduced. Furthermore, history data would be available in the data base for research. (In options 2a, 2b, and 2c, the expert system or CAI program can transfer history data, while in 2d, history data is directly entered, into the integrated data base.) Lastly, the cotherapists can use the expert system (options 2a and 2c)—though preferably not in the couple's presence—to assist in identifying: (1) the diagnoses, (2) the severity of the symptoms, (3) the behavioral and marital patterns of the couple, (4) significant life

events, and (4) previous sexual, medical, drug, and family histories that may influence therapy.

As for the physical, while one cotherapist is examining the client, the other can enter in the quantitative data for measurements taken at that moment (e.g., blood pressure, temperature, and respiratory rate), instead of recording it on paper. Notes on the condition of the skin, organs, systems, and the like can be entered in as well.

Laboratory results, as we are all aware, cannot be entered during the session since they are returned a few hours or days later. However, by linking the practice's computer in which the integrated data base resides to the laboratory's computer, it is possible to transfer results (machine to machine) directly into the system; thus, accruing the same benefits in efficiency as the above functions.

Testing. After the history and physical, some paper and pencil measures are often administered as part of the assessment process. Here again, Sampson (1986) suggested that a CAI program can explain to the couple the purpose of the test(s), the test administration, scoring and interpretation process, as well as issues regarding honesty, guessing, and fatigue. After reviewing the CAI program, the couple can then take the test(s).

As reported in the second chapter, there are a plethora of psychological tests in which responses to the test items are still written on paper (e.g., mark sense forms), but the scoring and interpretation are automated. One major drawback of these automated tests is that, due to their proprietary nature, the raw data (i.e., item responses and subscale scores) are usually kept by the vendor. Obviously, having that data in the data

base would be very advantageous for research. However, merging it into the data base, assuming permission is received, often requires rekeying or somehow obtaining the data file from the vendor, with the latter certainly being easier than the former. To obtain data from the vendor, the therapist can request that it be sent as a file on a floppy disk, or transferred from the vendor's computer to the practice's computer via modem.

If the therapeutic community presents a sufficient demand, the vendors of automated tests may someday develop software that allows the couple to take the test on the computer in the therapist's office. Instead of using mark sense forms, the couple answers test items by selecting responses displayed on the screen, which are then captured on disk as a file. In this way, not only can the file be sent to the vendor for processing and generating the reports as usual, it can also be "exported" from the testing software and merged into the system's integrated data base where it can be used for research.

In addition to a variety of psychological tests, some sexuality-related measures are often administered for assessment purposes. As mentioned in the previous chapter, while there is an abundance of automated psychological tests, there are virtually no automated sexuality-related measures. This state of affairs, however, presents an excellent opportunity to create automated sexuality-related measures using current technology.

Of the various approaches in which current technology can be used, three seem appropriate. They are expert systems, pen-based computers, and voice recognition. With an expert system, (1) the marital partners individually take the test by interacting with the computer, (2) the computer program scores and interprets the test, and provides

reports that can be reviewed with the couple, and (3) the data are stored in the system's integrated data base. This approach is not novel. Thus, its extensive use in previous systems means that it has been field tested.

Pen-based computers is a technology that has recently emerged. Measuring slightly larger than 8½ by 11 inches, they lie flat on the desktop similar to a tablet of paper. The software is written to display the forms on the screen almost exactly as they are on paper. Instead of a keyboard, however, a person writes on the screen with a stylus (i.e., the pen). The same "gestures" are used to circle or place a check mark next to the appropriate response. Given its capabilities, not only would client test taking be as natural as using paper and pencil, but all of the other benefits cited in previous functions would apply as well.

Pen-based computers currently lack the disk space and processing capacity to store the integrated data base, as well as run expert systems on them. However, these limitations are easily overcome. Using a simple cable connection and communications software, pen-based computers can transfer data to another computer, perhaps the central one in which the integrated data base is stored. Moreover, after it has been transferred, the data can be processed by an expert system. Thus, computer-consulted decision making is still possible. Since consulting an expert system in the presence of the couple is not recommended anyway, this limitation is not a serious handicap.

It should be noted that pen-based computers are still in their infancy. Currently, pen-based software cannot recognize cursive writing. Only printed characters, and approximately 80% of them at that, as well as gestures are recognized. However, by

placing pen-based computers in a targeted application, such as test taking, where simple gestures are used, this technology can be employed relatively successfully in the near future.

Voice recognition technology presents an attractive third choice. With voice recognition, the computer program could display its part of the dialogue and a list of fixed format responses (e.g., numbered one through five) on the screen as usual. However, instead of typing a response, the marital partner vocalizes it back to the computer. To capture the voice response, the program converts the analog signal of the human voice into a digital signal the computer can understand. The program then determines whether or not the response is within the valid range for that question. If valid, the response is converted to a data point and stored as that person's answer to the question in the integrated data base. After the test is over, the responses can be scored, interpreted, and a report can be generated as usual. In addition to gaining all of the benefits of the previous alternatives, this approach is perhaps the most natural.

As with pen-based computers, voice technology needs to mature. Currently, since vocal quality and accent is different from person to person, voice recognition software must be "trained" to understand the fixed responses of the individual. That, however, is a simple process: speaking into a microphone, the person says each of the responses using a few different inflections or levels of volume. After hearing the persons's voice a few times (the training), the software then stores those responses as digitized patterns of sound. Thereafter, the software will recognize those patterns, as well as a few

variations from it. As long as voice recognition technology is confined to narrow applications, such as test taking, it too can be used in the near future.

Intervention. Following the history, physical, and other assessment techniques, intervention occurs. Here, the computer can be used to: (1) record data and notes, (2) educate the couple, (3) identify, modify, or dispel inappropriate cognitions, behaviors, attitudes, and myths that helped shape the problem behavior, and (4) assist in clinical decision making.

During a therapy session, recording of quantitative data is kept to a minimum, with most of what is collected occurring during the first roundtable. Such quantitative data include: (1) the number of times the couple practiced the homework assignments, (2) the couple's level of arousal, enjoyment, satisfaction, and intimacy measured each time homework was practiced, (3) the couple's evaluation of their progress, as well as (4) their responses to the prior session's interventions.

The appropriate technique for recording the data depends on how it is brought to the session. For example, if the couple records the above data on "homework sheets," the sheets can be reviewed by the cotherapists during the roundtable, and entered or scanned in after the session. In this way, the team and the couple are rightly focused on the marital partners' experiences and progress, rather than the logistics of capturing the data.

At the end of each session, the cotherapists typically write progress notes in the couple's record. While keying the notes in will always remain a viable alternative, one promising option may be digitizing their voice notes, which are spoken into a

microphone. This variation of voice technology converts the analog signal of the human voice into a digitized format as in the test taking function above. However, the note is stored as non-quantifiable digitized speech (i.e., sentences and paragraphs), not as quantitative data as in the test taking function. Since notes themselves are rarely quantified anyway, this limitation does not pose any problem.

With this advancement, the couple's record is moving ever closer to what is called a "compound document." In a compound client record, voice (e.g., notes), quantitative data (e.g., history, test, and lab data), text (e.g., psychological test interpretations), graphics (e.g., profiles from psychological and sexuality measures), and if necessary, images (e.g., x-rays) are stored as "objects." All of the objects can be accessed and viewed at the same time, presenting a comprehensive view of the couple to the team, rather than a fragmented one that may result when each is viewed separately as is done now.

Client learning is prerequisite to changes in cognitions and behaviors. During intervention, the couple is educated in a variety of ways. In addition to facts imparted by the team, the couple learns useful information by viewing charts that explain the sexual response cycle, illustrations that depict various coital positions, film or videotape that demonstrate the squeeze technique or appropriate conflict resolution behaviors, and more.

Multimedia is one technology especially suited for education and cognitive-behavior change. It combines text, image, graphics, animation and full motion video

with high quality sound, using a variety of audio and video components with a series of CAI tutorial and simulation modules.

Imagine how the couple would interact with the modules. First, a tutorial module can review the basic anatomy and physiology of sexual response. As the audio portion of the module explains the functioning of male and female anatomy, the video portion could display it in color animation. In the next module, the audio portion could explain the sexual response cycle, while figures depicting the cycle, such as those in Human Sexual Response (Masters & Johnson, 1966, p. 5), and color animation of the internal sex organs (e.g., showing the lengthening of the vagina during the excitement phase) are displayed.

Similar use of multimedia in other modules can explain, among other things, the effects of drugs, hormones, alcohol, illness and aging on sexual response or dysfunction. To demonstrate overt behaviors, other multimedia capabilities can be used. For example, full motion video and audio can review such things as sensate focus exercises, the squeeze technique, various coital positions, and the use of prostheses.

Simulation modules can help the couple identify and modify cognitions and behaviors (Sampson, 1986). For example, a module using full motion video and audio might show a couple fighting unfairly or not using "I" language, explaining how such behaviors, as well as the thought processes involved, interfere with the relationship.

The module could present a number of scenarios in which the couple is asked to: (1) identify when the couple in the video is using "hitting below the belt" tactics or manipulative verbal and nonverbal communication, (2) state some likely cognitions that

might have spurred the inappropriate behaviors, and (3) project the consequences of such behaviors. Afterwards, the module could show the couple in the video modeling appropriate target behaviors.

Following the simulation modules, the couple can relate what they had just learned to their own fighting and communication patterns, with the team helping to facilitate cognitive-behavior change. Sampson (1986) suggested a CAI program as an alternative method for conducting the cognitive aspect of the change process. By interacting with a tutorial module, the couple could suggest more appropriate cognitions. The CAI program would then evaluate and provide feedback on the cognitions submitted by the couple.

At this point in time, multimedia hardware and software are sophisticated enough to implement useful modules. However, the hardware costs will be more than some practitioners might be willing to pay; and software development will require, if not media professionals or software engineers, extensive training for therapists. Fortunately, as the market for multimedia matures, these barriers will be broken. The consumer electronics and computer industries are banding together to develop low cost, but high quality hardware components. Moreover, if the trend continues, authoring software will be easier to use. It is estimated that in three to five years, non-computer professionals—especially those that become more computer literate—will be able to develop sophisticated programs. There is, however, a precautionary note. Using these tools will still not be for the faint of heart, but the quality of the programs and its concomitant benefits may make it well worth the effort.

Oftentimes, clinical decisions need to be made during the intervention step. In other steps of the sex therapy process, clinical decisions have two outstanding properties. First, a specific decision that characterizes that step must be made. Second, the decision is derived from results of primary tools geared for that particular step. For example, the specific decision that must be made in assessment is the diagnosis, while the history, physical, and the psychological and sexuality-related tests are the primary tools for generating a diagnosis. As we have seen in previous examples, for decisions with this type of structure, expert systems can be used.

Clinical decisions during intervention, however, have very different properties. First, they are more free form. Second, they are made on an ad hoc basis. Third, there are no special instruments or measures on which they rely. Typically, clinical decisions are made after a variety of questions in the mind of the therapist have been answered.

For example, in adjusting treatment to the couple, the therapist might ask, "Which combination of interventions (e.g., Kegel, masturbation, sensate focus, and communication exercises, sex education, assertiveness training) had the lowest failure rate for couples who presented with secondary orgasmic dysfunction, and whose circumstances include low marital adjustment, a previous rape incident, and a history of alcoholism in the male partner?"

These types of questions are called "ad hoc queries." By using a data base function called a "query processor," the therapist can submit these queries to the integrated data base, which contains a wealth of medical, psychological, sociological, and

sexuality data on previous couples. The results of the query provide the therapist with answers from which to make an informed decision.

Since the integrated data base is a vital cog in the sex therapy information system, and query capabilities are inherent in most data base management systems upon which the integrated data base can be built, the query processor function is one that can be developed immediately and enhanced over time.

Termination. At the last therapy session, there is again a flurry of data collection. The couple does a final evaluation of therapy, which often includes a client satisfaction questionnaire. The cotherapists: (1) measure multiple outcome variables (e.g., changes in the status of the dysfunction(s), the relationship, and communication, as well as sexual knowledge, attitudes, and behavior), (2) write the discharge note, and (3) schedule the follow-up appointment(s).

The nature of these activities are not very different from the previous steps in the therapeutic process. For example, the client satisfaction questionnaire and paper and pencil measures on marital adjustment, sexual knowledge, attitudes, and behavior, and the like are similar in format to psychological and sexuality-related measures. Thus, they can be automated in equally similar ways.

Follow-Up and Maintenance

After therapy has been terminated, the couple returns for follow-up in regular intervals (e.g., 3 months, 6 months, 1 year, 5 years). During the follow-up session, the couple and the team engage in therapeutic interaction, if necessary, in order to strengthen

or maintain the cognitive-behavioral improvements attained through treatment. In addition, many, if not all, of the same variables assessed in the last therapy session are measured once more, oftentimes using the same instruments. Thus, the methods for automation are no different than at the last therapy session and need not be reiterated here.

Worth mentioning, however, is the way information technology may prove valuable in maintaining therapy gains in the couple's natural environment. Of the available technology, multimedia seems most compatible with some of the clients' other needs or desires. When multimedia hardware (e.g., the multimedia personal computer itself, videodisc recorders) become affordable for the home market—and indeed, some components, such as audio compact disc players and sound adapters, already are—sophisticated game and education software will abound. (This lucrative market is in part the incentive for the consumer electronics and computer industries to make low cost, high quality hardware.) The same hardware on which game and education software will run can be used for the intervention tutorial and simulation modules mentioned above.

Thus, the couple will be able to run these modules at home either at therapist prescribed times or whenever they feel the need to review them. In addition, after interacting with these modules, the couple's maintenance data can be captured by the program, and transferred directly to the computer located in the therapist's office. Consequently, the team and the couple—by their mutual agreement, of course—can continue to communicate and review the marital partners' progress post therapy.

Research

As stated in the second chapter, one of the key aspects of an integrated information system is the ability to capture data at its point of origin so that they are available for all other functions downstream of it. In sex therapy research, most of the data is generated by the treatment process. Therefore, having data directly entered or transferred into the system's data base during treatment, as shown in numerous examples above, is an optimal way of achieving integration.

Certain types of research, such as process and outcome evaluation, are downstream of the therapeutic process. It is only after clinical data has been collected that such research can be conducted. Once the data are in the integrated data base, certain computer functions can assist in research in a number of ways.

The query processor, described in the intervention section above, can assist in two ways by itself. First, since many query processors are capable of returning descriptive statistics as results of ad hoc queries, it can help the clinician conduct simple descriptive research. Second, the query processor can facilitate hypothesis deduction. By submitting successively probing queries (i.e., where the answer to one query leads to asking the next deeper one), the clinician can test a variety of relationships until one or more seem worthy of investigation using conventional research methods.

For example, the therapist might successively request the processor to: (1) list the homework assignments that couples did not do upon direction by the team and the reasons they stated for not doing them, (2) sort the assignments and reasons by dysfunction by type of assignment by reason, and (3) perform a frequency count of

assignments and reasons by dysfunction. In this manner, the therapist can identify the interventions to which couples are most and least "resistant."

Following this identification, the therapist can use the query processor to: (1) link a number of client and situational variables in the system with the assignments and reasons, and (2) again submit queries to verify various relationships at a cursory level. As suggested by notable clinicians (Kaplan, 1974; LoPiccolo, 1981), the therapist can explore whether or not client resistance is due to the team's failure of therapeutic judgment (i.e., assigning inappropriate homework), the couple's intrapsychic or relationship dynamics, or some other extraneous reason. Once clinical observation has been confirmed at this level, the therapist can proceed with the investigation using more rigorous scientific tools.

Conventional statistical analysis packages are another way computers facilitate research. Their utility is obvious (e.g., see Hug, 1990), and therefore, need not be explained here. However, what is not so apparent is the level of integration these packages can have with the rest of the system. Currently, many statistical packages are able to read data directly from data base management systems upon which a sex therapy information system can be built. In addition, these packages can also be linked with spreadsheet, graphics, and word processing packages.

With this level of integration, the clinician can: (1) use the statistical package to extract the appropriate data from the integrated data base, analyze it, and produce tables, (2) link the data to a spreadsheet or graphics package to generate figures (e.g., scatter plot, histogram, regression line, bar graph, line graph), and then (3) merge the tables and

figures in a word processor, along with the narrative (also composed in the word processor), to produce a manuscript or program evaluation report. The ease with which this process can be done is far better than ever before, although the clinician will have to know data exchange concepts, as well as how to use the individual packages.

Practice Management

Office automation typically consists of patient and general accounting, records and document management, payroll, human resources management, word processing, and the like. Except for a few technologies under this classification, office automation is similarly well known to most clinicians, and thus, need not be delved into here. (See Robinson, 1990, for a review of office automation for practice management.) One technology, however, that bears some discussion is electronic data interchange (EDI).

This technology is frequently used by insurance companies. It allows a claim to be entered on the practice's computer, and transmitted to the insurance company's computer where it is immediately processed. This automated procedure eliminates paperwork between provider and payor, expedites payment to the provider, and allows the insurance company to more efficiently compute actuarial statistics.

Concluding Remarks

In the previous chapter, I defined the concept behind a comprehensive and integrated information system being developed at an academic medical center-based sex dysfunction clinic. In this chapter, I described through numerous examples the breadth of functions such a system might contain (i.e., its comprehensiveness), as well as how the functions could interact (i.e., its integration—primarily by passing data to and retrieving it from the system's data base). Lastly, I asserted that information technology can: (1) add value to the clinician's services by improving the quality of therapy, or by making the practice more efficient, and (2) increase the ease of use, performance, and functionality of the system.

Adding value to the clinician's services is the most important reason for using information technology. Fortunately, value can be added in a number of ways. For instance, in improving the quality of therapy, expert systems or the query processor can help the therapist: (1) blend clinical judgment with information *based on data*, and (2) easily explore the couple's relationship dynamics, histories, and situational factors. Armed with this information, the therapist can make decisions or select interventions appropriate for each couple, and thereby answer Paul's (1967) question discussed in the second chapter.

The integrated data base is another way technology can increase the quality of therapy. Due to the ease of data gathering from various system functions, the data base can contain important variables that may not otherwise be collected. Furthermore, since

this richer set of data is always available, process and outcome evaluation can be routinely conducted. This timely feedback can help the therapist adjust future interventions accordingly.

Increasing the efficiency of the practice is easily recognizable. For example, pen-based computers not only allow the couple to take a sexuality-related measure in a natural manner, they also can capture the data as the marital partners are responding. Thus, the accuracy of the data can be increased without increasing clerical time for data entry. Similarly, electronic data interchange between provider and insurer can reduce paperwork and expedite payment.

Increasing operational efficiency is one way of keeping costs down. With today's economic pressures and competition in the healthcare marketplace, lower operational costs can be used for competitive advantage. For example, with lower operational costs the therapist can: (1) offer services at a lower rate, thereby making them more affordable for clients and possibly gain market share, or (2) offer services at the same rate, but gain higher margins than his or her competitors.

In the next chapter, I will describe the initial functions of a comprehensive and integrated sex therapy information system, demonstrating the value that information technology brings to a specific sex therapy practice.

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CHAPTER IV

INITIAL FUNCTIONS

In the second chapter, I defined a concept of a comprehensive and integrated sex therapy information system. In the third chapter, I: (1) reviewed how certain factors influence the system's development, (2) described what a comprehensive and integrated system might look like if one were developed today, (3) described how it would change as a result of advancements in technology, and (4) discussed how information technology can add value to the clinician's services. Now, in this chapter, I describe the initial functions of a sex therapy information system currently being developed at an academic medical center-based sex dysfunction clinic.

Clinic Background

The Sexual Dysfunction Clinic (SDC) began in 1972. Since its inception, 1,432 couples presenting with a variety of dysfunctions have completed treatment. The most prevalent dysfunctions were secondary erectile dysfunction (36%), desire disorders (27%), and premature ejaculation (15%) for the male partners, and desire disorders (26%), secondary anorgasmia (21%), and primary anorgasmia (15%) for the female

partners. Thirty-two percent of the couples presented with both partners having sex problems.

The SDC uses a dual sex therapy format. The couples are seen for 7 weeks, one session per week, plus follow up sessions in scheduled intervals. Approximately 50 contact hours are spent with a couple during the 7 week and follow up sessions. The program is offered four times a year, and approximately 18 to 22 couples are seen each time.

In addition to the 7 week program, the SDC faculty conducts male group sex therapy, group therapy for female victims of incest, group therapy for pre-orgasmic women, and a number of continuing education programs for medical and other health care professionals. The SDC faculty also offers a five hour marital enrichment seminar to the general public, as well as to those couples on the waiting list who wish some type of assistance before they are seen for therapy.

More than 1800 therapists and 60 supervisors have been trained at the SDC. Though many of them have been physicians, nurses, psychologists, social workers, and ministers, a significant portion of the trainees have been medical interns and residents, as well as graduate students from the allied health schools within the university. The faculty and trainees have conducted several case studies or research projects using SDC data.

System Goals and Objectives

Goals

Until recently, automation in the SDC consisted of personal computer-based word processing and mainframe-based statistical analysis. After reviewing the needs of the SDC, it was determined that the primary goal should be to facilitate research by: (1) organizing the data in an integrated data base, and (2) providing the faculty and trainees with tools to easily retrieve and analyze the data. The obvious aim was to increase the amount of quality research emanating from the SDC.

The secondary goal was to increase operational efficiency in research and certain practice management areas. There were two criteria for identifying which practice management tasks would be automated. They either had to: (1) support research operations, or (2) require the development of a simple automated function. With the primary and secondary goals in mind, the decision was made to confine the initial set of functions to research and practice management. No computer-mediated therapy functions were included.

The decision was easily justifiable. From a tactical standpoint, it was important to leverage existing resources before attempting anything else. The best way to do that was to capitalize on the wealth of existing clinical, client, therapist, and evaluation data—of which there were twenty years worth in the archives. Further, the targeted computerized functions could be developed more easily and cost-effectively than computer-mediated therapy functions. Thus, in addition to leveraging existing resources,

an initial set of research and practice management functions, it was thought, would yield the best cost-benefit ratio.

Further, such functions could be developed in a relatively short time frame. Consequently, not only would the quicker use of the system by faculty and trainees increase their productivity and provide early returns on investment, it would also "buy time" for the development of more difficult computer-mediated therapy functions, and give its development tools (i.e., expert system shells, artificial intelligence languages, and authoring systems) more time to mature.

Lastly, there was no pressing need to develop computer-mediated therapy functions for cost containment or clinical decision making reasons. Indeed, the operational costs of the SDC were already exceptionally low for such a large practice, and there was sufficient faculty to assist their colleagues as well as the trainees in their clinical decision making. In short, though computer-mediated therapy functions were certainly valuable, they were not as high a priority as the research and practice management functions, and could therefore be addressed in a later upgrade of the system.

Objectives

Among the objectives for the initial set of functions were the following. The computerized research and practice management functions had to:

- Reduce duplication of data
- Streamline data collection procedures, capturing data at their points of origin and making them available to all downstream functions

- Reduce duplication of effort when physically entering and retrieving data
- Hide the complexity of both accessing data sets and porting them to the appropriate statistical tools
- Facilitate the production of tables, figures, graphs, and narrative style documents (e.g., manuscripts, grants, and correspondences),
- Support the hypothetico-deductive process, as well as clinical and management decision making, through the query function
- Streamline multiple reporting requirements, making a small number of reports serve as many audiences as possible (e.g., status reports to departmental or university administration, summative and formative evaluation reports for funding agencies, quality monitoring reports for accreditation organizations)
- Produce reports in a timely manner.

System Structure

By the time the initial functions are completed, the Sex Therapy Information System (STIS) will be comprised of: (1) four subsystems (clinical, therapist, academic, and administrative), (2) a query processor with links to statistical software, (3) a function to quickly locate, process and print reports, (4) utilities for converting files from dissimilar software, and (5) system administration functions (e.g., backing up the data).

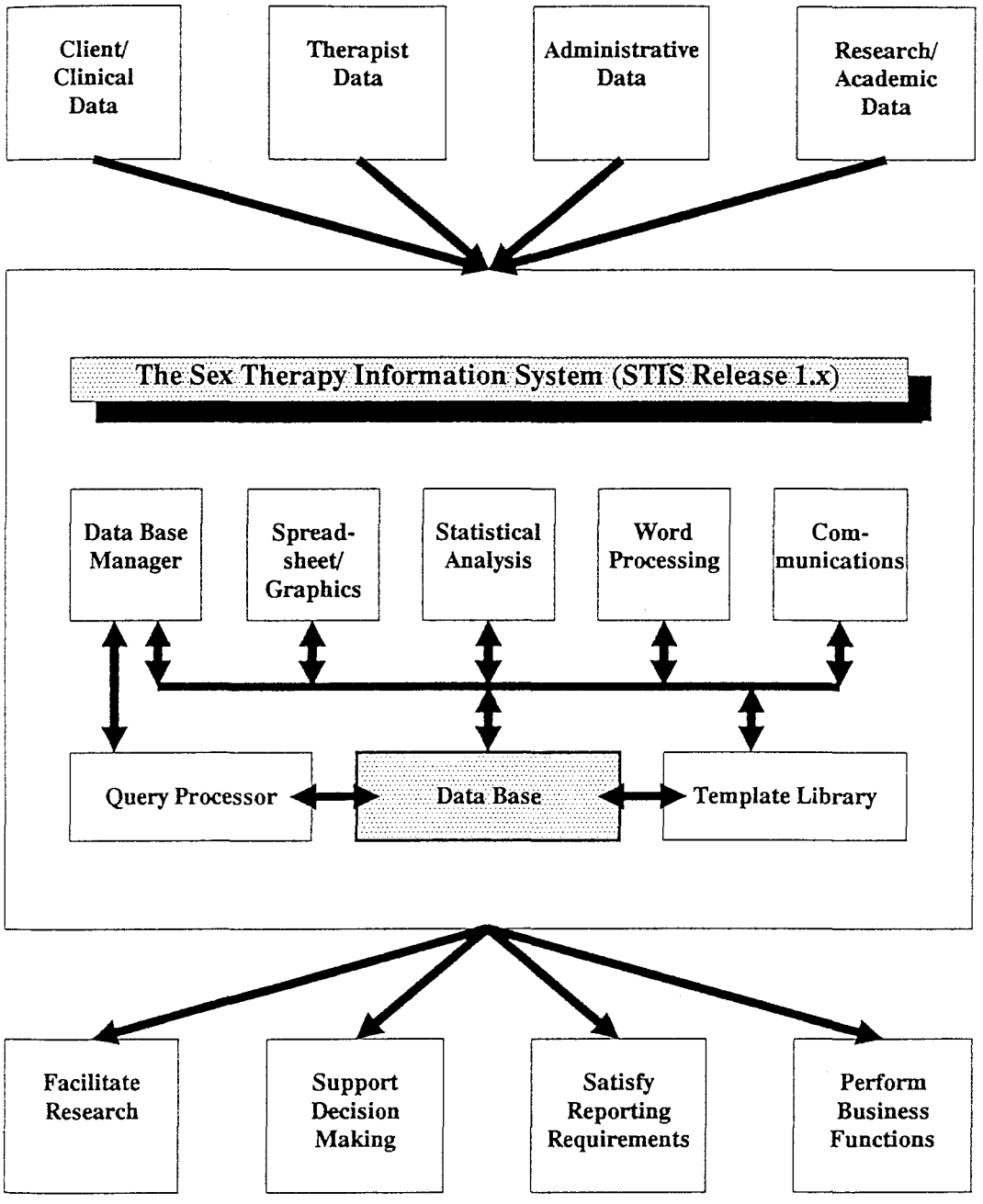
The appendix outlines the structure of, and lists the functions contained in, the STIS. As can be seen from the appendix, there are numerous functions and subfunctions in each subsystem. These functions will be delivered as the initial development and three minor *releases* (i.e., upgrades) called STIS 1.0, 1.1, 1.2, and 1.3 respectively. The functions to be contained in the various releases are identified in the appendix.

Currently, the STIS runs on a Disk Operating System (DOS) compatible, Intel 80286 CPU-based personal computer. In the future, (1) the massive data being collected, (2) more complex functions, and (3) a graphical interface—the latter two of which will be implemented in releases 2.0 and beyond—will place heavier processing and storage demands on the computer. Consequently, at the appropriate time, the present computer will need to be replaced by at least an Intel 80486 machine, with significantly large mass storage. However, by then, the SDC will have gotten its return on investment in the current computer and more.

The STIS software is a character based application that links together a compendium of off the shelf professional level data base management, spreadsheet and graphics, statistical analysis, word processing, and communications software. (See Figure 1.) It is not a system that is custom written in a programming language (e.g., C/C++, Assembler). The decision to build the STIS as an integrated application using shrink wrapped software, as opposed to a programming language, was a deliberate one. Integrated applications built from such software products will not only be highly functional, they can be developed in a shorter time frame, and can be used for other than STIS purposes.

Figure 1

Overview of the Sex Therapy Information System



Furthermore, major software vendors, especially those upon which the STIS is based, are beginning to incorporate object oriented tools into their products. Such tools promise greater functionality in, as well as faster development and maintenance of, subsequently built or enhanced applications. Thus, in a few years, as these software products incorporate more and more object oriented tools, enhancements to the STIS application will likewise gain in those areas.

The heart of the STIS is its integrated data base. It contains all the data collected in the subsystems, and can be accessed by the query processor as well as all the other tools that come with the off the shelf software. The STIS also contains a library of templates to help users build difficult or unfamiliar applications more quickly and easily using any of the software tools.

Branching *screen menus* simplify the system by helping the user wend his or her way through it. The user selects an item from the menu by entering its corresponding letter or number. For example, to select the clinical subsystem from the main menu, the user would press "C", the letter for the command, or "1", because the clinical subsystem happens to be the first item on the menu. The numbers and letters are highlighted, visually cuing the user as to which keys to press.

If the selected item is a function, its first screen appears with a *bar menu* located at the top of the screen identifying the commands that can be used within that function. If the user selects one of the commands, a *pull down menu* appears, listing the options underneath the command. As with previous menus, the user can then select one of the

options by entering its highlighted number or letter. The consistency in making selections from the various menus reduces the learning curve for the user.

Once inside a function, a number of features are available to assist the user. For brevity, only a few will be mentioned here. In the enter/modify data functions (e.g., function 1.1.1), a *pop-up menu* appears in all fields that have a finite range of values. Each menu contains only those valid values for the respective field. For example, the valid values for the "race" field are White, Black, Asian/Pacific Islander, American Indian/Alaskan Native, and Hispanic. To enter data into the field, the user simply selects one of the values by moving a highlight bar over it and pressing enter. This feature speeds data entry because the user does not have to enter the entire value or look up its code. Considering the many fields of this type across all functions, the time savings will be significant. Further, it ensures that only accurate data are entered into the data base.

The enter/modify data functions also contain a feature that automatically branches to, or skips a field or a table of fields, depending on the value of a previous field. A simple example is the "street drug history" field, the values of which are yes and no. If the partner has used street drugs in the past (yes), then the screen's cursor jumps to the table that tracks the type of drugs taken, as well as the frequency of use and dosage for each type of drug. If the partner has never used street drugs (no), the cursor bypasses the table and jumps to the next field. This feature again speeds data entry.

Another feature worth mentioning is error checking, particularly for date fields. For example, due to mistyping, the value for the "date seen for therapy" field could be entered as "7/26/71" instead of "7/26/81." We know that the former date cannot be

possible since the SDC did not officially open until 1972. Without error checking, the errant date would have been entered into the data base. With error checking, a beep sounds and a gentle message reminds the user that, in this example, the date is not valid and requests him or her to correct the entry. Obviously, error checking at data entry ensures accuracy of the data.

All of the functions contain a "masking" feature for the appropriate fields. A mask specifies the format of a field. For example, the mask "###-##-####" ensures that only numbers, specified by the "#" code, can be entered into the "social security number" field. If a letter is typed, it will not be accepted, and a beep alerts the user of the errant keystroke. Further, the mask specifies that there will be two dashes placed appropriately in the field, which the user does not have to type. Masks are used to ensure that names and addresses are in mixed case, that telephone numbers contain only numbers, with parentheses around the zipcode and a dash between the prefix and the suffix, and more. This feature again ensures accuracy of the data.

Initial Functions

What the functions do is fairly self-evident, given their names in the appendix. Therefore, I will not describe each one in detail. Instead, I will outline what data are collected in the various subsystems, as well as the intent of certain functions and how they help increase operational efficiency. (For your convenience, I will identify the

function by putting its appendix number in parentheses in the text. Note that the identified functions may not be confined to the subsystem under discussion, testifying to the fact that data are used by functions downstream of their point of origin and capture.) In addition, I may at times discuss future enhancements to the system. In the next section, I will focus on how the STIS can facilitate research and give some examples of research that can be done with STIS data and tools.

The Clinical Subsystem

Intake. Currently, a social worker conducts the intake assessment, collecting data on the couple's presenting problem(s), previous therapy, demographics, and insurance. Intake data can be entered (1.1.1) either in batch mode (where a pile of intake forms is entered after a number of interviews have occurred, but before the beginning of therapy), or online (by the intake coordinator while the interview is being conducted).

Entering data before therapy begins will reap productivity benefits in many areas down the road. For example, once the data are in the system after intake, there is no need to collect the same demographic and clinical data at any other point in the therapeutic process, except to verify or update it. Thus, these data elements do not have to be repeated on subsequent forms. More importantly, clients are saved the nuisance of having to provide redundant information, and the cotherapists of having to collect it.

Regarding practice management, a mail-merge type function saves time and labor. After it has been determined which couples to accept for therapy, put on the waiting list, or refer for other treatment, appropriate form letters are automatically printed by their

respective functions (1.1.4.4 to 1.1.4.6), merging the couples' names and addresses from the data base into the header part of the letter. Similarly, the acceptance letter also merges the first appointment date, time, and location of therapy in the body of its form.

Outside of therapy, you may recall that marital enrichment seminars are offered to couples waiting to be seen for therapy. Brochures are sent to these couples informing them of the seminars. Again, to save time and labor, the STIS contains a function which produces mailing labels (3.4.1.2) using demographic data entered after intake.

Therapy. In the 1.*x* releases of the STIS, the therapy functions are confined to simply entering or modifying clinical data, and scoring some of the measures. STIS functions provide custom screens for entering history and physical, psychological, marital adjustment, body image, client evaluation and other clinical data. These include: (1) homework assignments, which measure the number of times the couple practiced their homework (e.g., sensate focus) during the week, each partner's ratings of his or her own enjoyment and arousal, as well as each partner's perception of the spouse's enjoyment and arousal, and (2) a measure analyzing each partner's emotional needs and the spouse's ability to satisfy them. To keep apace with the massive amount of data to be entered in the initial stages of implementation, data during the 7 week programs are entered shortly after they are generated, while archival data are entered during non-peak times, using the supplied functions.

Developing the the data base for the psychological and sexuality-related measures in this subsystem now, rather than later, provides an important migration path. In future releases, as resources and client and therapist acceptance of the system permit, expert

systems will not only administer, score, and interpret psychological and sexuality-related measures, but automatically retrieve and store their data in the integrated data base as well. However, the data base for these measures must exist before the latter can be executed. Since the data base will have to be developed anyway, doing so in the initial releases offers two advantages. It allows archival data to be entered and used productively now. Furthermore, with that work already done, the expert systems can simply hook into the data base in the future.

The Therapist Subsystem

Among other things, the therapist subsystem contains functions to enter or modify data on therapists who wish to train at the SDC (2.1.1) as well as their evaluation of the training experience (2.1.2). Therapist data includes their name, address, phone number, status (e.g., professional, resident, student), level of experience, affiliation, and discipline (e.g., gynecology, psychology). Evaluation data includes a self-assessment of their knowledge and skills, and their appraisal of the training program.

The subsystem contains other functions that track each trainee's application, payment, and references (2.2), prints acceptance or hold letters and mailing labels (2.4.1 to 2.4.3), and lists the couples an experienced therapist has seen, the types of dysfunctions the couples had, the types (e.g., physician, nurse, psychologist, social worker) and experience levels of the trainees the therapist had worked with in the past, and the couple's outcomes (2.4.6). The latter function is useful in getting a quick sense

of the therapist's past activity and effectiveness, as well as in pairing him or her with another trainee.

The Academic Subsystem

Reports and Publications. Drawing extensively from the word processing software, the reports and publications functions allow the user to create, edit, and print any type of text document (3.1.1 and 3.1.4), including imported tables, graphs, and figures.

Oftentimes, standard paragraphs or pages of text are used for multiple documents. For example, the description of the clinic might be used in a marketing brochure, a grant proposal, an annual report, or a journal article. In the STIS, such standard text are stored as "boilerplates" (3.1.3), which can be retrieved into whatever documents they are needed. This function ensures that an authorized version of the description is used, minimizes typographical errors, and speeds development of a document since the thoughts contained in the standard text do not have to reinvented or retyped each time.

Bibliographic references are stored in the data base, which can then be sorted and retrieved by author, subject, title of article or chapter, title of journal or book, and year of publication, with nested permutations of all variables. This feature is useful, for example, in creating reading lists to give to couples or trainees (3.1.4.2). In addition, individual references, downloaded from reference data bases, can be selected on an ad hoc basis, and either merged into another document, or printed (3.1.4.3). This capability

is useful in expediting the preparation and ensuring the accuracy of the reference section of a manuscript.

Program Evaluation. The STIS contains functions that allow the therapist to write custom program evaluation reports (3.2.1). In addition, since such reports oftentimes contain numerical measures (e.g., the number of couples with multiple problems whose symptoms were reversed after treatment), a STIS function allows the therapist to set up or modify program evaluation measures, specify which measures are to be included in which report, and then generate them for any reporting period using data from the integrated data base (3.2.2). The narrative of the report, including the numerical measures, as well as individual reports summarizing the couples' and the trainees' evaluations can be processed and printed (3.2.3) at any time.

Note that, with the system's streamlined methods for data capture, raw data on which to do program evaluation will already be in the data base. Further, formulas for calculating the measures based on the data will be similarly available, having been programmed in when the program evaluation module was initially set up; and unless errors are made during the set up or modification of the formulas, they are virtually left untampered. Therefore, after writing the unique aspects of the narrative, which has to be done anyway, the generation of the measures and the printing of the report occurs more or less on a "production" basis.

Implementing program evaluation in this manner yields two important benefits. First, it reduces production time and labor, resulting in reports that can be generated more easily and on a timely basis. Second, it increases the accuracy of the numerical

measures and ensures their consistency from report to report. Of course, the measures must be carefully designed, set up and modified, and most importantly, checked after each run, for the module to work effectively.

Also note that this entire module does not contribute any new data to the system. Rather, it uses existing data in the integrated data base, underscoring the objective of having data serve multiple functions downstream of its point of origin and capture.

Continuing/Client Education Programs. To support the many continuing education programs conducted each year, faculty outside of the SDC or the university are sometimes invited to lecture. The STIS contains functions that tracks guest speakers and their honoraria (3.3.1), as well as the dates, times, topics, and costs of continuing education programs (3.3.2), registers participants (3.3.3), and handles guest speaker invitation and confirmation correspondences (3.3.4).

Several times a year, SDC faculty are invited to appear on television talk shows. Oftentimes, depending on the show's topic, the faculty person is asked to bring an interesting past couple of the SDC. Similarly, past couples are used in the continuing education programs. The STIS thus contains functions to help select couples as potential guests of the show or program (3.4.1) and prints correspondences to make the necessary arrangements (3.4.2).

The Administrative Subsystem

In this subsystem, the SDC annual report can be generated (4.3.1). Drawing from the data collected during therapy, the function can report the number of therapists

trained by discipline by year, the number of couples treated by dysfunction by year, the outcomes of couples by dysfunction, and the number and location of practices therapists have set up themselves after having completed their training at the SDC. The function can also extract data collected in the continuing/client education module, reporting the number and types of continuing and client education programs conducted, the diversity of guest lecturers, as well as the number of and the institutions where SDC faculty have guest lectured themselves. Taking full advantage of the available software tools, the annual report can be written in the word processor, incorporating graphs generated by the spreadsheet, as well tables from the statistical package and data manager.

Aside from the annual report, the administrative subsystem at this point merely contains functions to draft the various form letters, and data collection forms used throughout therapy and follow up. Keeping the functions to create the various forms in one place serves three purposes. First, it allows a clerical person to focus on this module. Second, it reduces the clutter in the screen menus that would otherwise surface if these functions were interspersed throughout the other subsystems (e.g., putting the functions to create the intake forms in the clinical subsystem, intake module). Third, by not having these functions located in related subsystems, there is no possibility of accidentally executing these functions (e.g., by hitting the key next to one you really wanted). Thus, the user is saved the time and annoyance of having to exit the accidentally entered function and entering the one originally desired. Apart from these points, the functions are largely clerical in nature, and hence, do not bear further discussion.

The Query/Analyze Data Function

The query function does what its name implies. (You may recall that the utility of the query function was explained in the third chapter. The STIS follows the *query by example* approach. In this approach, the user provides an example of the data he or she would like extracted and subsequently analyzed. For instance, suppose that a user wanted to analyze the outcomes of couples who presented with multi-phase disorders.

To execute the function (5.1.1), the user must follow a multi-step, but simple procedure. First, the user selects the variables he or she may want. In this case, the variables might be outcomes for each symptom, outcome of the relationship, and, of course, the primary and secondary symptoms of both marital partners. (In actuality, others will also be selected to make the research worthwhile, but selecting them would be extraneous to this demonstration.) Once the variables have been selected, their names appear on the screen. It is at this point that the user provides the example. In this case, the user could enter, "ISD," in the wife's primary symptom, and, "not ISD, but not empty," for her secondary symptom. Translated, this query simply extracts data on all requested variables for all couples where the wife had a desire phase disorder (ISD) for the primary symptom, and a disorder from some other phase in the secondary symptom (not ISD), with the stipulation that the wife had a secondary symptom (not empty). After pressing enter, the query processor searches the data base for couples meeting these criteria and displays them on the screen.

The user could issue subsequent queries to get other multi-phase combinations, and append the data in one file. Alternatively, he or she could issue a general query,

such as entering, "not empty," in the primary and secondary symptom fields for both marital partners. Using a series of *dialog boxes*, the user can then perform simple descriptive statistics on the data. If the same query will be used over and over again, it can be saved and executed (5.1.2) at any time. This saves the user time when performing subsequent similar queries. In addition, the results of the query can be printed (5.1.3) after it has been executed.

If more sophisticated analyses are required, the user must extract the data (5.1.1) and link to the statistical package (5.2). The link is set up such that the statistical package can read the file extracted by the query processor. Consequently, such tasks as defining the data (i.e., their variable names and location in the data file), the missing values, the valid ranges of each variable, and more are saved.

A variety of templates containing sections of statistical programming code which the researcher can retrieve into his or her computer program are also available. These templates range from simple descriptive statistics to multifactorial and multiple regression analyses. Once the templates are retrieved into the program, all the researcher has to do is fill out the parameters for the analysis. Of course, when using any statistical software, the researcher must truly understand the theory and concepts behind the tests to be performed. These templates not only speed the development of the researcher's computer program, they ensure the accuracy of the command syntax as well. The latter is very useful when running the program because it will reduce the frequency with which the program will be aborted due to syntactical errors.

The query by example approach is elegant in its simplicity. The user does not have to know programming to access the data. Granted there are a few syntactical rules in providing the example (for instance, knowing to enter, "not empty," in the secondary symptom to exclude couples that only have one presenting symptom). However, these rules are far simpler and fewer than in a programming language. Moreover, the statistical package's direct linkage with the data base not only increases efficiency, it ensures analysis on data that has integrity, and is authorized by SDC and STIS administrators.

The Express Reporting Function

Currently, many of the print report functions contained in each subsystem are two to four layers down from the main menu. In addition, with the myriad reports included in the initial functions, and more planned in later releases of the STIS, one could conceivably jump around from subsystem to subsystem—hitting a lot of keystrokes, and increasing the potential for error, in the process—if many different reports had to be printed at one time.

To reduce the effort in this situation, the express reporting function contains all reports in one list, sectioned by module. To print a number of reports consecutively, the user simply enters the numbers corresponding to the reports, separated by a comma. The express reporting function then stacks the requested reports, and prints them sequentially.

Utilities

Oftentimes, faculty share research data with colleagues at other institutions. If the shared data are fields contained in the integrated data base, the STIS contains functions allowing them to be directly imported to or exported from the data base (7.1.1 and 7.1.2). If the data coming from a colleague are not fields contained in the integrated data base, a separate data file or an entire data base structure can be created (7.1.1.1) with the assistance of STIS templates. Once the file or data base structure has been created, other templates help the user import and *view* the data along with STIS data (7.1.1.2). Alternatively, the templates can assist the user in *joining* non-STIS data with STIS data in a separate file or data base, which the user can then manipulate for his or her own purposes.

The templates both help the user build his or her custom applications quickly, and hides the complexity of accessing or joining data from separate data bases. Keeping non-STIS data files and custom applications separate is necessary in order to maintain the integrity of the data in the STIS data base, and prevent accidental corruption or deletion of STIS data or files.

At times, colleagues use a different software product than that owned by the SDC. To help with the exchange of data in this instance, the STIS contains functions that convert data file formats to American Standard Code for Information Interchange (ASCII), to which virtually all products conform, as well as to file formats of other popular software products (7.1.2). Similarly, text is converted to and from the file formats of other popular word processing software packages (7.2).

In actuality, the STIS does not reinvent the method for file conversion. That capability is supplied by most products on the market, the ones upon which the STIS is built included. Rather, the STIS functions for data and text file conversion are simply dialog boxes which prompt the user for parameters—in this example, the names of the software products the data or text is currently in, and the one to which it should be converted. Once these parameters have been supplied, the function accesses the appropriate off the shelf product (i.e., the word processing, spreadsheet, or data base management software), and has it do the actual file conversion.

For many persons, file conversion is an infrequently used, but necessary, procedure. As such, it may be difficult to remember which package to use to convert which file format, as well as the file conversion procedure within each package. The dialog boxes hide the complexity or unfamiliarity of the procedure by making it consistent and easy to use.

System Administration Functions

To protect confidentiality, only authorized users may access the STIS. Those wishing to gain access, such as a trainee or university student who needs the data for a research project, must ask for permission. Once permission is granted, the user is given a password (8.1), and is trained to use the STIS. Other system administration functions include the vital procedure of backing up and restoring the data (8.2), and electronically archiving data, reports and documents (8.3).

In the STIS, clients are actually separated into active and inactive status. It is the data for the inactive clients that are archived in function 8.3. This approach is extremely useful. When only the active clients need to be processed, the size of its files will be smaller than they would otherwise be because they do not contain all of the inactive clients, which now number over 1,400. Thus, processing and response time will be much quicker in comparison. However, since the inactive client files can be accessed at any time, the user has not lost the capability of performing research on the entire set, or subsets, of clients seen in the SDC.

As faculty, trainees, and clerical staff use the system, they often have suggestions for improving it. They also identify bugs. The STIS contains a function (8.5) for recording the suggestions and bugs, which will then be attended to in later releases.

Facilitating Research

As stated in the beginning of this chapter, the primary goal in developing the initial functions was to facilitate research by: (1) organizing the data in an integrated data base, and (2) providing researchers with tools to easily retrieve and analyze the data. The first part was accomplished by the design and development of the integrated data base. Previous to its existence, collection of past data required researchers to sift through the various file folders on each couple, determine whether or not the couple met

the selection criteria to be included in the project, pull their respective forms or tests if they did, set up computer files, and then enter the data for subsequent analysis.

By contrast, when the data base is completely loaded with archival data, the data will already be organized (e.g. by client, therapist, and clinical variables) and available for researchers to use. They can then employ the query processor to easily extract the data. Thus, what previously may have taken weeks just to get the right data may take only minutes or hours with the integrated data base and STIS tools. Further, though it is always good practice to check the data before running statistical tests, the physical process of cleaning it after data entry in the previous method is virtually eliminated because error checking by the system is conducted on an ongoing basis. Similarly, programming time will be reduced due to efficiencies gained by the direct links with the statistical package (which, along with the query processor, accomplishes the second part of the primary goal).

However, increasing operational efficiency alone is not enough. In simple vernacular, all that says is, "Here is a system that will help you perform better at what you do." Oftentimes, the *applications*, the important and substantive work that can be done with the help of a system must also be demonstrated. Thus, the question that must now be answered is, What research is possible with the data and tools that are now being provided? To answer this question, I will provide three examples.

Example 1. A two group design—where couples accepted for treatment represent the experimental group, while those on the waiting list comprise the untreated control group—is often used to detect the effects of therapy. However, as LoPiccolo (1981)

pointed out, the two group design may be inadequate to detect true differences because waiting list couples may not in real life be an untreated group. Since these couples are highly motivated to resolve their sexual problems, they may: (1) try to work out some techniques on their own, (2) seek and be more responsive to other available forms of assistance (e.g., sex manuals, clergy, family doctor), and (3) have extreme low scores on their initial assessment procedures "as a function of their acute upset" (p. 121). As a result, the supposedly untreated control group will show improvement in their second assessment. More importantly, in comparison with the experimental group, the treatment effect is minimized.

While it is possible to discourage control group couples from seeking informal therapy or attempt things on their own, it is doubtful they will be so deterred. However, there are other ways of controlling these events, including: (1) questioning the couples regarding the help they received before therapy, as LoPiccolo (1981) suggested, and (2) actually manipulating the informal therapy the couple has had. The SDC is well positioned to act on both of these forms of experimental control.

As a normal course in the history-taking process, the cotherapists delve into previous formal therapy as well as any other form of assistance. In addition, you may recall that marital enrichment seminars are offered to those couples on the waiting list who wish some assistance before therapy. Thus, the following groups might be formed: (1) minimal previous assistance before therapy (i.e., the couple tried a few things on their own without guidance—e.g., sex advice columns, X-rated material), (2) moderate assistance before therapy, but assistance was not therapy, and was not conducted by the

SDC (i.e., a workshop or seminar), (3) moderate assistance before therapy, the assistance was not therapy, but was conducted by the SDC (i.e., the marital enrichment seminars), and (4) maximum assistance before therapy (i.e., couple sought help from a trained professional, but outcome was unsuccessful).

In this example, the researcher can first extract the appropriate data from the integrated data base (e.g., previous therapy or assistance received as blocking variables, their evaluation data from the marital enrichment seminars, and outcomes). Following that, the researcher would link to the statistical package, read the extracted file, and perform a one-way analysis of variance.

Example 2. While there has been much work on the effect of therapist variables (e.g., age, race, sex, physical attractiveness, therapist-client attitude similarity) on psychotherapy, little of the same research has been conducted for sex therapy. In an analog study on the effects of professional title and degree on perceived credibility of a sex therapist, Bass (1986) found that college students attributed credibility in highest to lowest order to a licensed clinical psychologist, a certified sex therapist, and a certified social worker. There was no main effect for degree (Ph.D vs. non-Ph.D.). One of the limitations of the study was that it rated male therapists only. Bass suggested that future research should: (1) include female therapists, (2) be conducted in a clinical setting, and (3) be tied to therapeutic efficacy.

With the myriad professionals from different disciplines, with different degrees, and levels of experience trained in the past, the SDC is again well positioned to conduct such research. The therapist variables, collected in the therapist subsystem, and the

outcome variables (symptom reversal and status of relationship upon termination of therapy) can be extracted from the integrated data base using the query processor, and analyzed in the statistical package. Since the STIS supplies a template for such multi-factorial designs, the researcher can simply fill in the parameters and run the program.

Example 3. Segraves and Segraves (1991) asserted that previous research has focused on the assumption that treatment should be linked to one specific phase disorder. In a multi-site study, among other things, they found that 20% of the men with an erectile dysfunction also had a desire disorder, and 89% of the women with an arousal disorder had a desire disorder. Based on their findings, they suggest that "sexual functioning may be on a continuum that is not readily divided into discrete segments" (Segraves & Segraves, 1991, p. 155). Further research should investigate the interrelationships between libido, potency, and sexual performance variables.

As reported earlier, the SDC has treated over 1,400 couples, many where one or both of the partners presented with multiple symptoms. By extracting and subsequently analyzing the primary and secondary symptoms, as well as other libido, desire, and performance variables (such as those found in the sex history, and the homework assignments), STIS data and tools can assist the investigator in conducting the research suggested by Segraves and Segraves.

Concluding Remarks

In this chapter, I concentrated on describing the initial functions of the STIS, explaining how they can increase operational efficiency and facilitate research. Regarding the facilitation of research, as I stated in the second chapter, the most important over-arching research question to ask is that posed by Paul (1967): "What treatment, by whom, is most effective for this individual with that specific problem, and under which set of circumstances?" That question still serves as the guiding beacon for future research in the SDC. The three examples I provided in this chapter merely scratch the surface of that question.

As more and more of the data are loaded into integrated data base, Paul's question will be further pursued. By the time all of the archival data are entered, there may well be over 1,500 couples whose data can be analyzed. That significant amount of data should lend itself to regression analyses and multifactorial designs which are appropriate to handle the many facets of Paul's question.

I end this chapter on a practical note. What does a system like this cost? The personal computer itself, preferably an Intel 80486-based machine with a math co-processor, a high resolution color monitor, ample primary mass storage (e.g., 500 megabytes) and removable secondary mass storage (e.g. 90 megabytes) will cost approximately $5,000. The current DOS-based software totals approximately $1,500, taking full advantage of university discounts. The next leap in system performance will be two years from now, when software products using a graphical user interface (e.g.,

Windows or OS/2 WorkPlace Shell), running under their respective 32-bit operating systems, on more powerful computers, become the norm. Using the evolutionary development approach, the STIS will likely take advantage of these capabilities as they mature.

References

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APPENDIX A

SEX THERAPY INFORMATION SYSTEM (STIS)

MENU STRUCTURE AND LIST OF FUNCTIONS

BY RELEASE

STIS FUNCTIONS	Rel 1.0	Rel 1.1	Rel 1.2	Rel 1.3
1.0 CLINICAL SUBSYSTEM	X			
1.1 Intake – Referrals		X		
1.1.1 Enter, Modify, Browse Intake Data		X		
1.1.2 Assign Disposition to Couples (Therapy, Waiting List, Hold, Refer)			X	
1.1.3 Assign Couples to Therapist Teams			X	

STIS FUNCTIONS	Rel 1.0	Rel 1.1	Rel 1.2	Rel 1.3
1.1.4 Print Reports/Documents		X		
1.1.4.1 Intake List		X		
1.1.4.2 Couple's Intake Data			X	
1.1.4.3 Waiting List			X	
1.1.4.4 Acceptance/Confirmation Letters			X	
1.1.4.5 Hold Letters			X	
1.1.4.6 Referral Letters			X	
1.1.4.7 Referral History			X	
1.1.4.8 Mailing Labels			X	
1.2 Therapy	X			
1.2.1 Enter, Modify, Browse Therapy Data	X			
1.2.1.1 Sex History	X			
1.2.1.2 Physiological Examination Data			X	
1.2.1.3 Homework Sheets	X			
1.2.1.4 Fantastic Voyage Sheets			X	
1.2.1.5 Flowsheets			X	
1.2.1.5.1 Extra-marital Affairs			X	
1.2.1.5.2 Incest			X	
1.2.1.5.3 Erectile Dysfunction			X	
1.2.1.5.4 Inhibited Sexual Desire			X	
1.2.1.6 Adapted Hamilton Scale			X	
1.2.1.7 Emotional Needs Scale		X		
1.2.1.8 Marital Adjustment Criss-Cross Test			X	

STIS FUNCTIONS	Rel 1.0	Rel 1.1	Rel 1.2	Rel 1.3
1.2.1.9 My Body Image Inventory			X	
1.2.1.10 Renshaw Sexual Dysfunction Questionnaire			X	
1.2.1.11 MMPI			X	
1.2.1.12 Patient Evaluation Form I	X			
1.2.1.13 Patient Evaluation Form II	X			
1.2.2 Score Clinical Measures			X	
1.2.2.1 Homework Sheets			X	
1.2.2.2 Flowsheets			X	
1.2.2.2.1 Extra–marital Affairs			X	
1.2.2.2.2 Incest			X	
1.2.2.2.3 Erectile Dsyfunction			X	
1.2.2.2.4 Inhibited Sexual Desire			X	
1.2.2.3 Adapted Hamilton Scale			X	
1.2.2.4 Emotional Needs Scale			X	
1.2.2.5 Marital Adjustment Criss–Cross Test			X	
1.2.2.6 My Body Image Inventory			X	
1.2.2.7 Renshaw Sexual Dsyfunction Questionnaire			X	
1.2.2.8 MMPI			X	
1.2.2.9 Patient Evaluation I			X	
1.2.2.10 Patient Evaluation II			X	
1.2.3 Print Reports/Documents	X			
1.2.3.1 Patient List by Last Name	X			
1.2.3.2 Patient List by Rotation by Last Name	X			

STIS FUNCTIONS	Rel 1.0	Rel 1.1	Rel 1.2	Rel 1.3
1.2.3.3 Patient List by Dysfunction	X			
1.2.3.4 Couple's Scores on Clinical Measures			X	
1.2.3.5 Dysfunction by DSM–III Codes Report			X	
1.2.3.6 Pie Chart – Percentage of Each Dysfunction	X			
1.2.3.7 Abuse Report			X	
1.3 Follow–Up		X		
1.3.1 Enter, Modify, Browse Follow–Up Data		X		
1.3.2 Print Reports/Documents			X	
1.3.2.1 Follow–Up Letter I			X	
1.3.2.2 Follow–Up Letter II			X	
1.3.2.3 Mailing Labels			X	
2.0 THERAPIST SUBSYSTEM	X			
2.1 Enter, Modify, Browse Therapist Data	X			
2.1.1 Therapist Applications		X		
2.1.2 Therapist Evaluation Forms	X			
2.2 Track Therapists' Application Materials			X	
2.3 Form Therapist Teams			X	

STIS FUNCTIONS	Rel 1.0	Rel 1.1	Rel 1.2	Rel 1.3
2.4 Print Reports/Documents			X	
2.4.1 Letters of Acceptance/Confirmation			X	
2.4.2 Hold Letters			X	
2.4.3 Mailing Labels			X	
2.4.4 Rotation Schedule			X	
2.4.5 Letters Asking Therapists to Rotate Again			X	
2.4.6 List of Patients by Therapist	X			
3.0 ACADEMIC SUBSYSTEM	X			
3.1 Write Reports/Publications		X		
3.1.1 Enter, Edit Reports/Publications		X		
3.1.2 Enter, Edit, Browse References		X		
3.1.3 Enter, Edit Boilerplates			X	
3.1.4 Print Reports/Publications		X		
3.1.4.1 Reports/Publications		X		
3.1.4.2 Reading List			X	
3.1.4.3 Publication References		X		
3.1.4.4 Boilerplates			X	

STIS FUNCTIONS			Rel 1.0	Rel 1.1	Rel 1.2	Rel 1.3
3.2	Program Evaluation		X			
3.2.1	Write Program Evaluation Report Narrative			X		
3.2.2	Generate Program Evaluation Measures			X		
3.2.3	Print Reports/Documents		X			
	3.2.3.1	Program Evaluation Report	X			
	3.2.3.2	Patient Evaluation I Report	X			
	3.2.3.3	Patient Evaluation II Report	X			
	3.2.3.4	Trainees' Evaluation of SDC Program Report	X			
	3.2.3.5	Trainees' Self Evaluation of Knowledge and Skills Report	X			
3.3	CME Programs					X
3.3.1	Identify Speakers					X
3.3.2	Enter, Edit, Print CME Programs					X
3.3.3	Enter Registrations					X
3.3.4	Print Reports/Documents					X
	3.3.4.1	Speaker Invitation Letter				X
	3.3.4.2	Speaker Confirmation Letter				X
	3.3.4.3	CME Units Report				X

STIS FUNCTIONS	Rel 1.0	Rel 1.1	Rel 1.2	Rel 1.3
3.4 Speaker/Client Guest Appearances				X
3.4.1 Identify Clients for Interviews, Workshop, Seminars				X
3.4.2 Print Reports/Documents				X
3.4.2.1 Client Invitation Letter				X
3.4.2.2 Client Confirmation Letter				X
4.0 ADMINISTRATIVE SUBSYSTEM		X		
4.1 General Correspondence		X		
4.2 Enter, Edit, Print SDC Forms			X	
4.2.1 Intake Forms			X	
4.2.1.1 Intake Sheet			X	
4.2.1.2 Acceptance/Confirmation Letter			X	
4.2.1.3 Hold Letter			X	
4.2.1.4 Referral Letter			X	
4.2.2 Therapy Forms			X	
4.2.2.1 Sex History Supervision Form			X	
4.2.2.2 Sex History Form			X	
4.2.2.3 Homework Sheets			X	
4.2.2.4 Fantastic Voyage Sheets			X	

STIS FUNCTIONS	Rel 1.0	Rel 1.1	Rel 1.2	Rel 1.3
4.2.2.5 Flowsheets			X	
4.2.2.5.1 Extra–marital Affairs			X	
4.2.2.5.2 Incest			X	
4.2.2.5.3 Erectile Dysfunction			X	
4.2.2.5.4 Inhibited Sexual Desire			X	
4.2.2.6 Adapted Hamilton Scale			X	
4.2.2.7 Emotional Needs Scale			X	
4.2.2.8 Marital Adjustment Criss–Cross Test			X	
4.2.2.9 My Body Image Inventory			X	
4.2.2.10 Renshaw Sexual Dysfunction Questionnaire			X	
4.2.2.11 Patient Evaluation Form I			X	
4.2.2.12 Patient Evaluation Form II			X	
4.2.3 Follow–Up Forms			X	
4.2.3.1 Follow–Up Letter I			X	
4.2.3.2 Follow–Up Letter II			X	
4.2.4 Therapist Forms			X	
4.2.4.1 Application			X	
4.2.4.2 Acceptance/Confirmation Letter			X	
4.2.4.3 Hold Letter			X	
4.2.4.4 Letter Asking Therapist to Rotate Again			X	
4.2.4.5 Evaluation of SDC Program			X	
4.2.4.6 Self–Evaluation of Knowledge and Skills			X	

STIS FUNCTIONS	Rel 1.0	Rel 1.1	Rel 1.2	Rel 1.3
4.2.5 CME Programs				X
4.2.5.1 Speaker Invitation Letter				X
4.2.5.2 Speaker Confirmation Letter				X
4.2.6 Speaker/Client Guest Appearances				X
4.2.6.1 Client Invitation Letter				X
4.2.6.2 Client Confirmation Letter				X
4.3 Print Reports/Documents		X		
4.3.1 SDC Annual Report		X		
4.3.2 Letter of Confirmation for Guest Appearance				X
5.0 QUERY/ANALYZE DATA	X			
5.1 Query				
5.1.1 Create/Save a Query	X			
5.1.2 Print a Query	X			
5.1.3 Delete a Query	X			
5.2 Analyze Data	X			

STIS FUNCTIONS	Rel 1.0	Rel 1.1	Rel 1.2	Rel 1.3
6.0 EXPRESS REPORTING				X
7.0 UTILITIES		X		
7.1 Import/Export Data		X		
7.1.1 Import Data into Files			X	
7.1.1.1 Create Non-STIS Data File			X	
7.1.1.2 Import Data into Non-STIS File			X	
7.1.1.3 Append Imported Data into Existing STIS File			X	
7.1.2 Export Data from STIS Files		X		
7.1.2.1 Select Data to Be Exported		X		
7.1.2.2 Select Format		X		
7.1.2.2.1 ASCII Format		X		
7.1.2.2.2 Fixed Text Format		X		
7.1.2.2.3 Lotus 1-2-3			X	
7.1.2.2.4 dBase IV Format			X	
7.2 Convert Text from Other Word Processing Programs			X	
7.3 Access External On-Line Services				X

STIS FUNCTIONS			Rel 1.0	Rel 1.1	Rel 1.2	Rel 1.3
8.0	SYSTEM ADMINISTRATION			X		
	8.1	Add, Change, Delete Users or Passwords			X	
	8.2	Backup, Restore Files		X		
		8.2.1 Make a Backup Diskette		X		
		8.2.2 Perform Incremental Backup		X		
		8.2.3 Perform Full System Backup		X		
		8.2.4 Restore Incrementally		X		
		8.2.5 Restore Full System		X		
	8.3	Archive Data, Reports, Documents		X		
	8.4	Install STIS Software				X
	8.5	Enhancements and Bugs		X		
		8.5.1 Log Enhancements		X		
		8.5.2 Log Bugs in Current Release		X		
9.0	FAST MENU					X
10.0	QUIT/RETURN TO DOS		X			

CHAPTER V

DEMONSTRATION OF POSSIBLE RESEARCH: DIFFERENCES IN OUTCOME AND FOLLOW UP STATUS BETWEEN COUPLES PRESENTING WITH SINGLE AND MULTIPLE DYSFUNCTIONS

Couples presenting with multiple dysfunctions are a fairly frequent occurrence in sex therapy. For example, Masters and Johnson (1970) identified 43.7% of the couples they treated as being bilaterally dysfunctional (i.e., each partner has a dysfunction). Common combinations include: (1) premature ejaculation with either primary or secondary anorgasmia, as well as (2) some form of erectile dysfunction with primary anorgasmia, vaginismus (Kaplan, 1974; Masters and Johnson, 1970), or inhibited sexual desire (McCarthy, 1992). In addition to the one male-one female dysfunctional dyad, other combinations of multiple disorders are possible (e.g., two male-no female dysfunctions and vice versa), and have, in fact, presented in therapy.

Although treating couples with multiple dysfunctions is common, aside from the above works and other case studies, there has not been much research reported in this area. Most of that which has been reported describes therapy and outcomes for couples

presenting with one disorder. Further, from this body of literature, one senses the agreement with Kaplan (1983) that treatment should be tied to the phase of the sexual response cycle (desire, arousal, orgasm) in which the disorder appears.

Recognizing the paucity of research on multiple dysfunctions, Segraves and Segraves (1991) conducted a study examining the frequency of single versus multiple phase psychosexual disorders. They found that 62% of the 233 male patients, and 57% of the 527 female patients, had a single diagnosis. Thus, 38% of the males, and 43% of the females, had more than one dysfunction. Of those with multiple dysfunctions, desire and arousal phase disorders as a pair had the highest frequency of all possible combinations in both males and females. There was a pattern linking arousal and orgasm disorders as a pair. However, the low frequency of orgasm disorders in their sample precluded further analysis. Lastly, 5% of the males and 17% of the females had three disorders, one in each of the desire, arousal, and orgasm phases.

The authors stated that the actual frequency of those having multiple phase disorders may have been underestimated since males with premature ejaculation were not included in the study. The data were taken from 15 sites testing an experimental drug's efficacy in treating psychosexual disorders. Though it was a pharmaceutical study done with individuals, rather than an evaluation of therapy involving couples, the implications from the Segraves and Segraves (1991) study are nonetheless important.

The authors asserted that the "significant overlap between disorders of the different phases of the sexual response cycle appears discrepant from the work of many clinicians who emphasize the treatment of specific sexual syndromes that are confined

to one phase of the cycle...Sexual functioning may be on a continuum that is not readily divided into discrete segments" (Segraves & Segraves, 1991, p. 155). In essence, Segraves and Segraves raise some important questions about the way in which sex therapy is conducted. Are single and multiple dysfunctions two different phenomena? If so, should the treatment approach for couples with multiple dysfunctions be different from that used for couples with one dysfunction?

Similar questions have been raised more than once in the history of psychotherapy, as well as sex therapy, albeit from a research standpoint. Paul (1967) asked the question very poignantly and with great exactitude: "*What* treatment, by *whom*, is most effective for *this* individual with *that* specific problem, and under *which* set of circumstances?" Later, Kiesler (1971) raised the issue once again when he discussed the "uniformity myth," in which patients are thought to be so similar that virtually the same treatment can be administered to everyone. A decade afterwards, LoPiccolo (1981) applied both of these questions in his analysis of the state of sex therapy research.

Segraves and Segraves, as well as Kiesler, Paul, and LoPiccolo before them, essentially point out that therapy should be customized to the client, perhaps more so than is done now. However, before developing an alternative treatment approach and conducting research to determine whether or not that approach is more effective for couples with multiple dysfunctions, it seems logical that the following preliminary questions ought to be answered.

- What is the frequency of single and multiple dysfunction *couples treated in sex therapy?*
- Are treatment outcomes and follow up status different for couples with a single dysfunction as opposed to couples with multiple dysfunctions when they are given the same form of therapy?
- Do couples with multiple dysfunctions have the same client attributes as couples with a single dysfunction?

The above questions were used as the basis for the current research, conducted at a sex dysfunction clinic located in a large Midwestern academic medical center. It is important to emphasize that this retrospective study should be considered preliminary at this time, primarily because: (1) sampling was not random and (2) there are some gaps in the data which preclude formal analysis in some instances. These two issues will be addressed in the Data and Method section below.

Data and Method

Clinic Background

The sex dysfunction clinic where the research took place uses a dual sex therapy format. Couples are seen for 7 weeks, one session per week, plus follow up sessions, the first of which is usually three months after therapy has been terminated. Approxi-

mately 50 contact hours are spent with a couple during the 7 week sessions, as well as the first follow up session. The program is offered four times a year, and approximately 18 to 22 couples are seen each time.

A comparable number of therapist teams treat the couples. Trainees, or a trainee paired with an experienced therapist, comprise the therapist team. Experienced therapists are usually physicians, nurses, psychologists, social workers, or ministers, while trainees are medical interns, residents, or graduate students from the allied health schools within the university. One of the cotherapists must be from the field of medicine.

Sample

The non-random sample of 534 couples represents 66% of those who were treated from 1972, the clinic's inception, to 1984. The couples in this investigation were chosen because their basic data (e.g., demographics, history, outcomes, and follow up status) previously existed as electronic files on the university's mainframe. These data were downloaded into a sex therapy information system currently being implemented at the clinic, and were thus available at the time of the study.

The long range plan is to enter the basic data for all couples—spanning the 20 years the clinic has been in operation, not just the 12 year period in this study—into the computer during the initial implementation phase of the information system, which is just beginning. Once the basic data for all couples have been entered, randomness will not be an issue since future research will be conducted using the entire population.

However, for the sample used here, randomness may be an issue because many of the analyses in this paper are based on proportions. Hence, if the remaining 34% of the couples in the 12 year period of this study represent a certain group, then the proportion for that group will be understated. It is doubtful that this is the case, but until data for the remaining 34% are analyzed, the representativeness of this sample will always be an open question.

Data

Independent variables include group type (single v. multiple dysfunctions), client demographics, sex history and other data. The dependent variables are treatment outcomes and follow up status. Psychological measures (e.g., the MMPI) and other assessment and outcome instruments (e.g., patient evaluation questionnaires) were certainly used during the 20 years of sex clinic operations. However, these measures will not be entered into the aforementioned information system until input of the above basic data has been completed. Though such measures will undoubtedly stimulate more interesting research, unfortunately, it is infeasible to conduct the current investigation without the data being available for computer processing. As existing data are entered into the information system, additional research will be conducted, updating the current study.

Treatment outcomes. One of the dependent measures, treatment outcomes is a categorical variable, where 1 = No change in the individual's dysfunctional status, 2 = Symptom improved, and 3 = Symptom reversed since the beginning of therapy. The

director of the sex clinic, who supervised all therapist teams, used clinical judgment to determine outcome status.

Follow Up Status. The other dependent measure, follow up status is likewise a categorical variable, where 1 = Regressed, 2 = Status remained the same, 3 = Status improved, and 4 = Status reversed since therapy terminated. Again, the director's clinical judgment was used to determine follow up status. In this study follow up status indicated the client's condition at the three month follow up visit.

Results

Frequency of Single v. Multiple Dysfunctions

Couples with one dysfunction. The first objective of this study was to determine the frequency of couples presenting in therapy with a single dysfunction versus multiple dysfunctions. As shown in Table 1, 93 of the 534 couples (17.4%) presented with one male-no female dysfunction, while 95 (17.8%) presented with no male-one female dysfunction. Therefore, a total of 188 couples (35.2%) presented with one dysfunction; the remaining 346 couples (64.8%) had multiple dysfunctions.

Couples with two dysfunctions. It is interesting to see the breakdown of couples with multiple dysfunctions. Clearly, bilaterally dysfunctional couples had the highest frequency (n=198, 37.1%). In fact, their frequency was even higher than that of the one male-no female and no male-one female dysfunction couples combined. In addition to

Table 1

Number of Couples With A Single Dysfunction Versus Multiple Dysfunctions

By Male-Female Dysfunction Dyad

	Number of Female Dysfunctions								Total	
	No Dysfunctions		One Dysfunction		Two Dysfunctions		Three Dysfunctions			
Number of Male Dysfunctions	N	%	N	%	N	%	N	%	N	%
No Dysfunctions	0	0%	95	17.8%	26	4.9%	4	.7%	125	23.4%
One Dysfunction	93	17.4%	198	37.1%	18	3.4%	1	.2%	310	58.1%
Two Dysfunctions	34	6.4%	49	9.2%	8	1.5%	0	0%	91	17.0%
Three Dysfunctions	0	0%	7	1.3%	1	.2%	0	0%	8	1.5%
Total	127	23.8%	349	65.4%	53	9.9%	5	.9%	534	100.0%

bilaterally dysfunctional couples, other two dysfunction combinations presented in therapy as well. These included 34 couples (6.4%) who had two male-no female dysfunctions, and 26 couples (4.9%) who had no male-two female dysfunctions. Thus, there were a total of 258 couples (48.4%) with two dysfunctions. When combined with their one dysfunction counterparts, these two groups comprised an overwhelming majority of cases seen in the sex clinic, 83.6% (48.4% two dysfunction + 35.2% one dysfunction couples).

Couples with three or more dysfunctions. The remaining 16.4% of the sample was comprised of couples with three or more dysfunctions. Of interest here is the fact that there were more couples with no male-three female dysfunctions (n=4) than three male-no female dysfunctions (n=0). However, the converse is true for two-one dysfunction dyads. There were many more couples with two male-one female dysfunctions (n=49) than one male-two female dysfunctions (n=18).

Similarly, of those presenting with four dysfunctions, there were more three male-one female dysfunction couples than vice versa. However, the total number of all couples in this entire group is rather small (n=16). Consequently, nothing conclusive can be stated.

Breakdown of Couples With Single and Multiple Disorders By Type of Dysfunction

Couples with one dysfunction. Table 2 displays the frequency of couples with one dysfunction by disorder. Of the 93 couples with one male-no female dysfunction, 78.5%

Table 2

Frequency of Disorders in Couples With One Dysfunction

Part A: Couples With One Male-No Female Dysfunction

Type of Male Dysfunction	N	%
Inhibited Sexual Desire	9	9.7%
Primary Erectile Dysfunction	4	4.3%
Secondary Erectile Dysfunction	69	74.2%
Premature Ejaculation	10	10.8%
Delayed Ejaculation	1	1.1%
Total	93	100.0%

Part B: Couples With No Male-One Female Dysfunction

Type of Female Dysfunction	N	%
Inhibited Sexual Desire	23	24.2%
Primary Anorgasmia	30	31.6%
Secondary Anorgasmia	34	35.8%
Dyspareunia	4	4.2%
Vaginismus	4	4.2%
Total	95	100.0%

had arousal phase disorders (74.2% + 4.3% for primary or secondary erectile dysfunctions respectively).

Of the 95 couples with one female-no male dysfunction, 24.2% had a desire phase disorder, while 67.4% had orgasm phase disorders (31.6% + 35.8% for primary and secondary anorgasmia respectively). Thus, almost 92% of the couples presented with desire or orgasm disorders, with the latter being over two and a half times the frequency of the former.

Couples with two dysfunctions. Table 3 reveals the breakdown of disorders for the 198 bilaterally dysfunctional couples. Not surprisingly, secondary anorgasmia (column total n=99, 50%) and premature ejaculation (row total n=93, 47%) were the most frequently occurring *individual* dysfunctions. Owing to the large percentages these subgroups have within the total group, it is also not surprising that the most frequent dysfunctional dyad *as a couple* is premature ejaculation and some form of anorgasmia. This dyad of male orgasm-female orgasm phase disorders comprised 37.9% of the group (26.3% for premature ejaculation and secondary anorgasmia + 11.6% for premature ejaculation and primary anorgasmia), and is consistent with findings others have reported (Kaplan, 1974, Masters and Johnson, 1970).

The next most frequent disorder dyad was couples with secondary erectile dysfunction and again either primary or secondary anorgasmia. This pair of male arousal-female orgasm phase disorders constituted 20.2% of the 198 couples (14.1% secondary erectile dysfunction and secondary anorgasmia + 6.1% secondary erectile

Table 3

Frequency Breakdown of Bilaterally Dysfunctional Couples

	Female's Dysfunction								Total	
	Inhibited Sexual Desire		Primary Anorgasmia		Secondary Anorgasmia		Other[1]			
Male's Dysfunction	N	%	N	%	N	%	N	%	N	%
Inhibited Sexual Desire	7	3.5%	7	3.5%	15	7.6%	5	2.5%	34	17.2%
Primary Erectile Dysfunction	1	.5%	5	2.5%	4	2.0%	2	1.0%	12	6.1%
Secondary Erectile Dysfunction	18	9.1%	12	6.1%	28	14.1%	1	.5%	59	29.8%
Premature Ejaculation	14	7.1%	23	11.6%	52	26.3%	4	2.0%	93	47.0%
Total	40	20.2%	47	23.7%	99	50.0%	12	6.0%	198	100.0%

[1] Includes dyspareunia and vaginismus

dysfunction and primary anorgasmia). The above phase disorder combinations, as well as all others discussed below, are summarized in Table 4.

Similar to couples with one symptom, the women in bilaterally dysfunctional couples showed a preponderance of orgasm and desire disorders, making up 93.9% of all female dysfunctions in this group (50% + 23.7% + 20.2% column totals for the female orgasmic and desire disorders respectively). However, the same trend did not hold for the men in bilaterally dysfunctional couples. While arousal disorders (erectile dysfunctions) were predominant in couples with one male dysfunction, in bilaterally dysfunctional couples the frequencies for male disorders tended to concentrate in the arousal and orgasm phases, yielding 82.9% of the dysfunctions in the group (6.1% + 29.8% + 47% row totals for the arousal and orgasm dysfunctions respectively). Further, with the substantial percentage of males presenting with inhibited sexual desire (17.1%), one could almost say that males in this group were spread out among all three phases.

Since the other combinations of two dysfunctions (two male-no female, no male-two female)—and for that matter, all the other combinations—have far fewer frequencies, presenting them in table form as above would be inefficient. Instead, I will describe the pertinent findings for these dyads. Of the 34 couples with two male-no female dysfunctions, 24 (70.6%) had premature ejaculation and secondary erectile dysfunctions, an orgasm-arousal dyad. Of the 26 couples with no male-two female dysfunctions, half had an orgasm disorder coupled with inhibited sexual desire.

Table 4

Pattern of Phase Disorders for Two Units of Comparison:

As Individuals and As Couples

Combination		Unit of Comparison			
Number of Dysfunctions in the:		As a Couple		As Individuals	
Male	Female	Male	Female	Male	Female
1	0	Arousal		Arousal	
0	1		Orgasm-Desire		Orgasm-Desire
1	1	Orgasm	Orgasm	Arousal-Orgasm	Orgasm-Desire
		Arousal	Orgasm		
2	0	Arousal-Orgasm		Arousal-Orgasm	
0	2		Orgasm-Desire		Orgasm-Desire
2	1	Orgasm	Orgasm	Orgasm	Orgasm-Desire
		Orgasm	Desire		

Couples with three or more dysfunctions. Of the possible combinations of couples with three or more dysfunctions, only the two male-one female subgroup had sufficient frequencies to warrant further analysis. The pattern for the 49 couples in this subgroup was very similar to bilaterally dysfunctional couples. Most of the women had secondary anorgasmia (n=28, 57.1%). The second most frequent female dysfunction was inhibited sexual desire (n=11, 22.4%), thus creating an orgasm-desire dyad for the women. Most of the men had premature ejaculation (n=33, 67.3%).

Within couples, husbands having premature ejaculation and secondary erectile dysfunction, with wives having secondary anorgasmia (n=18, 36.7), was the most frequently occurring combination, creating a male orgasm-female orgasm dyad. Next in line were premature ejaculation and secondary erectile dysfunction in the males coupled with inhibited sexual desire in the females (n=9, 18.4%), yielding a male orgasm-female desire dysfunctional dyad. Secondary erectile dysfunction plus inhibited sexual desire in the males, and secondary anorgasmia in the females (n=8, 16.3%) was the third most frequently occurring combination. All totaled, these three combinations constituted 71.4% of the two male-one female dysfunction group.

Differences in Outcomes and Follow Up Status Between Single and Multiple Dysfunction Couples

The second objective of this study was to determine whether or not the outcomes and follow up status of single and multiple dysfunction couples are different when given virtually the same form of treatment, in this case the dual sex therapy format.

Outcomes. To determine whether or not outcomes were different, two 3x2 chi-square tests of significance (3 levels of outcome x 2 groups, single v. multiple) were performed, one each for male and female outcomes. To form the single dysfunction group, both the one male-no female and no male-one female dysfunction groups were combined. Similarly, all the remaining groups (i.e., the bilaterally dysfunctional, the two male-no female, no male-two female, and so on) were collapsed to form the multiple dysfunction group. Analysis of the results revealed that the two groups (single v. multiple dysfunction couples) were not independent on both male outcomes ($\chi^2 = 2.199$, $df = 2$, $p > .3329$) and female outcomes ($\chi^2 = .45664$, $df = 2$, $p > .7959$).

Follow Up Status. To determine differences in follow up status, two 4x2 chi-square tests of significance (4 levels of follow up status x 2 groups, single v. multiple) were performed. Again, the two groups were not independent on both male follow up status ($\chi^2 = 6.1781$ $df = 3$, $p > .0792$) and female follow up status ($\chi^2 = 4.1926$, $df = 3$, $p > .2414$).

It should be noted as well that, although virtually every couple is seen for a three month follow up visit, the number of couples for whom follow up status was recorded was low. There were 106 couples that had a recorded male follow up status, and 103 couples for female follow up status. As a result, there were 4 cells (50%) and 3 cells (37.5%) respectively in the chi-square analysis for male and female follow up status with frequencies of less than 5. Consequently, these analyses are somewhat suspect.

The low number of couples with recorded follow up status will be rectified as the clinic implements the sex therapy information system. When all of the basic data for the

couples have been entered, there will probably not be any cells with frequencies less than 5. Therefore, the statistical tests will be more meaningful.

Differences in Client Attributes Between Single and Multiple Dysfunction Couples

The third objective of this study was to determine the differences in client attributes between single and multiple dysfunction couples, reasoning that these differences might affect outcome and follow up status. Over 40 demographic, sex history and other data were compared. The demographic data included age, race, religion, level of religious practice (practicing v. non-practicing), occupational type (e.g., professional, clerical, sales), occupational status (employed, unemployed, homemaker, retired), and educational level. Sex history and other variables included: (1) number of years married, (2) number of previous marriages, (3) whether or not the couple or one of the marital partners had been in previous therapy, (4) whether or not any medication was being taken, (5) number of cigarettes and alcoholic drinks consumed, (6) whether or not one or both of the partners had a homosexual experience, been a victim of abuse, or had an affair, (6) motivation for therapy, and (7) what each partner considered the main problem to be in the relationship.

Multiple regression analyses using the above independent variables to predict outcome and follow up status would have been ideal, and, in fact were originally planned. Unfortunately, the amount of missing data precluded such analyses. In their place, a number of chi-square and one-way analysis of variance tests were performed. It must be emphasized that these analyses were conducted purely for exploratory purposes

since: (1) the number of couples across the analyses was rather uneven (e.g., the *n* for one test might have been 69, while for another it was 534), and (2) with the number of tests performed, a significant result might be due to chance (from capitalizing on the experiment-wise error rate).

Of all of the tests performed, only one was significant. The first compared the female partner's perception of the main problem in the relationship between the single and multiple dysfunction couples. The variable, main problem in the relationship, was categorical with 1 = No problem, 2 = Sex, 3 = The relationship, 4 = Sex and the relationship, and 5 = Other. The 5x2 chi-square test of significance (5 levels of main problem x 2 groups, single v. multiple) revealed that the two groups were independent on this variable ($\chi^2 = 16.582$, $df = 5$, $p < .05$).

Interestingly, in breaking down the cell comparisons, 45% of the females in couples with one dysfunction thought that sex was the main problem, compared to 62% in couples with multiple dysfunctions. There were no substantial differences between women in the two groups on any of the other levels of the variable (e.g., the relationship, sex and the relationship). As for the men, there was no significant difference in their perception of the main problem of the relationship.

Discussion

Even though the sample was not random, one simple but strong conclusion can be drawn from the present study: Couples with multiple dysfunctions present in sex therapy in fair numbers. In this study, a high proportion—almost two-thirds—have multiple dysfunctions. While there are many more couples treated at the clinic whose number of diagnoses must be determined (i.e., the remaining 34% of the 12 year period in this study, plus the couples from the last 8 years), which might reduce the proportion of couples with multiple dysfunctions, it is undeniable that there is more than adequate representation of these couples.

Establishing their proportions is only a preliminary step to the next, and more important, question: Are single and multiple dysfunctions two different phenomena? Judging from the phase disorders exhibited by couples with a single dysfunction versus multiple dysfunctions (Table 4), there does not appear to be a discernible pattern by this independent variable. Rather, the pattern appears to be by sex. Males across the dysfunctional dyads seem to have arousal or arousal-orgasm disorders, while females have orgasm-desire disorders. Thus, no matter how many disorders couples had, by and large males and females as individuals presented with the same pattern.

The pattern changes only slightly when the couple is used as the unit of comparison. Obviously, with one-none and two-none combinations the same pattern exists. For example, in the one male-no female group, the male's arousal phase disorder as an individual is the same for the couple. It is in bilaterally dysfunctional couples, as

well as those with two male-one female dysfunctions, where the individual pattern of disorders changes for the couple. For instance, in bilaterally dysfunctional couples, the heavy concentration of female orgasm disorders in that group's individual orgasm-desire dyad, paired with the male's individual arousal-orgasm disorders, produced a pattern of orgasm-orgasm phase disorders for the couple.

In short, it appears as though in treating couples where males presented with the only dysfunctions (i.e., the one male-no female and two male-no female dysfunction groups), the pattern is arousal or arousal-orgasm phase disorders. In treating couples where females presented with the only dysfunctions (i.e., the no male-one female and no male-two female dysfunction groups), the pattern is orgasm-desire phase disorders. For couples where both partners presented with at least one dysfunction (i.e., the one male-one female and two male-one female dysfunction groups), the pattern is orgasm-orgasm disorders. Therefore, with three different groups, there were three different patterns.

Based on these patterns, single and multiple dysfunctions do not appear to be two different phenomena. However, it is important to note that this conclusion is based on the simple analysis of only one dimension—the pattern of phase disorders. As Paul (1967) and Kiesler (1971) suggested, there are many other facets that need to be explored before anything conclusive can be stated.

Client attribute and clinical variables may be two of those dimensions. In this study, there was an attempt to test some client attribute variables. The subsequent analysis further supported the notion that, characteristically, couples with a single dysfunction versus multiple dysfunctions were not significantly different from each other.

The only significant difference was in females' perception of the main problem of the relationship. Other variables long thought to be important in the way they influence treatment outcomes (e.g., motivation) were not significant.

Therefore, since the pattern of phase disorders was essentially the same by sex, and client attributes were virtually identical for the two groups, it is not surprising that there were no significant differences in treatment outcome and follow up status for couples with a single dysfunction versus multiple dysfunctions.

Limitations. Except for the first one, these conclusions must be considered with some caution. The sample was not randomly selected; if included, the remaining couples who were treated at the sex clinic may possibly skew the group's proportions in an unknown manner. However, since there was no systematic method to exclude those who were not part of the study, it is doubtful that there is an extreme bias in the current sample.

Perhaps more damaging was the fact that a variety of clinical variables were not included in this study. Detailed sex history, physical, and psychological data (e.g., personality traits, emotional needs, body image, marital intimacy), if included, may yield traits that are different between couples with a single diagnosis versus multiple diagnoses.

It has been mentioned a few times in this paper that efforts are underway to analyze the data from all couples who have been treated at the clinic since its inception. (In addition to being worthwhile in its own right, there are other benefits of having the data available. For a discussion on this point, see the fourth chapter). However, even with all of the couples seen in the last 20 years, it is important to recognize that this

sample might still not reflect the population. The couples who contact the sex clinic might be attracted to it for reasons different from those who seek out other practices. Consequently, couples treated elsewhere may exhibit different phase disorder patterns and different client attributes.

If independent studies conducted elsewhere do indeed show that there are differences between couples with a single disorder versus multiple disorders on these and other dimensions, then there will be mounting evidence that these are two different phenomena. Until then, this preliminary study suggests that couples with one dysfunction versus multiple dysfunctions do not present in therapy cases vastly diverse enough to warrant different treatment approaches. Methods for customizing the current treatment approach appear suitable.

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VITA

The author, Donald T. Mon, was born in Monessen, PA.

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TOWARDS A COMPREHENSIVE AND INTEGRATED SEX THERAPY INFORMATION SYSTEM

Sex therapy is an information-intensive process. Integrating the information processing needs of therapy, research, and practice management is a formidable task, but one in which information systems and technology (IST) can greatly help. In this dissertation, I define a concept of a comprehensive and integrated system, and review how IST have been applied in psychotherapy. By expanding on the functions used in psychotherapy programs, the potential for developing a comprehensive and integrated Sex Therapy Information System (STIS) is high.

I also describe factors influencing the development of a STIS—including the rapid rate of change in IST, as well as a STIS' cost and acceptance. I then describe how STIS functions might: orient clients to the practice using computer-assisted instruction (CAI), take sex histories via expert systems, make it easier for clients to interact with automated testing using pen-based computers and voice recognition, assist the clinician with decision making using expert systems, provide patient education and post-therapy maintenance with multimedia technology and CAI, obtain descriptive and inferential statistics through

a query processor, and expedite insurance claims processing and payments through electronic data interchange. Examples demonstrating how technology can add value to the clinician's services are provided, focusing on improving the quality of therapy and increasing operational efficiency.

I next describe how a STIS collects data at their points of origin, allowing the data to be available for all downstream functions, and thereby achieve some measure of integration.

To demonstrate it capabilities, research was conducted using data contained in a STIS. The purpose of the study was to: (1) determine the frequency of single and multiple phase disorders in couples seen in sex therapy, (2) determine whether their treatment outcomes and follow up status are different, and (3) identify whether there were any differences in client attributes between the two groups. Almost two-thirds of the 534 couples in this sample had multiple phase disorders. There were no significant differences in treatment outcome, follow up status, and client attributes between the two groups. Thus, single and multiple phase disorders do not appear to be different in nature.

APPROVAL SHEET

The dissertation submitted by Donald T. Mon has been read and approved by the following committee:

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The final copies have been examined by the director of the dissertation and the signature which appears below verifies the fact that any necessary changes have been incorporated and that the dissertation is now given final approval by the Committee with reference to content and form.

The dissertation is therefore accepted in partial fulfillment of the requirements for the degree of Doctor of Philosophy.

November 16, 1992
Date

Director's Signature